

The Twin Deficits Phenomenon: Evidence from Italy

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Using time series techniques, this study explores the relationship between trade deficits and budget deficits in Italy in the period 1970-2010. Empirical findings show that current account balance and government budget are $I(1)$ processes. Cointegration tests reject the presence of a long-run relationship between these variables. Finally, Granger-causality tests show a unidirectional flow from trade deficits to budget deficits, in line with Neo-classical view.

I. Introduction

The current account in Italy was last reported at -3.3 percent of GDP. From 1980 until 2010, Italy's average current account as percent of GDP was -0.88 percent, reaching an historical high of 3.20 percent in December of 1996, and a record low of -3.70 percent in December of 1981. Usually, when Italy records a strong current account, its GDP expands boosted by exports revenues. Moreover, Italian trade is dominated by automobiles and machinery.

The challenge for Italy is not related to the fiscal deficit; in fact, in every year since 1991, Italy has run a cyclically adjusted primary balance, but it is the weight of the accumulated debt burden and low growth. The country's trend growth rate has been falling for decades, and during the first decade of the present century, it only managed to grow at an average rate of about 0.6% per annum.

The twin deficits hypothesis (TDH hereafter) are said to exist if the government budget deficit, through its effect on national saving and con-

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sumption, leads to a current account deficit. In a Mundell-Fleming framework, it is argued that an increase in budget deficit would induce upward pressure on interest rates, causing capital inflows and appreciation of exchange rates. Hence, an increase in current account deficit emerges. On the contrary, the Ricardian Equivalence Hypothesis (REH hereafter) states that shifts between taxes and budget deficits do not matter for the real interest rate, the quantity of investment, or the current account balance, negating any link between the two deficits (Magazzino, 2012).

Moreover, few studies have been devoted to the analysis of TDH for Italy (Bernheim, 1987; Kearney and Monadjemi, 1990; Blecker, 1992; Kouassi *et al.*, 2004; Bartolini and Lahiri, 2006; Salvatore, 2006; Boileau and Normandin, 2008; Bagnai, 2010; Bluedorn and Leigh, 2011; Magazzino, 2012).

The remainder of our article is organized as follows: in Section II the theoretical backgrounds and empirical evidences about these alternative theories are discussed. In Section III several issues relating to methodology, data and estimation results are shown. Finally, Section IV draws conclusions.

II. Causality Between Trade Balance and Government Budget in Time Series Studies

The TDH is based on the Keynesian proposition within a Mundell-Fleming framework (Keynes, 1936; Mundell, 1968; Fleming, 1962). It asserts that the government deficits resulting from excess or increased government expenditures reduce current account or trade surpluses, and vice versa. One of the policy implications of the conventional view is the desirability of raising taxes in order to reduce budget deficits, which in turn will reduce trade deficits. Persistent large trade deficits are troublesome due to the associated transfer of wealth to foreigners and the burden that this imposes on future generations (Anoruo and Ramchander, 1998). Questions pertaining to the impact of fiscal deficits on trade deficits have been empirically addressed in two ways. First, researchers have provided indirect and supplemental evidence about the twin deficit relationship by attempting to establish the impact of fiscal deficits on interest rates, exchange rates, and other proximate determi-

nants of the trade deficit (Batten and Belongia, 1984; Evans, 1985, 1986). Second, researchers have examined the relationship by providing direct empirical evidence based on regression analysis (Milne, 1977; Summers, 1986; Miller and Russek, 1989).

The REH, in contrast, states that a tax increase would contract budget deficits but would not alter trade or current account deficits. In his articulation of the “equivalence theory”, classical economist, Ricardo (1817) suggests that government budget deficits should not alter capital formation and economic growth or the level of aggregate demand including demand for imports due to the fact far-sighted individuals fully capitalize the implied future taxes associated with budget deficits. Thus, fiscal measures designed to influence aggregate demand will prove fruitless as individuals reduce consumption in anticipation of future tax liabilities.

As clarified in Kim and Kim (2006), four possible causation linkages may be present between budget deficits and current account imbalances:

1. the TD Keynesian (or conventional) view, based on Mundell (1968) and Fleming (1962) model, with a chronic budget deficit that generates a trade deficit;
2. the Neo-classical view, if, in contrast to the previous case, chronic and excessive current account deficits may lead to budget deficits, in order to strengthen the recovery;
3. the Ricardian (or neutrality) view, which assume the absence of any causal relationship between trade deficits and budget deficits;
4. and, finally, the bi-directional hypothesis, according to which, while budget deficits may cause current account deficits, the existence of significant feedback may cause causality between the two variables to run in both directions.

Table 1 sums up the principal findings of recent empirical literature on the relationship between current account imbalance and fiscal deficit.

Table 1. Causality between trade balance and fiscal deficit in time series studies

Author(s)	Time period	Countries and Causality
Baharumshah, Lau (2009)	1980-2006	GB
Hakro (2009)	1948-2005	Pakistan: GB→TB
Islam (1998)	1973-1991	Brazil: GB↔TB
Khalid, Guan (1999)	1950-1994	Egypt, France, Mexico, U.S.A.: GB→TB Indonesia, Pakistan: TB→GB Canada, India: GB↔TB Australia, U.K.: Neutrality
Kim, Kim (2006)	1970-2003	South Korea: TB→GB
Marashdeh, Saleh (2006)	1970-2004	Lebanon: TB→GB
Mukhtar <i>et al.</i> (2007)	1975-2005	Pakistan: GB↔TB
Onafowora, Owoye (2006)	1970-2001	Nigeria: TB→GB
Parikh, Rao (2006)	1970-2000	India: GB→TB
Pattichis (2004)	1982-1997	Lebanon: GB→TB
Ratha (2010)	1998-2009	India: GB→TB
Saleh <i>et al.</i> (2005)	1970-2003	Sri Lanka: GB→TB
Siddiqi (2010)	1974-2001	Bangladesh: GB→TB
Vamvoukas (1999)	1948-1994	Greece: GB→TB

Sources: our elaborations.

As we can notice, the results are mixed, depending on the country observed or the time span used.

III. Estimation Procedure, Data, Empirical Model and Results

In this research, we employ time series econometric analyses. Most of time series have unit root as many studies indicated, including Nelson and Plosser (1982). The presence of a unit root in any time series means that the mean and variance are not independent of time. Conventional regression techniques based on nonstationary time series produce spuri-

ous regression and statistics may simply indicate only correlated trends rather than a true relationship (Granger and Newbold, 1974).

In order to study the stationarity properties of the series, we ran several tests: ADF (Dickey and Fuller, 1979), PP (Phillips and Perron, 1988), DF-GLS (Elliott *et al.*, 1996), and KPSS (Kwiatkowski *et al.*, 1992). We apply four different unit root tests to check the robustness of results.

Then we examine the unit root (or stationarity) properties of the variables, accounting for structural breaks. The present paper employs two different kinds of tests: ZA (Zivot and Andrews, 1992) and CMR (Clemente *et al.*, 1998) have developed a procedure allowing for a gradual shift in the mean to test more than one break point.

Furthermore, the nonstationary series with the same order of integration may be cointegrated if we could detect some linear combinations of the series, which can be tested for stationarity. As regards cointegration, the JJ (Johansen, 1988; Johansen and Juselius, 1990) and EG procedure (Engle and Granger, 1987) have been carried out.

Granger causality implies causality in the prediction (forecast) sense rather than in a structural sense. It starts with the premise that '*the future cannot cause the past*'; if event A occurs after event B, then A cannot cause B (Granger, 1969).

Therefore, in order to test whether trade balance Granger causes government budget the following bivariate equation is estimated:

$$\Delta TB_t = \alpha_0 + \sum_{i=1}^m \beta_i \Delta TB_{t-i} + \sum_{j=1}^n \lambda_j \Delta GB_{t-j} + v_t \quad (1)$$

where TB_t is the trade balance; GB_t the government budget; and Δ is the first difference operator.

The presence of Granger-causality depends on the significance of the $\Delta e_{t,j}$ terms in eq. (1); public spending causes GDP if the current value of Δy is predicted better by including the past values of Δe than by not doing so.

Further, Toda and Yamamoto (1995) test may suffer from size distortion and low power especially for small samples (Giles, 1997; Mavrotas and Kelly, 2001).

We study the relationship between trade balance, *TB*, and government budget, *GB*, covering four decades (1970-2010); to this extent, we derived yearly data for the current account balance (as a share of GDP) from World Bank database, and for the net borrowing of general government (as a share of GDP) from AMECO database.

As a preliminary analysis, some descriptive statistics are presented in the following Table 2.

Table 2. Descriptive statistics

Variable	Mean	Median	Standard Deviation	Skewness	Kurtosis	Range
TB	-0.5574	-0.7686	1.7943	0.1283	2.2722	7.4793
GB	-7.0243	-6.9662	3.9175	0.0637	1.3722	11.5208

Sources: WB and AMECO databases.

The series are not correlated; in fact, the correlation coefficient is $r_{TB,GB}=0.0133$ (see Figure 1 in the *Appendix*).

Moreover, the Inter-Quartile Range shows the absence of outliers in our samples. Then, we applied time series techniques on stationarity and unit root processes, in order to check the stationarity properties.

Table 3. Results for stationarity tests

Variable	Stationarity tests				
	Deterministic component	ADF	ERS	PP	KPSS
TB	intercept	LS: -2.963 (-2.961)	LS: -2.592 (-2.329)	LS: -2.768 (-2.958)	LS: 0.212 (0.463)
GB	intercept, trend	NS: -2.542 (-3.580)	NS: -1.442 (-3.360)	NS: -2.592 (-3.580)	NS: 0.181 (0.146)
Δ GB	intercept	DS: -6.088 (-2.989)	DS: -2.627 (-2.442)	DS: -6.055 (-2.989)	DS: 0.200 (0.463)

Notes: LS: Level Stationary; NS: Non Stationary; DS: Difference Stationary. 5% Critical Values are reported in parentheses.

The results (Table 3) indicate that trade balance is a level-stationary, or $I(0)$, series, while government budget is stationary in first differences, or $I(1)$.

It has been well recognized that the ADF test is not appropriate in the case of variables that may have undergone structural changes. For this reason, we run unit root tests with structural breaks.

Table 4. Results for unit root tests with structural breaks

Variable	Break-point	k	t-stat	1% Critical Value	5% Critical Value
TB	1993	0	-3.620	-5.43	-4.80
Δ TB	1997	0	-6.565	-5.43	-4.80
GB	1997	0	-4.843	-5.57	-5.08
Δ GB	2001	0	-7.799	-5.43	-4.80

The results of the ZA unit root test (Table 4) cast doubt on stationarity of TB , since the null hypothesis of a unit root cannot be rejected in levels for both series. When these are examined in first differences, it is found that we can reject the null hypothesis at a 1% level of significance. Therefore, each of these series may be characterized as an $I(1)$ process.

Table 5. Results for additive outliers unit root tests

Variable	Optimal break-point	k	t-stat	5% Critical Value
TB	2004	0	-3.263	-3.560
Δ TB	2002	2	-3.597	-3.560
GB	1994	0	-5.089	-3.560
Δ GB	1995	1	-4.808	-3.560

Yet, from the Table 5 above, we note that the breaks detected by the CMR test roughly correspond to the effects of the euro adoption (2002-2004) for *TB*, and to the Italian efforts to join the EMU and the implementation of the “Stability and Growth Pact” (1997-2000) for *GB*, in line with findings of Magazzino (2011). Despite the structural breaks, we are unable to reject the null hypothesis of a unit root in our series; notwithstanding, performing the tests at the first differences, the variables become stationary: so, we can conclude again that trade balance and government budget are integrated of order 1.

In order to examine the long-run relationship between current account balance and budget balance, cointegration tests have been subsequently applied (Table 6). Starting with the null hypothesis of no cointegration among variables, $H_0: r_0=0$, the trace test does not reject H_0 at the 5% level of significance. The maximum-eigenvalue statistic is 10.3771, which is below the 5% critical value of 15.67. Hence, the null hypothesis of $r=0$ is not rejected. These results imply that our two series do not have a cointegrating equation. On the basis of the cointegration tests reported below, we provided evidence that the trade balance and government budget do not exhibit a compatible long-run dynamics.

Table 6. Results for cointegration tests

Johansen and Juselius procedure		
Rank = 0 Trace statistic: 13.8965 5% Critical Value: 19.96 Log-Likelihood: -88.6069	Rank = 0 Maximum-eigenvalue statistic: 10.3771 5% Critical Value: 15.67 Log-Likelihood: -88.6069	Rank = 0 SBIC: 6.5753 HQIC: 6.4458 AIC: 6.3867
Rank = 1 Trace statistic: 3.5195 5% Critical Value: 9.42 Log-Likelihood: -83.4184	Rank = 1 Maximum-eigenvalue statistic: 3.51955% Critical Value: 9.24 Log-Likelihood: -83.4184	Rank = 1 SBIC: 6.6819 HQIC: 6.4228 AIC: 6.3047

In contrast to the JJ procedure, the EG residual based cointegration indicates the presence of a long-run relationship, at a 10% significance level (Table 7).

Table 7. Results for cointegration tests

Engle and Granger procedure				
N	Test-Statistic	1% Critical Value	5% Critical Value	10% Critical Value
29	-1.887 *	-2.654	-1.950	-1.602

Notes: *, **, and *** indicate that the null hypothesis of no cointegration is rejected at 10%, 5%, and 1% significance level, respectively.

Although the cointegration tests results are mixed, we leaning towards the absence of cointegration, since the JJ results are reinforced to the EG test, which rejects the existence of a long-run relationship at a 5% significance level.

Finally, we can investigate the short-run causality flow. Thus, we estimated a VAR(1) model between the stationary series, regressing trade balance on the first differences of government budget. We choose the lag lengths of the VAR model via information criteria (AIC, HQIC, SBIC), which selected an optimal lag of $k=1$. Moreover, the diagnostic tests suggest that the VAR model, on which the Granger-causality test is based, is quite well-specified. In fact, The RESET statistics reveal the

correct specification of the model. The ARCH tests suggest that the errors are homoscedastic and independent of the regressors. The BG tests evidence no significant serial correlation in the disturbances of the error term. As with the CUSUM test, movement inside the critical lines suggests parameter stability (see Figure 2 in the *Appendix*).

Table 8. Results for short-run causality tests

Equation	Excluded	X^2 -statistic	df	Prob.
ΔTB	ΔGB	0.0598	1	0.807
ΔGB	ΔTB	6.7617	1	0.009

Granger causality tests results show a unidirectional causality flow, from trade balance to fiscal deficit, giving empirical support to Neo-classical view (Forte and Magazzino, 2011).

IV. Concluding Remarks

This study has used several time series econometric techniques to analyse the linkages between current account and budget deficits in Italy, in the 1970-2010 years. It has been found that trade balance Granger-causes budget deficit, while no long-run relationship (cointegration) exists between these variables. Our results imply that correcting external imbalances, Italian government could improve public finance context, which actually represents the crucial sore point for the country. Therefore, renewed trade equilibrium should strengthen the new fiscal measures enforced by Italian policymakers in these years.

References

- Anoruo, E., Ramchander, S. (1998), Current Account and Fiscal Deficits: Evidence from Five Developing Economies of Asia, *Journal of Asian Economics*, 9, 3, 487-501.
- Bagnai, A., (2010), Twin deficits in CEEC economies: evidence from panel unit root tests, *Economics Bulletin*, 30(2), 1071-1081.
- Baharumshah, A.Z., Lau, E., (2009), Structural breaks and the twin deficits hypothesis: Evidence from East Asian countries, *Economics Bulletin*, 29, 4, 2517-2524.
- Barro, R.J., (1974), Are Government Bonds Net Wealth?, *Journal of Political Economy*, 82, 1095-1117.
- Bartolini, L., Lahiri, A., (2006), Twin Deficits, Twenty Years Later, *Current Issues in Economics and Finance*, 12, 7, 1-7.
- Bernheim, B.D., (1987), Ricardian Equivalence: An Evaluation of Theory and Evidence, in S. Fischer (ed.), *NBER Macroeconomics Annual 1987*, The MIT Press: Chicago.
- Batten, D.S., Belongia, M.T., (1984), The Recent Decline in Agricultural Exports: Is the Exchange Rate the Culprit?, *Federal Reserve Bank of St. Louis Review*, October, 5-14.
- Blecker, R.A., (1992), *Beyond the Twin Deficits*, New York: Economic Policy Institute.
- Bluedorn, J.C., Leigh, D., (2011), Revisiting the Twin Deficits Hypothesis: The Effect of Fiscal Consolidation on the Current Account, *IMF Economic Review*, 59, 4, 582-602.
- Boileau, M., Normandin, M., (2008), Do Tax Cuts Generate Twin Deficits? A Multi-Country Analysis, *CIRPEE Working Paper*, 08-32.
- Clemente, J., Montanes, A., Reyes, M., (1998), Testing for a unit root in variables with a double change in the mean, *Economics Letters*, 59, 175-182.

Dickey, D.A., Fuller, W.A., (1979), Distribution of the estimators for autoregressive time series with a unit root, *Journal of the American Statistical Association*, 74, 427-431.

Elliott, G., Rothenberg, T.J., Stock, J.H., (1996), Efficient tests for an autoregressive unit root, *Econometrica*, 64, 813-836.

Engle, R.E., Granger, C.W.J., (1987), Co-integration and error correction: Representation, estimation and testing, *Econometrica*, 55, 251-276.

Evans, P., (1985), Do Large Deficits Produce High Interest Rates?, *American Economic Review*, March, 68-87.

Evans, P., (1986), Is the Dollar High because of Large Budget Deficits?, *Journal of Monetary Economics*, November, 227-249.

Fleming, J.M., (1962), Domestic Financial Policies under Fixed and under Floating Exchange Rates, *International Monetary Fund Staff Papers*, 9, 369-379.

Forte, F., Magazzino, C., (2011), Optimal Size Government and Economic Growth in EU Countries, *Journal of Analytical and Institutional Economics*, XXVIII, 3, 295-321.

Giles, D.E.A., (1997), Causality between the measured and underground economies in New Zealand, *Applied Economics Letters*, 4, 63-67.

Granger, C.W.J., (1969), Investigating causal relations by econometric models and cross-spectral methods, *Econometrica*, 37, 424-438.

Granger, C.W.J., Newbold, P., (1974), Spurious Regressions in Econometrics, *Journal of Econometrics*, 2, 111-120.

Hakro, A.N., (2009), Twin Deficits Causality Link-Evidence from Pakistan, *International Research Journal of Finance and Economics*, 24, 54-70.

Islam, M.F., (1998), Brazil's Twin Deficits: An Empirical Examination, *Atlantic Economic Journal*, 26, 2, 121-128.

Johansen, S., (1988), Statistical analysis of cointegrating vector, *Journal of Economic Dynamics and Control*, 12(2-3), 231-255.

Johansen, S., Juselius, K., (1990), Maximum likelihood estimation and inference on cointegration with applications to the demand for money, *Oxford Bulletin of Economics and Statistics*, 52(2), 169-210.

Kearney, C., Monadjemi, M., (1990), Fiscal policy and current account performance: International evidence on the twin deficits, *Journal of Macroeconomics*, 12, 2, 197-219.

Keynes, J.M., (1936), *The General Theory of Interest, Employment and Money*, London: Macmillan.

Khalid, A.M., Guan, T.W., (1999), Causality tests of budget and current account deficits: Cross-country comparisons, *Empirical Economics*, 24, 389-402.

Kim, C.-H., Kim, D., (2006), Does Korea have twin deficits?, *Applied Economics Letters*, 13, 10, 675-680.

Kouassi, E., Mougoué, M., Kymn, K.O., (2004), Causality tests of the relationship between the twin deficits, *Empirical Economics*, 29, 503-525.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., Shin, Y., (1992), Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?, *Journal of Econometrics*, 54, 159-178.

Magazzino, C., (2011), Disaggregated Public Spending, GDP and Money Supply: Evidence for Italy, *European Journal of Economics, Finance and Administrative Sciences*, 41, 118-131.

Magazzino, C., (2012), Fiscal Policy, Consumption and Current Account in the European Countries, *Economics Bulletin*, 32, 2, 1330-1344.

Marashdeh, H., Saleh, A.S., (2006), Revisiting Budget and Trade Deficits in Lebanon: A Critique, *University of Wollongong, Faculty of Commerce - Economics Working Papers*, 06-07.

Mavrotas, G., Kelly, R., (2001), Old Wine in New Bottles: Testing Causality between Savings and Growth, *The Manchester School*, 69, 97-105.

Miller, S.M., Russek, F.S., (1989), Are the Deficits Really Related?, *Contemporary Policy Issues*, 7(4), 91-115.

Milne, E., (1977), The Fiscal Approach to the Balance of Payments, *Economic Notes*, 89-107.

Mukhtar, T., Zakaria, M., Ahmed, M., (2007), An Empirical Investigation for the Twin Deficit Hypothesis in Pakistan, *Journal of Economic Cooperation and Development*, 28, 4, 63-80.

Mundell, R.A., (1968), *International Economics*, New York: Macmillan.

Nelson, C., Plosser, C., (1982), Trends and Random Walks in Macroeconomics Time Series: Some Evidence and Implications, *Journal of Monetary Economics*, 10, 139-162.

Onafowora, O.A., Owoye, O., (2006), An Empirical Investigation of Budget and Trade Deficits: The Case of Nigeria, *The Journal of Developing Areas*, 39, 2, 153-174.

Parikh, A., Rao, B., (2006), Do Fiscal Deficits Influence Current Accounts? A Case Study of India, *Review of Development Economics*, 10, 3, 492-505.

Pattichis, C., (2004), Budget and trade deficits in Lebanon, *Applied Economics Letters*, 11, 2, 105-108.

Phillips, P.C.B., Perron, P., (1988), Testing for a unit root in time series regression, *Biometrika*, 75, 335-346.

Ratha, A., (2010), Twin Deficits or Distant Cousins? Evidence from India, *St. Cloud State University, Economics Faculty Working Papers*, 5.

Ricardo, D., (1817), *On the Principles of Political Economy and Taxation*, London: John Murray.

Saleh, A.S., Nair, M., Agalewatte, T., (2005), The Twin Deficits Problem in Sri Lanka: An Econometric Analysis, *South Asia Economic Journal*, 6, 2, 221-239.

Salvatore, D., (2006), Twin deficits in the G-7 countries and global structural imbalances, *Journal of Policy Modeling*, 28, 6, September, 701-712.

Siddiki, J.U., (2010), The Ricardian equivalence hypothesis: evidence from Bangladesh, *Applied Economics*, 42:11, 1419-1435.

Summers, L.H., (1986), Tax Policy and International Competitiveness, *Harvard Institute of Economic Research Discussion Paper*, 1256, August.

Toda H.Y., Yamamoto T., (1995), Statistical Inference in Vector Autoregressions with Possibly Integrated Processes, *Journal of Econometrics*, 66, 225-250.

Vamvoukas, G.A., (1999), The twin deficits phenomenon: evidence from Greece, *Applied Economics*, 31, 9, 1093-1100.

Zivot, E., Andrews, D., (1992), Further evidence on the Great Crash, the oil price shock, and the unit-root hypothesis, *Journal of Business and Economic Statistics*, 10, 251-270.

Appendix

Figure 1. Trade balance and government budget in Italy

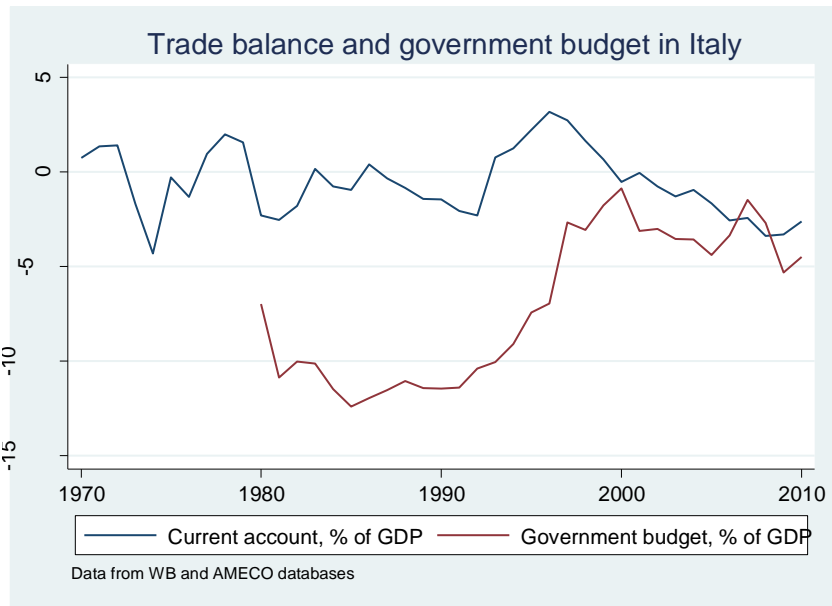


Figure 2. Cumulative sums of the recursive residuals and their squares

