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Social Conflict and Growth in Euroland.

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DISCUSSION PAPER

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This paper aims at contributing to the literature on the differences in the transmission processes within Euroland. We start from the proposition that there are 'deep' differences in the nature of social conflicts and in the way countries deal with these conflicts. We empirically test this effect for the EU-growth and introduce several proxies for social conflicts and conflict management. We then analyse (in addition to common growth variables) an EU wide shock and find that differences in the social conflict and the conflict management institutions contribute to different effects on economic growth. We conclude by presenting a model giving a theoretical foundation of the empirical results.

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1 Introduction

One of the conditions for a smooth-functioning of the European Monetary Union is that disturbances should not be asymmetric. A vast literature exists analysing to what extent shocks in Euroland will become more or less asymmetric. A consensus on this issue has as yet not emerged. Recently, economists have analysed whether and how the transmission process of the same shocks (e.g. interest rates) differs among the member states of EMU (see Dornbusch et al. (1998), Checcetti (1999) and Maclennan et al. (1999)). The consensus here is that these asymmetries in the transmission processes are significant today. They result from the fact that legal systems, cultures, and social and political structures continue to differ among countries. This then leads to different patterns of reactions to the same shocks in the labour markets, the financial markets, the housing markets, etc. The question that remains open, is whether these 'deep' differences will disappear so that one should expect convergence of these transmission processes in the future.

This paper aims at contributing to the literature on the differences in the transmission processes within Euroland. We will start from the proposition that there are 'deep' differences in the nature of social conflicts and in the way countries deal with these conflicts. We will then analyse how these differences are responsible for different patterns of transmission of the same shocks. More in particular we focus on how these different transmission processes affect economic growth performances.

The paper is structured as follows. In section 2 we survey the literature analysing how social conflicts and the management of these conflicts affect economic growth. We will use the insights of this literature in section 3 to analyse empirically how conflicts and conflict resolution in the EU-countries differ and what the implications are for the growth performances in the EU for the period 1961-95. In section 4, we present a theoretical model that focuses on how differences in tax fraud and its punishment affect growth potential when a shock occurs.

2 Conflict and Growth: a Survey of the Literature

Recently the importance of conflicts and conflict management for the process of economic growth has been recognised. An innovative study is Rodrik (1998). His basic idea is that economic growth is not only determined by the variables of classical growth models, but also by the process through which countries absorb external shocks that affect income distribution. For example, when a negative terms of trade shock occurs, this will affect the distribution of income of major groups in society. The conflict to which this leads must be managed. The way this conflict management is organised has important effects on economic growth. Schematically one can write:

$$\Delta growth = f\left(external\ shock * \frac{latent\ social\ conflict}{institutions\ of\ conflict\ management} \right)$$

with f(.) a negative function.

Thus, the way an external shock affects economic growth depends on the balance between social conflicts and the way they are resolved. For example, consider a country with a lot of latent social conflicts (due to say large income inequalities). If the institutions that manage these conflicts are weak, i. e. they are not capable of distributing the income effects in a fair manner, the external shock will have a strong negative effect on economic growth. In other countries with few social conflicts or with institutions capable of managing these conflicts effectively, the same external shock will have fewer negative consequences for economic growth. In our empirical implementation for the EU-countries we will use Rodrik's general framework giving practical content to social conflict and conflict management in the EU-countries.

A number of recent papers have analysed the influence of corruption and bureaucratic inefficiency on economic growth. Jones (1998) studies how corruption, tax rates and bureaucratic inefficiency affect investment in infrastructure and thus economic growth.

Tornell and Lane (1998) construct a growth model with two sectors, a high return formal sector and a less efficient shadow sector. In their model, taxes are perceived in the formal sector only and are exclusively used to pay transfers to powerful groups in the shadow sector. Tornell and Lane find that if there is a positive productivity shock in the formal sector, there will be less growth in the formal sector but more growth in the shadow sector, under the condition that there are powerful pressure groups and no institutional barriers to discretionary redistribution.

Shleifer and Vishny (1993) situate the problem of corruption in a principal agent framework: a corrupt official has some effective property rights over the government good he is allocating. Their paper focuses on the consequences of corruption for the resource allocation. The central question is why bribery is much more costly than its sister activity taxation. They argue that the imperative of secrecy makes bribes more distortionary than taxes. Corruption reallocates resources most of the times in an inefficient way.

Bertola (1993) presents a model focusing on the distinction between accumulated and non-accumulated factors of production and points to the conflict of interest that exists among individuals with differing sources of income. He uses an endogenous growth model and introduces the fact that private production requires the provision of public services. The higher is the factor-endowment share of the median voter above unity, the lower is the rate of growth of the economy. Or, the more unequal is the distribution of income and wealth the lower is the rate of growth.

The link between shocks, conflicts and growth has also been tested empirically. Easterly et al. (1993) for example look for an explanation of low persistence of economic growth rates. As the common explanatory variables for growth models are all more persistent than the growth rates, they analyse the effect of shocks on long run growth. They define three shock variables and find substantial explanatory power of these shock variables and justify it by factor movements, i.e. the movement from negative shock sectors to positive

shock sectors. Moreover, the shock variables influence growth also indirectly through policy changes.

Alesina et al. (1992) investigate the relationship between political instability and per capita GDP growth in a sample of 113 countries for the period 1950-82. They define political instability as the propensity of a change in the executive, either by constitutional or unconstitutional means. Their empirical results suggest that the degree of political instability negatively affects per capita GDP growth.

Alesina and Rodrik (1994) focus on how an economy's initial configuration of resources shapes the political struggle for income and wealth distribution, and how that, in turn, affects long-run growth. They use the median voter theorem, according to which the tax rate selected by the government is the one preferred by the median voter. The more equitable is the distribution in the economy, the better endowed is the median voter with capital. They find out that the lower the equilibrium level of capital taxation, the higher is the economy's growth. Distributive struggles are more likely to take place when resources are distributed unevenly. Their empirical finding is that the land GINI coefficient has a statistically significant and negative effect on long term economic growth.

3 The Empirical Model

In this section we describe the model that we will use to analyse differences in social conflicts and the institutions managing these conflicts in the EU. We will use the framework as proposed by Rodrik (1998). In addition to the traditional explanatory variables (e.g. initial income levels, saving, investment, population growth, investment in education) that have been used extensively in economic growth econometric models (see Barro and Sala-i-Martin (1995)), we add indicators of social conflict and of the management of social conflict. We specify our empirical growth model as follows:

$$GDPCGR_{it} = c + a_1 SHOCK_{it} + a_2 CONFL_{it} + a_3 MGTINST_{it} + a_4 \ln GDPY1_{it} + a_5 SAV_{it} + a_6 GFCF_{it} + a_7 POPGR_{it} + a_8 EDUEXP_i + a_9 EUM_{it} + a_{10} TRADE_{it} \quad (1.)$$

where

$$CONFL_i = \begin{cases} GINI_i \\ ELF_i \\ GOVC_{it} \\ PMC_{it} \end{cases} \quad \text{and} \quad MGTINST_{it} = \begin{cases} BUR_i \\ GVTEXP_{it} \\ TAX_{it} \end{cases}$$

GDPCGR is the GDP per capita growth, SHOCK is some exogenous shock, GINI and ELF are indices for income disparity and ethno-linguistic fragmentation, respectively; GOVC and PMC are the number of government and of prime minister changes during the period. These variables are used as proxies for social conflict. BUR is an index of bureaucratic efficiency, GVTEXP is the government consumption expenditure in percent of GDP, TAX are tax revenues in percent of GDP. We use the latter three variables as indicators of the capacity of a country to manage social conflicts. CONFL stands for the social conflict, MGTINST for the conflict management institutions.

The other explanatory variables are the traditional ones in the econometric studies of economic growth, i.e. GDPCY1 which is GDP per capita in the initial year of the period, SAV and GFCF are the rates of saving and investment (in percent of GDP), POPGR is the growth of the population, EDUEXP is the expenditure on education, EUM a dummy for the membership in the European community (union), and TRADE are imports plus exports divided by the GDP.

The specification of equation (1) measures separately the effect of the shock, the social conflict and the conflict management institutions on long term economic growth. As we want to find out whether the effect of a shock on economic growth is amplified through the conflict variables, we also run the regression with an interaction term of the shock and the conflict variables. The estimated equation is:

$$GDPCGR_{it} = c + b_1 INTERACT_{it} + b_2 \log(GDPY1_{it}) + b_3 SAV_{it} + b_4 GFCF_{it} + b_5 POPGR_{it} + b_6 EDUEXP_i + b_7 EUM_{it} + b_8 TRADE_{it} \quad (2.)$$

where INTERACT is an interaction term consisting each time of the shock, multiplied with different proxies for the underlying social conflict and for the existing conflict management institutions:

SGB=SHOCK*GINI*BUR;	SGG=SHOCK*GINI*GVTEXP;	SGT=SHOCK*GINI*TAX;
SEB=SHOCK*ELF*BUR;	SEG=SHOCK*ELF*GVTEXP;	SET=SHOCK*ELF*TAX;
SGCB=SHOCK*GOVC*BUR;	SGCG=SHOCK*GOVC*GVTEXP;	SGCT=SHOCK*GOVC*TAX;
SPMB=SHOCK*PMC*BUR;	SPMG=SHOCK*PMC*GVTEXP;	SPMT=SHOCK*PMC*TAX;

We will now first define the shock, then the underlying social conflict and the conflict management institutions and finally the traditional growth variables. Summary statistics and graphs for the shock and the conflict variables can be found in Appendix B.

3.1 The Shock

The shock we will consider in this study is a deterioration of the terms of trade. It is defined in the following way:

$$SHOCK_p = \left(\frac{M+X}{GDP} \right)_p \times \sqrt{\frac{1}{10} \sum_{y=1}^{10} \begin{cases} \left(\Delta ToT_y - \Delta ToT_p\right)^2 \; if \; \left(ToT_y - ToT_p\right) < 0 \\ 0 \; otherwise \end{cases}}$$

where M, X and GDP are imports, exports and the GDP in current prices and USD exchange rates, and ToT are the terms of trade. The subscript y indicates the year and p the period of 10 years.[1]

[1] This definition deviates from the one of Rodrik who defines his shock in the following way:

3.2 The Social Conflict

Two indices reflecting the latent social conflict are introduced into the growth model. The first one is the GINI index of income disparities. This index has been used in other economic growth studies. For example, Alesina and Rodrik (1994), use the GINI index for land distribution to find out the effect on long-run growth of political struggle for income and wealth distribution. They conclude that higher inequality leads to lower long-run growth.

The second index concerns the ethno-linguistic fragmentation within a country. It is defined as the probability that two randomly selected persons from a given country will not belong to the same ethno-linguistic group.

As we only have one data point per country for these two variables, they can only explain the difference in growth rates between countries and not the changes over time.

Two indicators varying over time have therefore also been included, i.e. the number of changes of the government (GOVC) and of the prime minister (PMC) respectively. These variables are not only a sign of political instability, they can also be interpreted as indicators of social unrest.

$$SHOCKR = \frac{M_p + X_p}{GDP_p} \sqrt{\frac{1}{10} \sum_{y=1}^{10} \left(\Delta ToT_y - \Delta ToT_p\right)^2}$$

The difference between the two definitions is that our variable only takes into account negative shocks, whereas Rodrik calculates the standard deviation of the growth in the terms of trade without differentiating between positive and negative shocks. We take the view that negative and positive shocks do not have symmetric effects.

3.3 The Conflict Management

As a proxy for conflict management, we introduce the bureaucratic inefficiency index of Mauro (1995)[2]. This variable is the average of three indices: the inefficiency of the judiciary system, red tape and corruption. The indicator lies between 0 (efficient bureaucracy) to 10 (high inefficiency) and does not vary over time (as is the case with the GINI and the index for ethno-linguistical fragmentation).

Although the consensus view is that this variable should have a negative effect on economic growth (see e.g. Rodrik (1998)), because it leads to inefficient allocations of resources, some authors have suggested that corruption (which is one component of the bureaucracy index) might raise economic growth. The reason is that bribes can be seen as the lubricant that increases the work effort of civil servants, thereby increasing the efficiency of the bureaucracy[3].

We introduce the government expenditure and tax revenues as two other proxies for the quality of conflict management[4]; they also explain variation over time and are expressed in percent of GDP.

3.4 The Traditional Growth Variables

The theory of growth states that per capita growth should tend to converge because low-income countries have a higher marginal productivity of capital than high-income countries. This idea is based on the assumption of diminishing returns to capital.

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[2] Note that in Mauro the index is reversed and defined as an efficiency index.

[3] Mauro (1995), p. 681

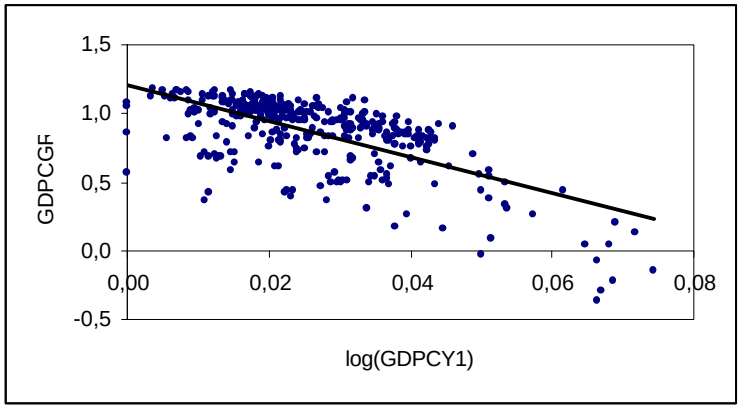
[4] There is no granger causality between GDP per capita on the one hand, and government expenditure (tax revenue) on the other.

To find some evidence on this we introduced the GDP per capita in the first year of each period (GDPY1) into our equation. Countries with a low initial GDP per capita should thus have a higher growth rate; i.e. the variable should have a negative effect on growth.

The initial GDP per capita may also be interpreted as an indicator of imitation. As imitation is cheaper than innovation, especially poorer countries choose this channel for technological advances. This should lead to conditional convergence.[5]

Graph 1 illustrates this relationship for the members of the EU. It represents the logarithm of the GDP per capita of the initial year of each period of ten years (from 1961-70 to 1986-95) on the x-axis, and the GDP per capita growth rate on the y-axes. The trend line is downwards sloping, i.e. the higher the initial level of GDP per capital, the lower the growth rate.

Graph 1 GDP per capita growth and initial GDP per capita



These variables describing the steady state are, according to neo-classical growth models, the population growth (or the growth of labour force), saving, capital, the technological progress and the labour skill. We introduce the population growth, the

[5] See Barro and Sala-i-Martin (1995)

growth of the savings rate and the growth rate of gross fixed capital formation[6] divided by GDP into our equation. The skill of the labour force is represented by the expenditure on education. As we only have one observation of this variable per country, it only explains growth differences between countries and not the change of growth over time. Barro and Sala-i-Martin (1995) introduced the years of schooling as variable for education. In our example, expenditure on education is more adequate, as tertiary schooling has less variation across EU countries than expenditure on education – unlike in the regression of Barro and Sala-i-Martin who included a larger sample of more heterogeneous countries.

We also add the openness of the countries into our equation. Levine and Renelt (1992) argue that open economies better absorb foreign technology and suffer less from credit constraints that limit investment. Therefore, we introduce trade (imports plus exports) divided by the GDP as explanatory variable.

Finally, as not all of the countries participate in the European union since the beginning of the period, we construct a dummy for EU membership. This dummy is equal to one in the years were the country is member of the EU, and zero otherwise.

4 The Empirical Results

Equation (1.) is estimated for the period 1961-95. Our observations are ten year averages so that the first observation spans 1961-1970 and the last one 1986-1995. Because of the overlapping sample, we use the Newey-West heteroscedasticity and

[6] Barro (1994) argues that the empirical finding of a significant effect of investment on growth can also be due to an inverse relationship, so that the instrument of lagged investment has to be introduced. As in his sample, lagged investments do not have a significant effect on growth, he concludes that there is inverse relationship. However, in our sample, lagged GFCF still has a significant effect on growth, so that the significance is apparently not only due to inverse causality.

autocorrelation consistent standard errors with a truncation lag of 9 years. Table 1 reports the regression results of equation (1.).[7]

[7] For those variables where we found evidence for granger causality, we ran the regression with their lagged values as instruments. As we found approximately the same results, we do not produce the results here.

Table 1: Results of Equation (1.)

C	0,014	0,049 ***	0,049 ***	0,057 ***	0,026 *	0,016	0,036 **	0,035 ***	0,026 **	0,043 **	0,038 ***	0,025 **	0,041 **
SHOCK		-0,225	-0,192	-0,429 **	-0,225	-0,220 *	-0,425 **	-0,227	-0,252 **	-0,424 **	-0,240	-0,252 **	-0,436 **
GINI		-3,E-4	-6,E-4 ***	-3,E-4									
ELF					1,E-4 **	7,E-5	9,E-5 *						
GOVC								-6,E-4	-1,E-3 **	-2,E-3 ***			
PMC											1,E-4	-1,E-3 **	-1,E-3 **
BUR		-0,005 ***			-0,005 ***			-0,006 ***			-0,006 ***		
GVTEXP			-0,001 ***			-0,001 ***			-0,001 ***			-0,001 ***	
TAX				-0,001 ***			-0,001 ***			-0,001 ***			-0,001 ***
GDPY1	-0,038 ***	-0,049 ***	-0,021 **	-0,025 ***	-0,047 ***	-0,011	-0,022 ***	-0,046 ***	-0,019 ***	-0,022 **	-0,046 ***	-0,018 ***	-0,020 *
SAV	-0,027	0,071	-0,009	-0,086 ***	0,072 *	-0,004	-0,079 ***	0,076 *	-0,021	-0,093 ***	0,088 **	0,002	-0,074 ***
GFCF	0,132 ***	0,098 ***	0,071 **	0,119 ***	0,127 ***	0,104 ***	0,137 ***	0,113 ***	0,116 ***	0,149 ***	0,095 ***	0,102 ***	0,139 ***
POPGR	-0,541 ***	-0,495 ***	-0,471 ***	-0,548 ***	-0,527 ***	-0,492 ***	-0,556 ***	-0,569 ***	-0,618 ***	-0,585 ***	-0,559 ***	-0,621 ***	-0,587 ***
EDUEXP	0,460 ***	0,246 **	0,636 ***	0,591 ***	0,330 ***	0,610 ***	0,633 ***	0,240 **	0,606 ***	0,634 ***	0,214 *	0,660 ***	0,665 ***
EUM	0,006 **	0,005 **	0,009 ***	0,008 ***	0,004 **	0,007 ***	0,007 ***	0,003 *	0,006 ***	0,006 ***	0,003	0,007 ***	0,006 ***
TRADE	-0,009 *	-0,018 ***	0,001	0,004	-0,020 ***	0,002	0,003	-0,017 ***	0,003	0,005	-0,018 ***	0,001	0,004
A-RSQ	0,60	0,69	0,66	0,59	0,70	0,64	0,49	0,68	0,73	0,56	0,68	0,73	0,54

** significant at 10%; **: significant at 5%; ***: significant at 1%;*
The adjusted R2 is lower in some regressions with conflict variables than in the regression without conflict variables, as there are missing values for the conflict variables.

The coefficient of the shock variable is negative, but not always significantly different from zero at a confidence interval of 5%[8].

We can see that for the variables of the underlying social conflict, the evidence is mixed. Except for ELF (ethno-linguistic fragmentation), the coefficients have the expected negative sign, although not always significantly so.

The positive sign of the ethno-linguistic fragmentation variable (ELF) is intriguing. One way to interpret this result is to consider that ethno-linguistic fragmentation has two effects. One is to increase conflict in society (call it the Bosnia-effect). The other is to create a dynamics for groups at the lower end of the social ladder to climb up by above average economic achievements (call it the American melting-pot effect). Our results suggest that the second effect has dominated the first one in the EU[9]

For the proxies of conflict management institutions, the results are always negative and significant even at 1%. Thus, the inability to manage conflicts (as measured by size and inefficiency of public administrations) tends to reduce economic growth.

The other more traditional explanatory variables (initial GDP per capita, investment, population growth[10], expenditure on education and the EU dummy) generally have the expected effects. The exceptions are the savings rate and the trade variable, which have insignificant effects most of the time and do not always have the expected sign.

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[8] Remember that this variable catches up only the effect of negative shocks and is always positive, so that the coefficient is negative.

[9] For a recent fascinating economic history book stressing the positive effects of ethnic and national fragmentation on economic growth see Landes, David (1998), *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor,* W. W. Norton & Company

[10] Note that the coefficient of population growth is negative. This negative sign is due to the fact that the dependent variable is *per capita* growth. The fact that the estimated coefficient of population growth in our regression is smaller than one suggests that population growth has a *positive* effect on economic growth.

Table 2 reports shows the regression results of the equation with an interaction term for the shock and the conflict variables in order to find out whether our conflict variables amplify external shocks (equation 2.)

Table 2: Results of Equation 2.

	SGB	SGG	SGT	SEB	SEG	SET	SGCB	SGCG	SGCT	SPMB	SPMG	SPMT
C	0,022 **	0,010	0,012	0,014	-3E-4	0,006	0,009	0,001	0,005	0,004	-0,002	0,003
INTERACT	-1,E-2 ***	-3,E-4 ***	-2,E-4	4,E-4	9,E-5	1,E-4	-0,088 ***	-0,003 ***	-0,003 ***	-0,051 ***	-0,002 ***	-0,002 *
GDPY1	-0,045 ***	-0,037 ***	-0,034 ***	-0,039 ***	-0,031 ***	-0,031 ***	-0,040 ***	-0,036 ***	-0,035 ***	-0,040 ***	-0,036 ***	-0,033 ***
SAV	0,028	-0,028	-0,029	-0,028	-0,009	-0,014	0,006	-0,043 **	-0,043 *	0,039	-0,017	-0,021
GFCF	0,118 ***	0,128 ***	0,129 ***	0,135 ***	0,134 ***	0,133 ***	0,155 ***	0,172 ***	0,162 ***	0,140 ***	0,157 ***	0,151 ***
POPGR	-0,383 ***	-0,371 ***	-0,538 ***	-0,546 ***	-0,439 ***	-0,588 ***	-0,449 ***	-0,471 ***	-0,503 ***	-0,432 ***	-0,492 ***	-0,528 ***
EDUEXP	0,403 ***	0,539 ***	0,442 ***	0,468 ***	0,521 ***	0,407 ***	0,400 ***	0,565 ***	0,482 ***	0,487 ***	0,584 ***	0,467 ***
EUM	0,005 ***	0,008 ***	0,006 **	0,006 **	0,006 **	0,005 **	0,004 ***	0,008 ***	0,006 ***	0,005 ***	0,008 ***	0,006 **
TRADE	-0,011 **	-0,005	-0,004	-0,009 *	-0,011 *	-0,007	-0,007 *	-0,006	-0,004	-0,012 ***	-0,007	-0,005
A-RSQ	0,70	0,47	0,49	0,60	0,43	0,49	0,71	0,63	0,45	0,68	0,62	0,43

** significant at 10%; **: significant at 5%; ***: significant at 1%*

The interaction term is significant and negative in almost all regressions except those, which contain ELF and the regression with SGT as interaction term. This seems logical, as the coefficient for ELF was positive in the previous regression, so that the whole terms becomes insignificant now. As in the regression with the separate term, the interaction term SGT is not significant.

The results for the other variables are broadly the same as for equation (1.).

5 The Growth Effect of an EU-wide Shock

The aim of this section is to analyse in how far a symmetric shock is transmitted differently because of differences in social institutions. The way we proceed is as follows. We impose the same terms of trade shock on all countries, which we take to be the average size of the shock during the sample period. The growth loss due to a deviation of the conflict variables from the EU minimum, given an EU-wide shock, can be written as:

$$\Delta GDPCGR_{it} = b_1\left(SHOCK_{EUt} \cdot CONFL_{it} \cdot MGTINST_{it} - SHOCK_{EUt} \cdot CONFL_{\min t} \cdot MGTINST_{\min t}\right)$$

with β_1 the coefficient of the interaction term in equation (2.).

The outcome, $\Delta GDPCGR_{it}$, indicates how much less growth would have taken place in this country when an EU-wide shock would have occurred, because the conflict variables were different from that of the country with the best performance within the EU. The results can be found in table 3.

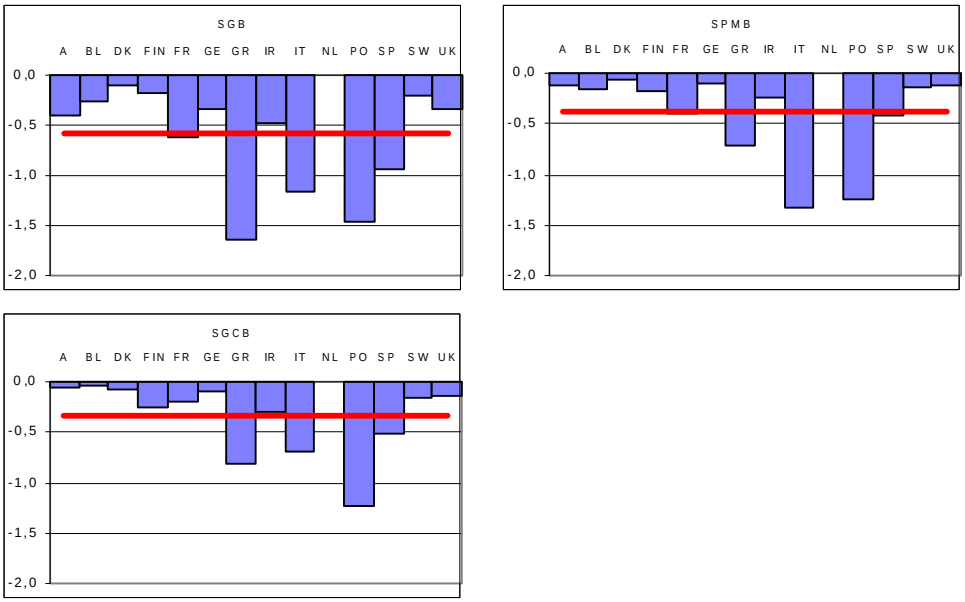
Table 3: Growth Loss through EU-wide Shock (in %)

	A	BL	DK	FIN	FR	GE	GR	IR	IT	NL	PO	SP	SW	UK	**EU**
SGB	-0,409	-0,252	-0,105	-0,184	-0,629	-0,342	-1,647	-0,478	-1,169	0,000	-1,455	-0,936	-0,201	-0,342	**-0,582**
SGG	-0,104	-0,204	-0,153	-0,137	-0,260	-0,133	-0,204	-0,245	-0,178	-0,264	-0,084	-0,050	-0,243	-0,179	**-0,174**
SGCB	-0,062	-0,044	-0,089	-0,250	-0,204	-0,095	-0,810	-0,299	-0,696	0,000	-1,223	-0,508	-0,159	-0,137	**-0,327**
SGCG	-0,052	-0,079	-0,349	-0,556	-0,206	-0,115	-0,283	-0,362	-0,315	-0,294	-0,303	-0,157	-0,559	-0,188	**-0,273**
SGCT	-0,041	-0,070	-0,332	-0,511	-0,192	-0,096	-0,199	-0,292	-0,247	-0,250	-0,268	-0,118	-0,394	-0,173	**-0,227**
SPMB	-0,116	-0,167	-0,064	-0,178	-0,406	-0,108	-0,718	-0,246	-1,328	0,000	-1,252	-0,424	-0,129	-0,125	**-0,376**
SPMG	-0,085	-0,335	-0,245	-0,421	-0,397	-0,099	-0,199	-0,310	-0,596	-0,215	-0,317	-0,121	-0,413	-0,157	**-0,279**

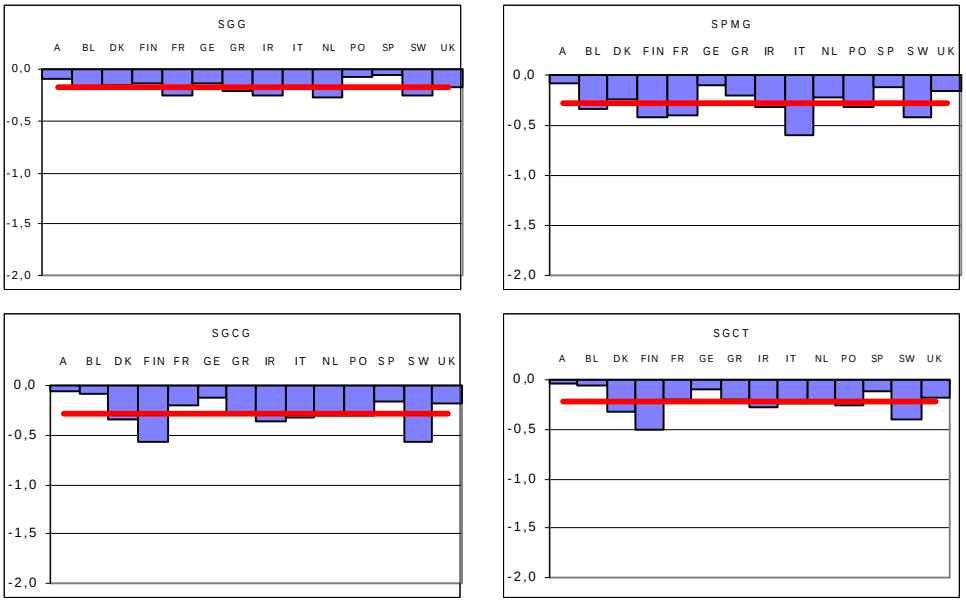
It is obvious that the effect of the interaction term is much lower than the effect of the conflict variables of the separate regression taken together. This is because the interaction term only catches up the growth effect of these three variables that are linked with each other.

The combination of GINI with BUR has the highest effect on growth (0,58% for the EU average). All interaction terms with the bureaucratic inefficiency index have a comparatively high impact on growth. Remember however that this indicator does not vary over time so that it explains only differences between countries. The figures in graph 2 represent the growth effect of the interaction term.

Graph 2 Growth Loss through INTERACT with an EU-wide Shock (in %) - BUR as Conflict Variable



Graph 3 Growth Loss through INTERACT with an EU-wide Shock (in %) - GVTEXP and TAX as Conflict Variables



When we use the bureaucratic inefficiency index we find that Southern countries (Spain, Italy, Portugal and Greece) are most effected. Thus, some negative terms of trade shock reduces economic growth by 1% to 1,5% in these countries as compared to less than 0,5% in Northern countries. One can conclude that the existing difference in bureaucratic efficiencies can lead to relatively large differences in the transmission of the same terms of trade shocks in the EU.

We find much less differences in the transmission of terms of trade shocks when we use either government spending or taxes as measures of conflict management. The transmission effect on growth remains within a narrow band of approximately 0,1% to 0,6%.

6 Theoretical Foundation of the Model

In this section we present a theoretical model that aims at giving a theoretical foundation to some of the empirical effects we have found in the previous section. We will focus on one phenomenon, i.e. the effect of bureaucratic inefficiency in the collection of taxes. In order to do so we set up a model consisting of a formal and a shadow section; Producers have the choice to produce in the formal and the shadow sector. Their decision depends on the efficiency of the bureaucracy to detect and to tax revenue in the shadow sector.

We first derive the results for the producer side, and then for households. Combining both we obtain the equilibrium values for production and analyse the effect of a terms of trade shock on this equilibrium value.

6.1 The Producer

We consider an economy with two representative firms, one producing in the formal sector (F) and the other in the shadow sector (S). The production functions of both firms are identical. The difference lies in the payment of turnover taxes (τ_t) which are only paid by the firm in the formal sector. The other firm faces a risk of being detected, $Pr_t(d)$. In this case, it has to pay a punishment equal to π_t times the non-paid taxes. In an infinite horizon model,

and using a Cobb-Douglas production function, we can write the value of the firm in the formal sector for period t as:

$$V_t^F\left(K_t^F\right)=\max_{I_t^F,L_t^F}\left\{(1-t_t)Y_t^F P_t - I_t^F - w_t^F L_t^F + \frac{1}{1+r_t}V_{t+1}^F\left(K_{t+1}^F\right)\right\} \quad (3.)$$
$$s.t. K_{t+1}^F = K_t^F(1-d)+I_t^F$$

where

$$Y_t^F = \left(K_t^F\right)^a\left(E_t^F L_t^F\right)^{1-a} \quad (4.)$$

The value of the firm in the shadow sector is correspondingly:

$$V_t^S\left(K_t^S\right)=\max_{I_t^F,L_t^F}\left\{(1-t_t \Pr(d)p_t)Y_t^S P_t - I_t^S - w_t^S L_t^S + \frac{1}{1+r_t}V_{t+1}^S\left(K_{t+1}^S\right)\right\} \quad (5.)$$
$$s.t. K_{t+1}^S = K_t^S(1-d)+I_t^S$$

where

$$Y_t^S = \left(K_t^S\right)^a\left(E_t^S L_t^S\right)^{1-a} \quad (6.)$$

with $V_t^i(K_t^i)$ the value of the firm at time t, Y_t^i the production function, P_t the price (equal in both sectors and exogenous), I_t^i investment, K_t^i and L_t^i the amount of capital and labour, E_t^i is the technological progress, w_t^i the wages, τ_t are turnover taxes, r the interest rate and δ the depreciation rate of capital, the subscript t designing the period and the superscript i the sector, i = F,S (F for formal sector, S for shadow sector). We assume that the interest rate and the depreciation rate are the same in both sectors, and the depreciation rate is moreover constant over time.

We assume that $\Pr(d)\tau_t > 1$, i.e. the tax contribution (either through turnover taxes, or through the punishment when being detected) is higher in the formal than in the shadow

sector. As the shadow sector is submitted to less competition than the formal sector, the efficiency in the formal sector is higher: $E_t^F L_t^F > E_t^S L_t^S$.

The first order condition with respect to investment leads to:

$$\frac{\partial V_t^F}{\partial I_t^F} = 0 \Rightarrow \frac{\partial V_{t+1}^F}{\partial I_{t+1}^F} = 1 + r_t \qquad (7.)$$

i.e. the marginal product of capital equals the interests.

Deriving the value of the firm with respect to capital (using the envelope theorem), substituting for $\frac{1}{1+r_t}\frac{\partial V_{t+1}^F}{\partial I_{t+1}^F}$ from (7.), calculating the same for the next period and substituting for $\frac{\partial V_{t+1}^F}{\partial I_{t+1}^F}$ into (7.) we obtain:

$$r_t = a\left(1 - t_{t+1}\right)\frac{P_{t+1}Y_{t+1}^F}{K_{t+1}^F} - d \qquad (8.)$$

Equation (8.) states that the interest rate plus the depreciation rate of capital is equal to the production divided by capital and multiplied with the share of capital in the production.

In the shadow sector we obtain correspondingly:

$$\frac{\partial V_t^S}{\partial I_t^S} = 0 \Rightarrow \frac{\partial V_{t+1}^S}{\partial I_{t+1}^S} = 1 + r_t \qquad (9.)$$

and

$$r_t = a\left(1 - t_{t+1}\,\mathrm{Pr}_{t+1}(d)p_{t+1}\right)\frac{P_{t+1}Y_{t+1}^S}{K_{t+1}^S} - d \qquad (10.)$$

Finally, production has to be equal to the sum of consumption, investment and taxes:

$$C_t = Y_t^F P_t + Y_t^S P_t - \left(I_t^F + I_t^S\right) - T \qquad (11.)$$

We will assume that government spending (G) is equal to tax revenues (T), and that government spending is fixed over time, so that we have:

$$\overline{G} = t_t Y_t^F P_t + t_t \Pr(d) p_t Y_t^S P_t \qquad (12.)$$

The implication of this assumption is that if total production diminishes, the government must either rise taxes on turnover, or increase the probability of being detected when producing in the shadow sector, or increase the punishment rate when being detected.

6.2 The Household

As the firms need workers in the formal as well as in the shadow sectors, households also have to be split into two groups, working each in one sector. Households will maximise the following utility function subject to the flow budget constraint:

$$\max U_t^i = \ln C_t^i + b\ln\left(1 - L_t^i\right) + \sum_{s=t+1}^{\infty}\left(\frac{1}{1+q}\right)^{s-t}\left[\ln C_s^i + b\left(1 - L_s^i\right)\right]$$
$$s.t. A_{s+1}^i = \left(A_s^i + w_s^i L_s^i - C_s^i\right)(1+r)$$
$$\lim_{s\to\infty}\left(\prod_{s=t}^{\infty}\frac{1}{1+r}A_s^i\right) \geq 0 \quad \textit{transversality condition}$$

where C_t^i is the consumption of sector i at time t, b the preference for leisure, and A_t^i the assets of households working in sector i at time t (i = F,S).

The first order conditions are:

$$\frac{\partial Lagr^i}{\partial C_t^i} = 0 \Rightarrow l_t = \frac{1}{(1+r)C_t^i} \qquad (13.)$$

$$\frac{\partial Lagr^i}{\partial C_{t+1}^i} = 0 \Rightarrow l_{t+1} = \frac{1}{(1+r)(1+q)C_{t+1}^i} \qquad (14.)$$

$$\frac{\partial Lagr^i}{\partial A^i_{t+1}} = 0 \Rightarrow l_t = l_{t+1}(1+r) \qquad (15.)$$

Substitute (13.) and (14.) into (15.) to obtain the usual Euler equation:

$$C^i_{t+1} = \frac{1+r}{1+q} C^i_t \qquad (16.)$$

i.e. consumption in period t+1 is equal to consumption in period t multiplied by the interest divided by the time preference.

6.3 The Equilibrium

We want to find out the effect of a productivity shock in the formal sector on capital (production) in the formal sector relative to the shadow sector. For this purpose, we first need to assume that the economy is in a steady state. In order to find the steady state, we make the model stationary:

$$Y^{i*} = \frac{Y^i_t}{E^i_t L^i_t},\ K^{i*} = \frac{K^i_t}{E^i_t L^i_t},\ C^{i*} = \frac{C^i_t}{E^i_t L^i_t},\ L^{i*} = L^i_t$$

We also assume that the technological progress grows at a rate g:

$$E^i_{t+1} = E^i_t(1+g)$$

This rate is assumed to be the same in both sectors in the steady state.

Write equations (4.), (6.) and (16.) in the steady state and combine them with each other to obtain:

$$K^{F*} = \left[\frac{a(1-t_t)P_t}{(g+q+d)}\right]^{\frac{1}{1-a}} \qquad (17.)$$

and

$$Y^{F*} = \left[\frac{a(1-t_t)P_t}{(g+q+d)} \right]^{\frac{a}{1-a}} \tag{18.}$$

for the formal sector, and

$$K^{S*} = \left[\frac{a(1-t_t \Pr(d) p_t)P_t}{(g+q+d)} \right]^{\frac{1}{1-a}} \tag{19.}$$

and

$$Y^{S*} = \left[\frac{a(1-t_t \Pr(d) p_t)P_t}{(g+q+d)} \right]^{\frac{a}{1-a}} \tag{20.}$$

in the shadow sector.

Social conflict and conflict-management institutions affect our model in the following way. Consider an economy where the firm producing in the shadow sector has the power to influence the government decision on the probability of being detected when working in the shadow sector, and/or the punishment rate. By influencing these variables, the firm can extract money from the firm producing in the formal sector. We know from equation (12.) that the government budget has to be balanced. Assuming that government spending is distributed evenly for the two sectors, the way to extract wealth from the formal sector is to put some pressure on politicians to reduce the probability to be detected when producing in the shadow sector, or to reduce the punishment rate. As the government budget has to be balanced, this entails an increase in the tax rate, so that firms in the formal sector pay most part of the decrease in the contribution of powerful groups in the shadow sector. However, if good conflict management institutions are put into place, there are fewer possibilities for the firm in the shadow sector to reduce the probability of being detected or the corresponding punishment rate. In terms of Rodrik (1998), the existence of a powerful firm in the shadow sector can be interpreted as an underlying social conflict. As we maximised the value of the two representative firms in the formal and the shadow sector independently,

the existence of a powerful firm (without adequate conflict management institutions) leads to a relatively big shadow sector (compare equations (18.) and (20.)). As the productivity in the formal sector is higher than in the shadow sector, this will result in less economic growth.

6.4 The Effect of Terms of Trade Shocks

We now analyse the effect of a terms of trade shock in both sectors (ΔP_t). We focus on how this effect is amplified through our conflict variables ($\tau_t Pr_t(d)\pi_t$). For this purpose we derive Y_t^F and Y_t^S with respect to P_t:

$$\frac{\partial Y_t^F}{\partial P^t} = \frac{a}{1-a}\left[\frac{a(1-t_t)}{(g+q+d)}\right]^{\frac{a}{1-a}} (P_t)^{\frac{2a-1}{1-a}} E_t^F L_t^F$$

and

$$\frac{\partial Y_t^S}{\partial P^t} = \frac{a}{1-a}\left[\frac{a(1-t_t \Pr(d)p_t)}{(g+q+d)}\right]^{\frac{a}{1-a}} (P_t)^{\frac{2a-1}{1-a}} E_t^S L_t^S$$

The ratio of the effect of the shock on the production in the formal sector and the effect on the shadow sector is thus:

$$\frac{\frac{\partial Y_t^F}{\partial P^t}}{\frac{\partial Y_t^S}{\partial P^t}} = \left(\frac{1-t_t}{1-t_t \Pr(d)p_t}\right)^{\frac{a}{1-a}} \frac{E_t^F L_t^F}{E_t^S L_t^S}$$

The question is whether the nominator or the denominator is bigger, i.e. whether the effect of a shock is amplified or not through corruption. Or, put otherwise, we want to know whether

$$\frac{E_t^F L_t^F}{E_t^S L_t^S} > \left(\frac{1 - t_t}{1 - t_t \Pr(d) p_t} \right)^{-\frac{a}{1-a}}$$

If so, the effect of a terms of trade shock will be stronger in the formal sector.

We can see from this term that the higher $Pr_t(d)\pi_t$ (the better the conflict management institutions), the smaller the denominator is relative to the nominator, and thus the smaller the effect of a terms of trade shock on the shadow sector relative to the formal sector. The existence of a powerful firm in the shadow sector without adequate conflict management institutions will lead to a relatively higher effect of the terms of trade shock in the formal than in the shadow sector.

We know from equation (12.) that the government budget has to be balanced. If Y_t^F and Y_t^S decrease due to a negative shock, the government thus has to raise its revenues either through an increase in taxes (τ_t), or through an increase in $Pr_t(d)\pi_t$. In the first case, the effect in the shadow sector is amplified relative to the formal sector as $Pr_t(d)\pi_t > 1$.

7 Conclusion

In this paper we combined two strands of the economic literature. One is the literature on economic growth, the other is the literature on the different transmission processes of the same shock in Euroland. The economic growth literature tells us that the existence of social conflicts and the ability to master these conflicts affect economic growth prospects of nations. In particular, these social variables affect how a given terms of trade shock influences economic growth. Countries experiencing a lot of social (distributive) conflicts and weak institutions to master these conflicts will tend to be more affected by the same terms of trade disturbances than other countries. We applied this idea to Euroland. We first developed an econometric model explaining economic growth in the EU. We found that indeed differences in social conflict variables and differences in bureaucratic efficiency have significant effects on economic growth.

We then used these results to simulate how the same terms of trade shock affects economic growth in the EU. Our main conclusion is that differences in social conflicts and bureaucratic efficiency lead to different effects on economic growth after the same terms of trade shock. More specifically we found that Southern EU countries suffer more from a negative terms of trade shock, mainly because of weak bureaucracies.

Finally we presented a theoretical model that gives some foundation to the empirical phenomenon detected in this study. The model consists of a formal and a shadow sector. We find that the inefficiency in the detection of fraud and the imposition of penalties tends to amplify the effect of a terms of trade shock on output.

8 References

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Appendix A: Definition of the Variables

GDPCGR: GDP per capita growth, GDP (national currencies, current prices) and population from OECD, converted into GDP in US dollar (1990 prices and exchange rates) with deflator and US dollar exchange rates from OECD;

GINI: GINI index for income disparity, from Deininger and Squire (1996)

ELF: Index for ethno-linguistic fragmentation, from Mauro (1995)

GOVC: Number of government changes, from http://web.jet.es/ziaorarr/00index.htm, 'Political Leaders 1945-99'

PMC: Number of prime minister changes from http://web.jet.es/ziaorarr/00index.htm, 'Political Leaders 1945-99'

BUR: Index for bureaucracy efficiency, from Mauro (1995)

GVTEXP: Total Expenditure: General Government (Percentage of GDP in Market Prices), European Economy, No 60, 1995

TAX: Total tax revenue as percentage of GDP / Tax revenues, OECD Revenue Statistics

GDPY1: GDP of the first year of the period of ten years (in log); source see GDPCGR

SAV : Gross savings rate, European Economy, no 60, 1995; p; 192-93, table 50

GFCF : Gross fixed capital formation by GDP, OECD National Accounts I

POPGR: Growth rate of total population, calculated from total population, OECD Labour Force Statistics

EDUEXP: Education expenditure by GDP in 1985, from World Bank, World Tables.

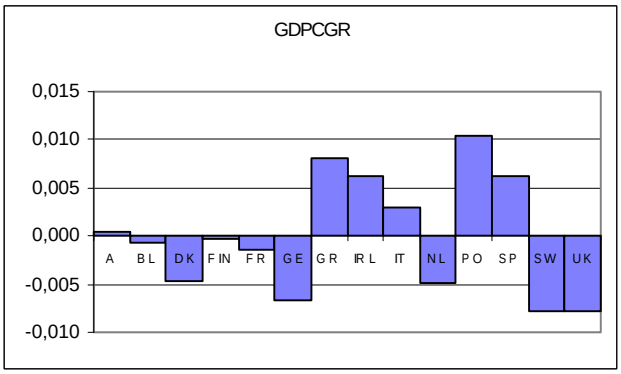
EUM: dummy for EU membership, see Gravity

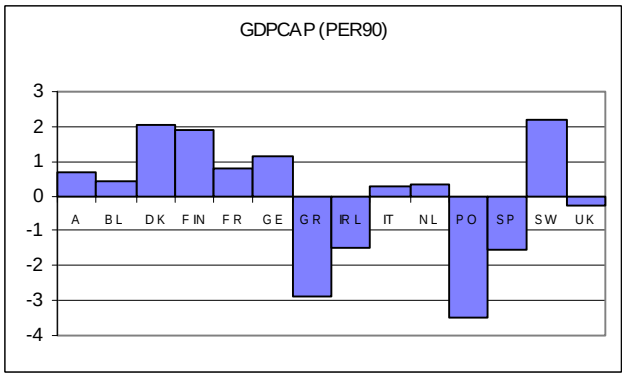
TRADE: imports plus exports in current home currency, divided by GDP in current home currency; imports and exports from IFS, GDP from OECD (see above) (also for the definition of SHOCK)

TOT: Terms of trade (for the definition of SHOCK) European Economy, No 60

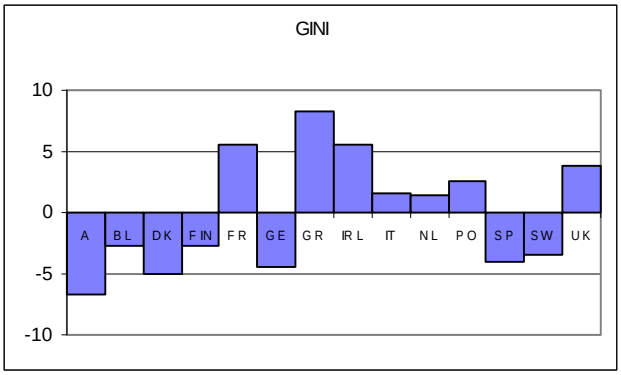
Appendix B: Statistical Summary for the Shock, Social Conflict and Conflict Management

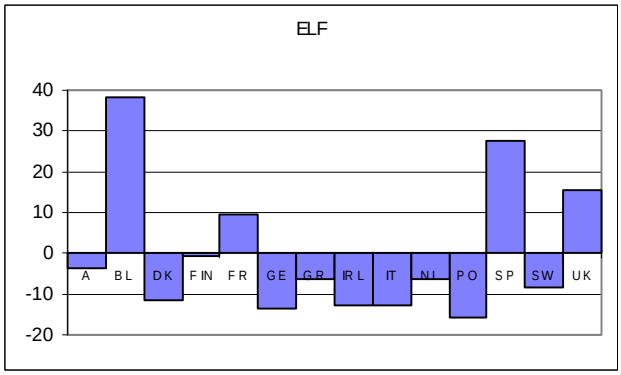
Graph B.1 GDP per capita (growth) (average 1961-95) for EU14

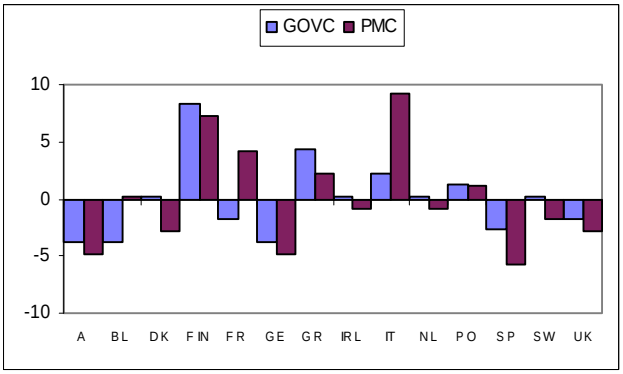




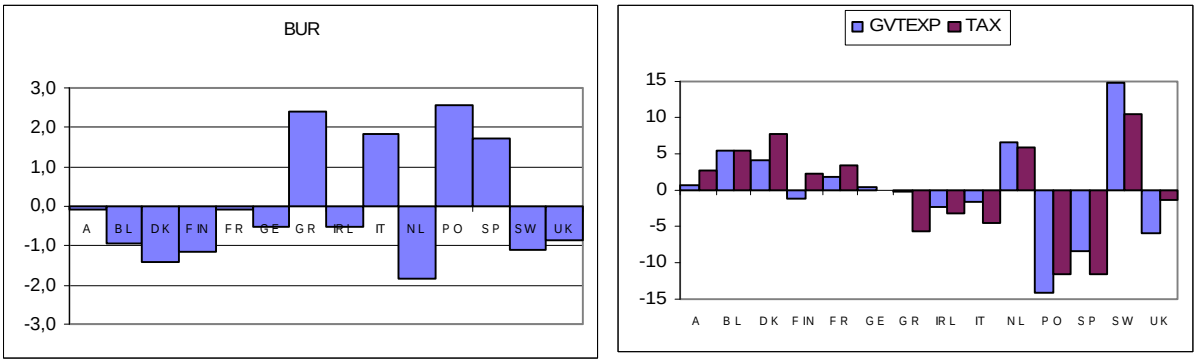
Graph B.2 Social Conflict - average 1961-95 (sum for GOVC and PMC)







Graph B.3 Conflict Management - average 1961-95



Graph B.4 Link Between GDPCGR, GDPCY1, GVTEXP and TAX

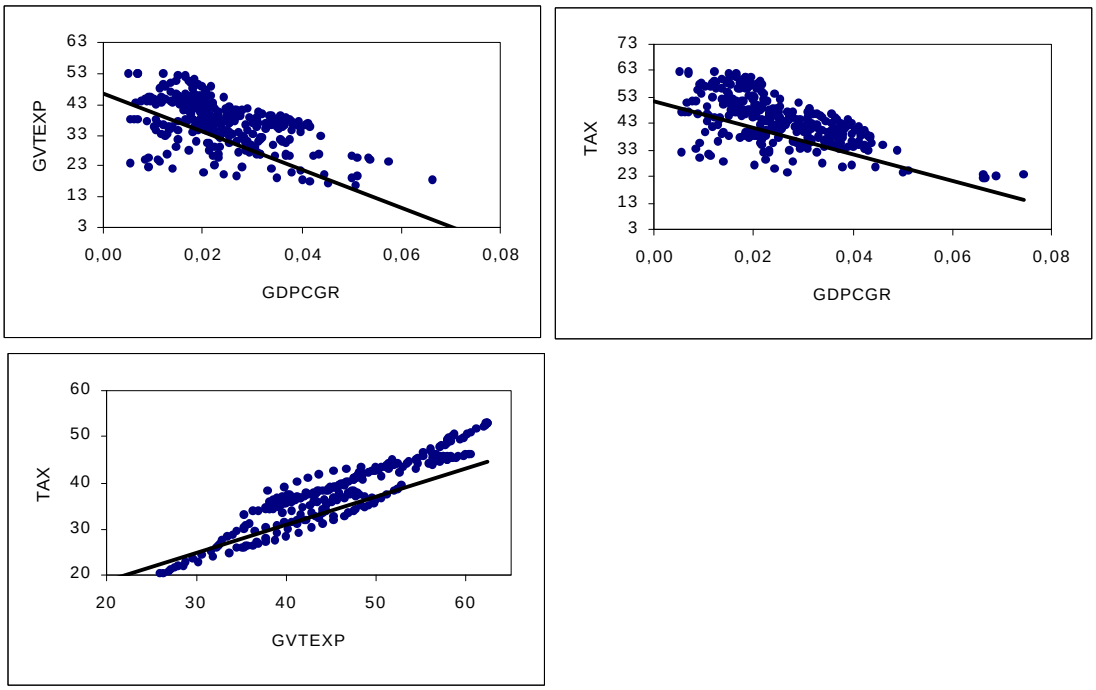


Table B.1 Correlation Between the Traditional Growth Variables

	GDPCGR	GDPY1	SAV	GFCF	POPGR	EDUEXP	EUM	TRADE
GDPCGR	***1,00***	***-0,51***	0,32	0,46	-0,10	-0,04	-0,10	-0,02
GDPY1	***-0,51***	***1,00***	***-0,52***	***-0,59***	-0,17	***0,55***	0,17	0,09
SAV	0,32	***-0,52***	***1,00***	0,39	0,13	-0,33	0,23	0,09
GFCF	0,46	***-0,59***	0,39	***1,00***	0,27	-0,31	-0,48	-0,31
POPGR	-0,10	-0,17	0,13	0,27	***1,00***	-0,07	0,00	0,01
EDUEXP	-0,04	***0,55***	-0,33	-0,31	-0,07	***1,00***	-0,01	0,47
EUM	-0,10	0,17	0,23	-0,48	0,00	-0,01	***1,00***	0,29
TRADE	-0,02	0,09	0,09	-0,31	0,01	0,47	0,29	***1,00***

Bold italic: correlation superior to 0,5

Table B.2 Correlation with the Shock, Social Conflict and Conflict Management

	SHOCK	GINIGWB	ELF	GOVC	PMC	BUR	GVTEXP	TAX
GDPCGR	0,19	0,09	-0,10	0,01	0,20	0,20	***-0,52***	-0,48
GDPY1	-0,32	-0,43	0,14	-0,15	-0,23	***-0,67***	***0,73***	***0,79***
SAV	0,02	0,29	-0,10	-0,06	0,30	***0,65***	-0,33	***-0,54***
GFCF	0,14	0,05	-0,37	0,40	0,44	0,47	***-0,64***	***-0,60***
POPGR	0,32	0,17	-0,16	0,08	0,08	0,04	-0,20	-0,24
EDUEXP	0,11	-0,16	-0,15	0,03	0,03	***-0,74***	***0,65***	***0,70***
EUM	0,06	0,40	0,10	-0,28	-0,11	-0,11	0,26	0,14
TRADE	0,27	0,02	0,19	-0,14	-0,19	-0,50	***0,50***	0,40
SHOCK	***1,00***	0,33	-0,11	0,17	0,17	-0,05	-0,18	-0,27
GINIGWB	0,33	***1,00***	-0,08	0,20	0,31	0,27	-0,24	-0,30
ELF	-0,11	-0,08	***1,00***	-0,31	-0,15	-0,11	0,04	0,06
GOVC	0,17	0,20	-0,31	***1,00***	***0,68***	0,11	-0,16	-0,14
PMC	0,17	0,31	-0,15	***0,68***	***1,00***	0,32	-0,28	-0,32
BUR	-0,05	0,27	-0,11	0,11	0,32	***1,00***	***-0,60***	***-0,74***
GVTEXP	-0,18	-0,24	0,04	-0,16	-0,28	***-0,60***	***1,00***	***0,93***
TAX	-0,27	-0,30	0,06	-0,14	-0,32	***-0,74***	***0,93***	***1,00***

Table B.3 Correlation With the Interaction Term

	SGB	SGG	SGT	SEB	SEG	SET	SGCB	SGCG	SGCT	SPMB	SPMG	SPMT
GDPCGR	0,28	0,08	0,08	-0,13	-0,13	-0,12	0,04	0,04	0,04	0,20	0,14	0,15
GDPY1	***-0,77***	-0,18	-0,15	-0,10	0,12	0,13	***-0,60***	-0,16	-0,13	***-0,59***	-0,19	-0,17
SAV	***0,57***	0,00	-0,07	0,03	-0,05	-0,08	0,41	-0,12	-0,17	***0,59***	0,14	0,07
GFCF	***0,50***	-0,02	-0,03	-0,08	-0,36	-0,36	***0,51***	0,27	0,28	***0,53***	0,27	0,29
POPGR	0,26	0,29	0,27	0,06	-0,14	-0,15	0,22	0,25	0,23	0,23	0,24	0,23
EDUEXP	***-0,51***	0,26	0,29	-0,44	-0,01	0,00	-0,38	0,21	0,23	-0,33	0,23	0,25
EUM	-0,07	0,22	0,20	-0,10	0,15	0,15	-0,19	-0,10	-0,13	-0,09	0,06	0,03
TRADE	-0,24	0,42	0,40	-0,19	0,38	0,36	-0,14	0,15	0,13	-0,24	0,18	0,16