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Globalization, Public Expenses and Economic Growth: Evidence from Turkey

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Globalization, Public Expenses and Economic Growth: Evidence from Turkey[1].

I- Theoretical Background

In the economic literature, several points of view exist. First, the famous Keynesian model considers that public expenses policies imply a multiplier effect on the production through their support to investment goods. This reasoning supposes an economic environment where prices are rigid and capacity of production is under used. However, if this surplus of expenses increases the interest rate, the private expenses are reduced by a standard crowding-out effect, thus the multiplier effect on the economic activity is minimized.

Then, contrary to Keynesian analyses, the hypotheses of a "sustained fiscal contraction" suggest that a reduction of the public expenses leads to a rise of both consumption and investment. It implies that a real restrictive budgetary policy, after a period of relax, clearly signals the beginning of a policy aiming at the public finances[2] purification. This neoclassic approach considers that a public expenses policy provokes essentially a crowding-out effect of the private sector and a negative effect on wealth[3]. This scenario remains true as a long as a rise of public expenses necessarily leads to an increase of future taxes. It underlies that a possible reduction of wealth implies a consumption contraction on the demand side, increases the unemployment and reduces the interest rates through the investment slowing in case of a decrease of the production[4]. The real proportions of such a wealth effect depend on the perception of the public policies, if it is a permanent action or just a transition.

To this debate, it is necessary to recall a radical point of view, named "Ricardian" (Barro, 1974; Evans, 1988). This vision argues that a public expenses increase, financed by more taxes or by a public debt, will be completely compensated by a growing private saving, that is why it is inefficient. However, this diagram supposes some hypotheses that have not always been completely verified in the empirical studies (Evans, 1988; Hemming, Kell and Mahfouz, 2002). The absence or the partial presence of this Ricardian equivalence is more and more notified. The individuals do not completely compensate the public expenses rise since they often reason in the short term and/or cannot disengage themselves quickly from their debt obligations (Blanchard, 1985; Mankiw, 2000). Actually, the Ricardian effect is partial when the private sector does not expect a whole financing of the public expenses by a fiscal way. Therefore, the fiscal policy can play a stabilizing role and its efficiency can be defended.

Finally, tax increase is supposed to have a theoretical impact on the levels of interest rates and inflation and therefore to encourage a crowding-out effect in the private sector. This result is compatible with the principle of "Ricardian

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[1] A draft version, to not to distribute without the agreement of its authors.
2 Barry and Devereux, 1995; Sutherland, 1997; Perotti, 1999).
3 Barro, 1981; Aiyagari, Christiano and Eichenbaum, 1992; Christiano and Eichenbaum, 1992; Baxter and King, 1993).
4 Ramey and Shapiro, 1998; Burnside, Eichenbaum, and Fisher, 2004.

equivalence". According to Mankiw (1987), a rise of public expenses could make the interest rates lower because of the private consumption decrease through the intermediary of negative wealth effect. However Evans (1987) does not note any positive relationship between public deficit and high real interest rates.

In the same way, when public expenses are financed by monetary creation, chronic budgetary deficit push inflationary pressure. This relationship between budgetary deficit and inflation has not always been confirmed (to see Dwyer 1982). The recent data analyses, coming from several countries, let suppose that a positive relationship between budgetary deficit and inflation is confirmed only in developing hyperinflationary countries contrary to the industrial countries characterized by a very moderate inflation (Fischer, Sahay and Végh, 2000; Catão and Terrones, 2003).

II- Empirical reports.

To the empirical level, several studies tried to examine the effect of the public expenses policies change without taking into account the nature of the studied economy. Therefore, the results remain mitigated and don't permit to make a categorical judgment.

Ramey and Shapiro (1998) used the United States' post-war data and noted that a rise of the military expenses decreases the durable goods consumption, but increases the non residents' investment. These results are compatible with the neoclassical models. Blanchard and Perottis (2002), conducting an approach based on the American data by the VAR technique, note a positive relationship between public expenses on one hand and consumption and production on the other hand. But, the impact of this expenses rise proves to be negative on the investment.

Alesina (2002), using a data base widened to several industrial economies, confirms this negative relationship between public expenses and investment. This report reinforces the anti-keynesian approach about the efficiency of the budgetary policy by the demand side. Perotti (2002) confirms this increasing inefficiency of the public expenses in a certain group of industrial countries during the last 20 years. In the opposite, Fatás and Mihov (2003), basing on a big set of countries' database, note that a contraction of public expenses often comes with a macroeconomic instability.

Two types of study underline the difficulty to determine efficiently the impact of expansionary budgetary policies. One leans on the diversity of mechanisms that increae the public expenses. Giavazzis, Jappelli, and Pagano (2000) suggest that such a script concerning the saving has been noted as much in the industrial countries as in development countries. According to Alesina (2002) there is little chance that the existing tie between public expenses and investment can vary in relation to the intensity of budgetary expansions.

The other sort of studies underlines the difficulty to measure the reaction of consumers' expectations following fiscal adjustments in order to maintain a sustainable public debt. Bertola and Drazens (1993) underline that when the public expenses level reaches a high critical level, there is a non linear relationship between public expenses and private sector consumption because of expectations about the effects of the future budgetary restrictions that will be necessary in the setting of a

stabilization program. Sutherland (1997) theoretically and Perottis (1999) empirically examined the influence of the public debt level on the effects of an expansionary budgetary policy. A high level of public debt reinforces consumers' expectations about a rise of taxes.

In our contribution, we consider a different analysis of the public expenses effects: there is not an unique approach, keynesian, neoclassic or ricardian. Our empiric model aims at capturing the different effects of public expenses on economic activities. We especially consider the analysis of the asymmetric effects of budgetary policies on the economic activity according to the level of real interest rates and the method how the budgetary efforts are financed.

First, we propose a linear regression of the budgetary expenses variable by the least squares method from a set of economic and monetary variables in order to put in evidence the nature and the structure of the public expenses in Turkey. Second, we realize a linear regression of the Turkish economic growth in order to test the budgetary expenses role during the whole period of financial liberalization. Finally, in a third step, we use the VAR technique, a generalization of the autoregressive models where the set of the selected variables has the same a priori status. There are no endogenous or exogenous variables. The objective is to avoid the instrumentalization of the econometrics tools. We will retain the Var model corresponding to the weakest Akaike and Schwartzes criteria. Those results could thus confirm or invalidate the results obtained in the previous stages. Our final conclusion synthesizes the key elements of this contribution.

III- Method of analysis and identification of the econometric model variables

We consider a situation in which the ricardian principle of equivalence is applied only partially. The expansion of public expenses doesn't necessarily result in a decrease of the private expenditure, since the agents consider that the governmental debt is a part of their heritage. In other words, the governmental expenses, financed by a public debt, push the consumption through this heritage effect. In the same way, the expenses in public goods and infrastructure drive to a better productivity and therefore a better investment. Therefore, the effects in terms of wealth and productivity compensate the unfavourable impact in the ricardian sense.

The sustainability of the debt depends closely on the level of interest rate in relation to the growth rate. When the interest rates are relatively high, the economy is necessarily in the superior limit of the debt / production ratio and therefore the negative impact of public expenses is reinforced. A fiscal funding becomes strongly possible during the temporal horizon of the private agents.

Our model tries to integrate the key variables effects in the economic system in order to get the net effect of public expenses. We estimate a system of multiple equations, methodology TVAR, that integrates the reduced equations relative to public expenses, consumption (or investment), production and interest rates.

A- THEORETICAL ANALYSIS MODEL

We consider logically that all variables are endogenous and that public expenses depend as much on the other variables as on its own past values. This TVAR[5] model combines three regimes in a simple linear model[6].

Our analysis puts in evidence the list of the following variables :

The **first category** of variables is the one that corresponds to the economic activity :
The ratio of real public expenses **(G/X)**.
The ratio of real private expenses[7] **(Z/X)**.
The growth rate of real GDP (**Y**).

The **second category** regroups the variables supposed to influence the method and the cost of financing the public expenses policy. It concerns :
The ratio of public debt (**D/X**).
The real interest rate variations **(Δrr)**.

Finally, the key variable in our analysis is the interest rate. Usually, most economic models take into consideration the State rate on 3 months public treasury bills. However, in an inflationary economy, or even hyper-inflationary, the 3 months treasury bills become rare, nearly inexistent, what prevents from constituting a continuous set of observations. Therefore, we consider the interest rates practiced by banks on 3 months deposits because of the inflationary specificity of the Turkish economy.

However, it seems useful to take into account the monetary financing of public expenses and inflation. We integrate therefore in the **third category** the monetary mass growth rate, represented by the **ratio of monetary base over GDP**, the inflation rate represented by the indicator **Pt**, as well as the real interest rate (**rrt**).

Therefore, our final model is composed of the following variables:
(G/X, M/X, Z/X, OF IT, Pt, rrt) [8].

Our empirical application is limited to Turkey, and then we will extend it to other countries. This future stage will permit to compare the results and to put the accent on the particularities of each economy.

We are going to use quarterly data of SFI 2005 and WDI 2004[9].

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[5] See Tong, 1990 ; Choi, 1999.
[6] For more details, see Annexe I.
[7] To note that the private expenses are measured, either by the real private consumption (Ct), either by the private investments (It). These two measures are supposed reflected the risks of the private expenses (Zt).
[8] This model seems easier to us to study because of our constraints bound to our data base. Indeed, the variable of the debt in quarterly data is absent of the different data bases that we interrogated. This variable is replaced therefore by those of the monetary mass and the inflation. These are supposed to express the level of the public debt and his/her/its constraints indirectly to the level of the public expenses.

According to the importance of interest rates in our contribution, we start our analysis with its evolution between 1987 and 2004. We have the nominal interest rate represented by the 3 months (R) [10] deposits rates. The real interest rate is calculated thanks to the GDP deflator. Thus, we get the ex-post real interest rate that is equal to the nominal interest rate of the past period decreased by the inflation rate, giving the following formula:

$$rr_{t-1} = R_{t-1} - 400(P_t / P_{t-1} - 1)$$

Figure 1 : Evolution of real interest rate on 3 months deposits.
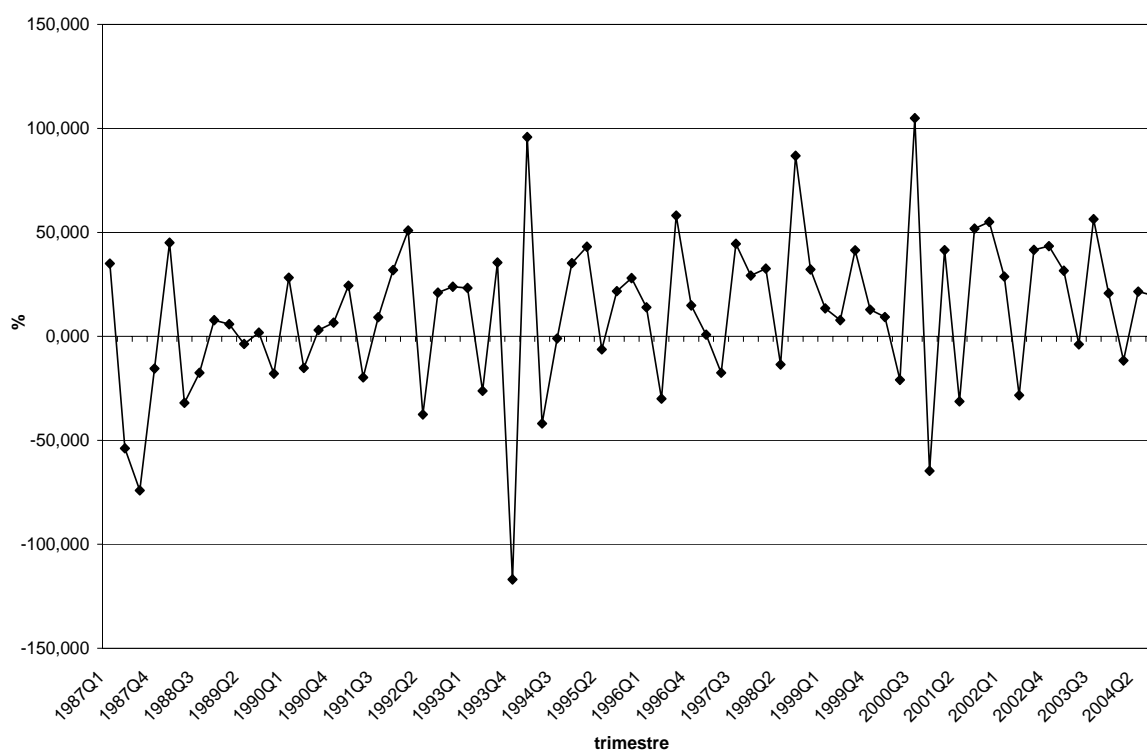
Source : IFS 2005.

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[9] The details of the data used will be exposed in Annex 2.

[10] Usually, the representative interest rate is the one of the treasury bills public to three due months. However, we have a set of observations non regular in Turkey because of a situation inflationary hyper that prevented the sale of the good of treasure to 3 due months, judged risky too much.2.

HILMI Nathalie & Alain SAFA   6

The figure 1 clearly indicates a strong variability of the real interest rate all along the years 80, 90, but also 2000. These years of financial liberalization are often marked by a strong two-digit inflation and sometimes three-digit, by repetitive financial crises, by the monetary policies irregularity. All these conditions made the interest rate very irregular, generally very high and therefore, the speculative waves were numerous. Besides, the peaks observed in 1994, 1998-99 and 2001 come from sharp financial crises. The first and the last ones reflect the fragility and the instability of the banking and monetary system in Turkey. The second is the Asian crisis impact on the emerging countries.

Consequently to the chaotic situation on the interest rates market, public finances were directly affected. Because of the financial liberalization, the State had to finance its chronic deficit on the market, paying thus for the instability of its policies. Therefore, the expansionary budgetary policy, through the raise of the public investments, had extremely reduced effect. The main part of the State's resources went more and more to the payment of an increasing debt service, which was stuffy.

Figure 2 : Ratios of debt, public and private expenses.
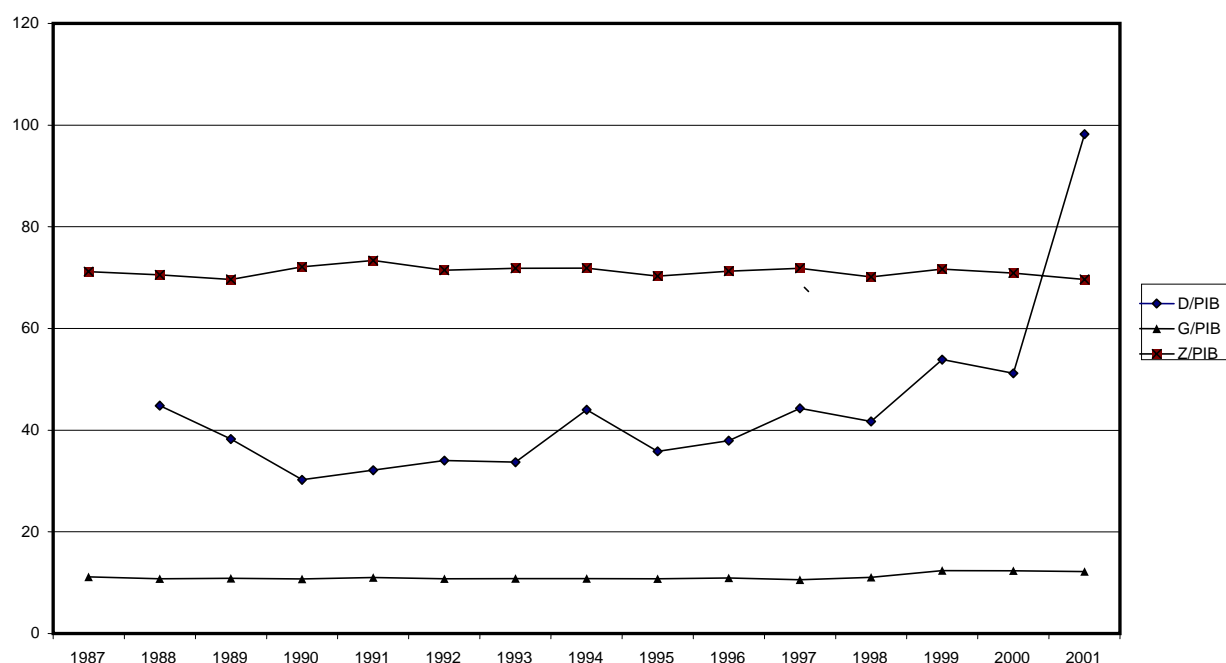
Thus, as shown on figure 2, the higher and higher level of the debt ratio (Dt / GDP) was accompanied by a certain stability of the public expenses (Gt / GDP) that increased strongly from 1997. This situation is clearly put in evidence on the figure 3. However, this growth of the public expenses is more the result of the payment of the debt service than a true policy of investment expenses. This last category was seriously reduced and thus, the State had few possibilities in implementing its policy.

Figure 3 : Ratio of public expenses.
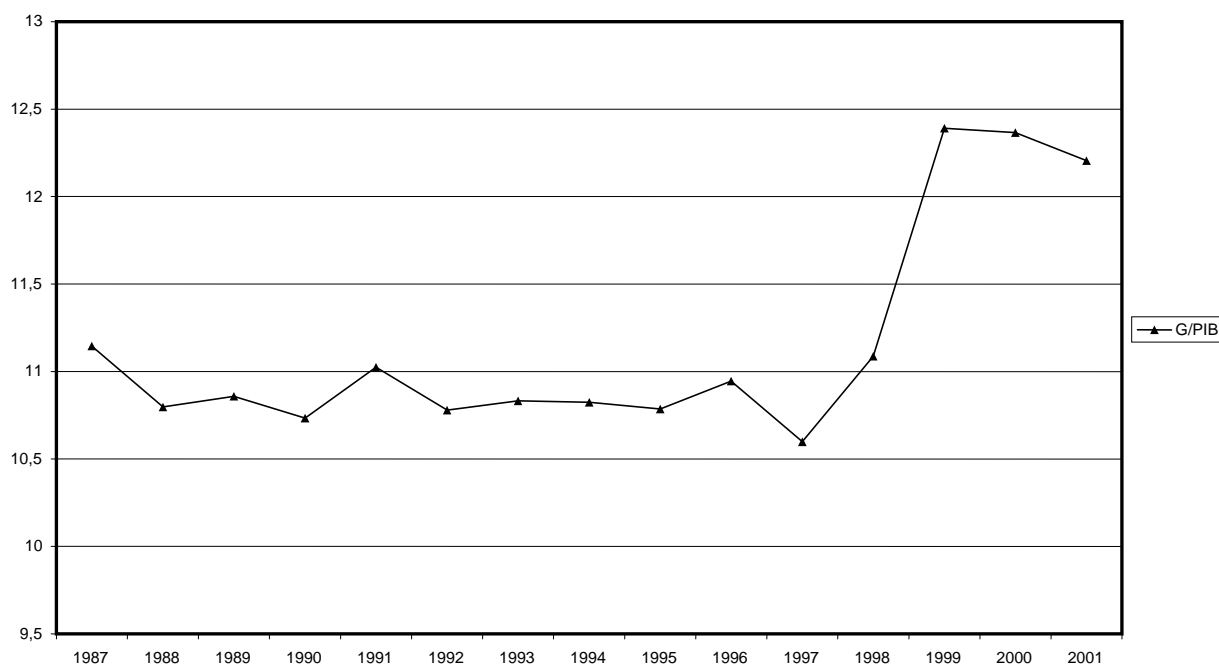
Figure 4 : Ratio of Private expenses.
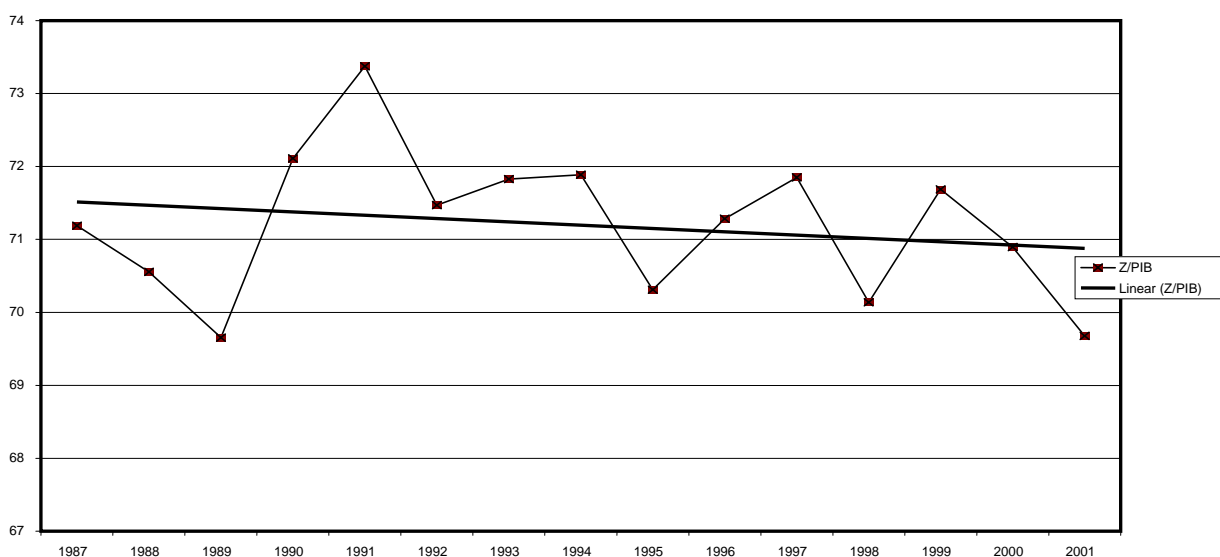
Finally, an attentive observation of the private expenses curve clearly shows a strong irregularity, characteristic of a hyperinflationary economy. To this, an established bearish tendency is added. This situation lets us think that the principle of the ricardian equivalence could be confirmed in the case of Turkey, but in its most negative sense. Indeed, its existence is more the reflection of a State budget to the service of the banking and financial sector than a voluntary State policy.

We think that an econometric study will explain the phenomena that characterise the evolution of the public expenses in the Turkish economy.

B- ANALYSIS OF LINEAR REGRESSION OF PUBLIC EXPENSES.

According to the results obtained in the annex II, the unit root statistical tests permitted to put in evidence the structures of a regression model where the endogenous and exogenous variables accept the stationary conditions. Therefore, our linear regression model is composed of the following variables:

GDP (100=prices 2000),
Ratio of public expenses over GDP = G/X,
Ratio of private expenses over GDP = Z/X,
Ratio of monetary base over GDP = M/X,
Creditor interest rate on three months deposits = R,
Inflation rate noted = P

It consists in making a classic evaluation by the method of OLS of (ordinary least squares) of the public expenses variable, considered as endogenous, from a set of economic, monetary and financial variables, considered as exogenous. The choice of these variables is in conformity with the theoretical orientations specified in the presentation of our analysis method. We obtain the following linear model:

G/X = C(1)*M/X + C(2)*R(1) + C(3)*Y + C(4)*Z/X + C(5)

G/X = -0.0628*M/X + 0.0162*R(1) + 0.0420*Y + 0.2974*Z/X - 11.0417

Dependent Variable: G/X
Method: Least Squares
Date: 09/18/06   Time: 16:31
Sample (adjusted): 1987Q1 2004Q2
Included observations: 70 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M/X	-0,0629	0,0714	-0,8804	0,3819
R(1)	**0,0163**	**0,0075**	**2,1788**	**0,0330**
Y	**0,0421**	**0,0207**	**2,0367**	**0,0458**
Z/X	**0,2975**	**0,0456**	**6,5211**	**0,0000**
C	-11,0417	4,8780	-2,2636	0,0269

R-squared	0,4335	Mean dependent var	12,2626
Adjusted R-squared	0,3986	S.D. dependent var	2,8806
S.E. of regression	2,2339	Akaike info criterion	4,5141
Sum squared resid	324,3556	Schwarz criterion	4,6747
Log likelihood	-152,9928	F-statistic	12,4336
Durbin-Watson stat	1,5595	Prob(F-statistic)	0,0000

This analysis puts in evidence that the three exogenous variables the most determining in the linear estimation of the public expenses ratio are:

- The ratio of private expenses with a highly meaningful positive influence since the threshold of mistake is lower to 1%. This relationship is likely to be in the two opposite directions. This can be explained by the important amount of the internal debt service that increases the expenses of the households, but also by the importance of the public sector. In other words, the rise of the public expenses sometimes translated a rise of the public wages reinforcing their purchasing power and encouraging their expenses. Vice versa, a rise of private expenses results in better fiscal returns that encourage State's expenses.

- The creditor interest rate. It exercises a positive pressure on the public expenses. Indeed, this rate reflects the public debt cost and therefore the supplement of the debt service especially in the case of an indebted economy like Turkey.

- The GDP evolution is naturally accompanied by a public expenses rise. This report is rational and in conformity with the theoretical forecasts. All periods of economic growth are auspicious to budgetary laxity and to increase in the budgetary expenses ratio. It is even truer in a country as Turkey where the government often appeared incapable to respect the different programs of budgetary discipline.

C - LINEAR REGRESSION ANALYSIS OF THE GDP.

Once the public expenses structure identified in Turkey, we propose to test the public expenses efficiency for the economic growth. To do this, we construct another linear regression model of the GDP (endogenous variable) using the other variables (becoming endogenous) of the previous model. These last ones contain the public expenses variable.

Therefore, our linear regression model is composed of the same previous variables.

The linear model is the following one:

$$Y = C(1)*Y(-1) + C(2)*G/X(-1) + C(3)*M/X + C(4)*R(1) + C(5)*Z/X(-1) + C(6))$$

$$Y = 0.3864*Y(-1) - 0.3379*G/X(-1) - 2.2655*M/X + 0.0203*R(1) + 0.7324*Z/X(-1) + 52.5169$$

Dependent Variable: Y				
Method: Least Squares				
Date: 09/18/06 Time: 18:27				
Sample (adjusted): 1987Q2 2004Q2				
Included observations: 69 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	**0,3864**	**0,1221**	**3,1648**	**0,0024**
G/X(-1)	-0,3379	0,7430	-0,4548	0,6508
M/X	**-2,2655**	**0,3696**	**-6,1294**	**0,0000**
R(1)	0,0204	0,0477	0,4269	0,6709
Z/X(-1)	**0,7325**	**0,4023**	**1,8209**	**0,0734**
C	52,5170	36,5076	1,4385	0,1552
R-squared	0,6054	Mean dependent var		84,7881
Adjusted R-squared	0,5741	S.D. dependent var		21,1605
S.E. of regression	13,8100	Akaike info criterion		8,1716
Sum squared resid	12015,1800	Schwarz criterion		8,3659
Log likelihood	-275,9205	F-statistic		19,3302
Durbin-Watson stat	1,5378	Prob(F-statistic)		0,0000

This analysis puts in evidence that the three exogenous variables that are determining in the linear estimation of the volume of GDP are:

- The past level of the volume of GDP, which is very logical according to the traditional process of wealth accumulation in economy.

- But, the public expenses don't play the expected role in the economic activity development in spite of the importance of their volume. Indeed, the main part of the public expenses in Turkey is destined to the payment of the debt service and nourishes less and less the public investment. The State became an actor to the service of the banking and financial sector and no a major economic actor capable of balancing and dynamizing the economic activity. The high level of the interest rates, in addition to a relatively elevated debt, can only generate a debt service, which is very complex to manage. It weakens the leading economic role of the State. This is unfortunately the bitter report of the negative influence of a fast economic and financial opening of an emerging economy non prepared to the game new rules of the internationalization of goods and services exchange and the globalization of monetary and financial transactions. This fact joins our previous theoretical analysis of the key role of interest rates in the efficiency of public expenses.

- Evidently in such a context of economic and financial opening, the volume of the monetary base plays a determining role in the dynamization of the economy. In the case of Turkey, this variable has a negative influence. It can be explained itself by the hyperinflationary context that has long characterized the economic activity. A monetary policy less restrictive is often badly perceived and instead of dynamizing the economy, as it is in general the case, it dynamites the confidence in the public management of the economy and influences negatively the investment and therefore the economic activity volume.

- Finally, the ratio of private expenses has a positive role and it is relatively significant. Indeed, the level of the mistake threshold is slightly superior to 5%. Nevertheless, one can consider that this result is in conformity with our analysis of the Turkish economy where the private sector plays more and more a major dynamic role. This role is often underestimated because of the traditionally high weight of the informal sector in Turkey[11].

D - ANALYSIS BY THE VAR TECHNIQUE.

In the VAR technique, a sort of generalization of the autoregressive models, the selected variables according to the studied problem have all, a priori, the same status.

The coefficients of the VAR process can only be estimated from stationary sets, what is the case of our variables.

The next stage is the choice of the number of gradual delays, either the order of the VAR model. So, it is about classifying the different VAR models (one by period) according to the criterias of Akaike (AIC) and Schwarzes (SC). We keep the one of which the AIC and SC criterias are the weakest.

As in the annex III, the model that corresponds to the weakest criterias is the one that joins the budgetary policies to the other variables. In fact, it is about the role of GDP, inflation, interest rate and monetary base on the ratio of budgetary expenses with differentials of order 1 and order 2.

The retained model of linear regression is therefore the one of budgetary expenses ratio:

$$G/X = C(2,1)*Y(-1) + C(2,2)*Y(-2) + C(2,3)*G/X(-1) + C(2,4)*G/X(-2) + C(2,5) + C(2,6)*M/X + C(2,7)*R + C(2,8)*Z/X$$

The obtained results, represented in details in the annex III, are:

$$G/X = 0.0798*Y(-1) - 0.0052*Y(-2) + 0.1773*G/X(-1) + 0.2568*G/X(-2) - 14.2031 + 0.0773*M/X - 0.0030*R + 0.1899*Z/X$$

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[11] According to the survey economic of OECD on Turkey in 2005, on average, more of the half of the employees are not declared.

The variables that play a meaningful role are those that have a threshold mistake lower to 5%: Y(-1), Y(-2), M/X, R, Z/X. All those coefficients are positive. We can estimate therefore that the extent of the budgetary expenses depends positively on all those variables.

In accordance with the results, it clearly appears that the efficiency of the budgetary expenses is questioned in the case of Turkey. The budgetary policy is influenced by the other parameters of the economy and notably the variables of the monetary policy and not the inverse. Therefore, these results confirm our analyses issued from the regression obtained by the OLS method.

IV - CONCLUSION

Our first analysis of the budgetary expenses structure through its linear evaluation shows the increasing dependence of the budgetary expenses on the monetary market financing conditions. The deterioration of these conditions in Turkey - high interest rate, increasing inflation and restricted liquidity - resulted in an extremely expensive debt service that reinforced the budgetary policy inefficiency during the last two decades.

Therefore, we note in our second evaluation of the GDP growth that public expenses are not anymore the determining variable that generates positive reactions in chain on the other key variables of the economy. The essential reason of this deviation is the extraordinary rise of the interest rates. In a context of financial liberalization, the State is obliged to finance its budgetary deficit according to the conditions prevailing on the internal and external monetary markets and to pay therefore the counterpart of its macroeconomic unbalances.

The third linear regression coming from the model using the VAR Technique confirms our previous findings. The analysis of the set of these variables, without classifying them a priori between endogenous and exogenous and taking into account the temporal shift of order 1 or 2, confirmed the absence of an efficient and meaningful budgetary expenses role in the economic growth. The most optimal equation retained affirms the increasing and determinant role of the monetary conditions on the budgetary expenses volume that has no more determining impact on the investment level and therefore on the economic growth volume.

In other words, our analysis clearly puts in evidence that the Turkish economy presents the typical case of a developing country where an expansionary budgetary policy would not have any positive and tangible consequences on the real economy. The high interest rate reduces drastically the State's policies choices. The advantages of an expansionary economic policy are quickly caught up by the supplement of interest due on a mainly internal debt and financed according to the market law, in a context of financial liberalization. The progressive programming "sequencing" of the financial liberalization remained necessary to give to the budgetary policy the chance to succeed in a healthy monetary environment.

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ANNEXE I : List of variables used in the VAR model.

Quarters	Volume of GDP, 1987 constant prices (LT)	PUB DEF, 1987 constant prices (LT)	PRI DEF 1987 constant prices (LT)	Rate Creditor 3 months	Monetary base 1987 constant prices (LT)	Indice déflateur P
	X	G	Z	Rt	M	P
1987Q1	12,52	0,84	9,88	0,84	4,53	0,09
1987Q2	15,83	1,2	11,26	35,00	5,07	0,09
1987Q3	23,45	1,44	14,2	35,00	5,96	0,09
1987Q4	22,62	2,37	15,68	-53,89	8,44	0,11
1988Q1	21,27	1,64	15,71	-74,09	6,81	0,14
1988Q2	27,93	2,08	18,7	-15,47	7,45	0,16
1988Q3	42,82	2,52	23,78	45,00	8,87	0,16
1988Q4	37,2	3,6	23,87	-32,00	11,02	0,19
1989Q1	34,54	2,81	25,55	-17,54	9,93	0,23
1989Q2	45,37	3,69	32,21	7,76	11,89	0,26
1989Q3	78,79	6,63	42,57	5,92	15,26	0,29
1989Q4	68,63	8,11	48,81	-3,67	19,09	0,33
1990Q1	62,25	7,69	48,78	1,82	18,33	0,37
1990Q2	84,3	9,02	61,73	-17,89	23	0,43
1990Q3	130,58	11,18	77,1	28,23	25,04	0,45
1990Q4	115,93	15,2	81,95	-15,19	30,24	0,52
1991Q1	96,46	13,35	76,44	3,02	26,94	0,58
1991Q2	128,14	15,33	93,5	6,59	31,92	0,65
1991Q3	213,25	21,94	130	24,41	35,98	0,71
1991Q4	192,27	27,27	134,43	-19,71	44,28	0,86
1992Q1	177,87	25,22	134,53	9,20	42,49	0,99
1992Q2	223,31	29	158,16	31,91	48,68	1,08
1992Q3	357,25	38,34	212,44	50,91	58,97	1,13
1992Q4	334,95	48,02	229,18	-37,56	76,37	1,43
1993Q1	303,84	47,29	235,5	21,08	75,87	1,6
1993Q2	407,57	53,26	294,32	23,90	88,9	1,77
1993Q3	662,76	66,34	418,41	23,25	103,13	1,95
1993Q4	607,7	91,21	421,19	-26,26	125,87	2,39
1994Q1	510,7	77,93	424,56	35,55	99,12	2,56
1994Q2	786,7	97,82	572,98	-116,95	147,3	3,82
1994Q3	1296,7	118,54	802,61	95,84	196,56	4,13
1994Q4	1274,33	156,31	906,12	-41,95	228,41	5,3
1995Q1	1228,16	137,97	998,05	-1,02	229,87	6,26
1995Q2	1645,86	188,07	1200,93	35,24	305,95	7,03
1995Q3	2585,3	197,8	1626,74	43,12	360,43	7,56
1995Q4	2303,14	313,41	1632,18	-6,24	384,39	8,98
1996Q1	2180,55	283,81	1750,82	21,77	408,01	10,23
1996Q2	2952,4	331,17	2164,78	28,03	502,42	11,67
1996Q3	4886,47	494,46	2996,84	13,93	608,01	13,58
1996Q4	4752,7	599,81	3025,25	-29,94	882,29	17,3
1997Q1	4156,53	534,41	3260,49	58,10	991,42	18,23
1997Q2	5775,99	744,31	4267,6	14,89	1079,05	21,05
1997Q3	9652,86	999,35	5915,47	0,76	1132,72	25,06
1997Q4	9250,5	1257,04	6175,53	-17,46	1491,71	31,25
1998Q1	8528,17	1166,78	6800,74	44,50	1479,57	34,25
1998Q2	10997,9	1434,65	8210,35	29,30	1788,09	38,82
1998Q3	17176,8	1668,24	10752,3	32,62	2125,05	43,44
1998Q4	15522,1	2363,1	10359,2	-13,54	2432,97	53,09
1999Q1	11999,4	2158,11	10035,6	86,81	3010,41	52,48
1999Q2	16362	2498,34	12722,5	32,22	2655,71	59,05
1999Q3	25672,6	3046,26	16661,8	13,44	3128,3	69,25
1999Q4	23381,3	4045,03	16507,9	7,77	4709,81	81,69
2000Q1	21096,2	3207,81	16879,6	41,35	4608,44	87,39
2000Q2	27444,2	4059,54	21260,8	12,88	5357,5	93,08
2000Q3	40122	4458,07	26560,3	9,33	6126,44	100,41
2000Q4	35920,6	5813,53	24277	-20,94	7406,91	115,88
2001Q1	25154,4	4175	22792,5	104,99	7817,09	105,22
2001Q2	38797,7	5682,96	29686,3	-64,66	9278,4	145,21
2001Q3	58997,7	6246,85	38567,1	41,52	10105,8	159,56
2001Q4	55462,6	9300,54	37467,1	-31,32	10839,6	199,08
2002Q1	49903,3	7152,38	35850,4	51,79	10552,1	204,48
2002Q2	59890,7	8909,53	44272,1	55,08	12135,4	205,68
2002Q3	86169,9	9546,37	53605,2	28,76	12988,5	215,94
2002Q4	80039	13113,7	50308,8	-28,36	14814,3	257,96
2003Q1	69004,1	9686,13	48929,6	41,56	13888,6	261,05
2003Q2	79504,4	11532,9	55932,6	43,38	16069,3	262,72
2003Q3	113569	12620,9	71783,6	31,57	18173	269,62
2003Q4	97685,2	15164,6	62940,1	-3,86	21193,6	295,64
2004Q1	79919,8	11643,6	58636,9	56,40	21214,7	274,61
2004Q2	95185,9	12650,9	67435,2	20,77	24101,8	277,36
2004Q3	133035	13617,2	84257	-11,59	25841,5	302,11

List of observations of the econometric model.

Quarters	Volume GDP (100=price 2000) Y	Ratio PUB DEP /GDP G/X	Ratio PRI EXP/GDP Z/X	Creditor rates on 3 months Deposits Rt	Ratio of Monetary Base /GDP M/X	Inflation rate P
1987Q4	67,38	10,48	69,32	-15,47	37,31	22,22
1988Q1	49,77	7,71	73,86	45,00	32,02	27,27
1988Q2	56,81	7,45	66,95	-32,00	26,67	14,29
1988Q3	86,84	5,89	55,53	-17,54	20,71	0,00
1988Q4	64,02	9,68	64,17	7,76	29,62	18,75
1989Q1	48,57	8,14	73,97	5,92	28,75	21,05
1989Q2	55,86	8,13	70,99	-3,67	26,21	13,04
1989Q3	87,39	8,41	54,03	1,82	19,37	11,54
1989Q4	66,28	11,82	71,12	-17,89	27,82	13,79
1990Q1	53,79	12,35	78,36	28,23	29,45	12,12
1990Q2	63,30	10,70	73,23	-15,19	27,28	16,22
1990Q3	92,85	8,56	59,04	3,02	19,18	4,65
1990Q4	72,04	13,11	70,69	6,59	26,08	15,56
1991Q1	53,55	13,84	79,25	24,41	27,93	11,54
1991Q2	63,00	11,96	72,97	-19,71	24,91	12,07
1991Q3	96,52	10,29	60,96	9,20	16,87	9,23
1991Q4	71,53	14,18	69,92	31,91	23,03	21,13
1992Q1	57,95	14,18	75,63	50,91	23,89	15,12
1992Q2	66,57	12,99	70,83	-37,56	21,80	9,09
1992Q3	101,68	10,73	59,47	21,08	16,51	4,63
1992Q4	75,43	14,34	68,42	23,90	22,80	26,55
1993Q1	60,80	15,56	77,51	23,25	24,97	11,89
1993Q2	74,10	13,07	72,21	-26,26	21,81	10,63
1993Q3	109,22	10,01	63,13	35,55	15,56	10,17
1993Q4	81,76	15,01	69,31	-116,95	20,71	22,56
1994Q1	63,95	15,26	83,13	95,84	19,41	7,11
1994Q2	66,18	12,43	72,83	-41,95	18,72	49,22
1994Q3	100,70	9,14	61,90	-1,02	15,16	8,12
1994Q4	77,27	12,27	71,11	35,24	17,92	28,33
1995Q1	62,99	11,23	81,26	43,12	18,72	18,11
1995Q2	75,14	11,43	72,97	-6,24	18,59	12,30
1995Q3	109,73	7,65	62,92	21,77	13,94	7,54
1995Q4	82,39	13,61	70,87	28,03	16,69	18,78
1996Q1	68,46	13,02	80,29	13,93	18,71	13,92
1996Q2	81,21	11,22	73,32	-29,94	17,02	14,08
1996Q3	115,54	10,12	61,33	58,10	12,44	16,37
1996Q4	88,18	12,62	63,65	14,89	18,56	27,39
1997Q1	73,19	12,86	78,44	0,76	23,85	5,38
1997Q2	88,09	12,89	73,89	-17,46	18,68	15,47
1997Q3	123,67	10,35	61,28	44,50	11,73	19,05
1997Q4	95,05	13,59	66,76	29,30	16,13	24,70
1998Q1	79,95	13,68	79,74	32,62	17,35	9,60
1998Q2	90,96	13,04	74,65	-13,54	16,26	13,34
1998Q3	126,97	9,71	62,60	86,81	12,37	11,90
1998Q4	93,87	15,22	66,74	32,22	15,67	22,21
1999Q1	73,41	17,99	83,63	13,44	25,09	-1,15
1999Q2	88,96	15,27	77,76	7,77	16,23	12,52
1999Q3	119,03	11,87	64,90	41,35	12,19	17,27
1999Q4	91,90	17,30	70,60	12,88	20,14	17,96
2000Q1	77,51	15,21	80,01	9,33	21,84	6,98
2000Q2	94,67	14,79	77,47	-20,94	19,52	6,51
2000Q3	128,30	11,11	66,20	104,99	15,27	7,87
2000Q4	99,53	16,18	67,59	-64,66	20,62	15,41
2001Q1	76,76	16,60	90,61	41,52	31,08	-9,20
2001Q2	85,78	14,65	76,52	-31,32	23,91	38,01
2001Q3	118,71	10,59	65,37	51,79	17,13	9,88
2001Q4	89,45	16,77	67,55	55,08	19,54	24,77
2002Q1	78,36	14,33	71,84	28,76	21,15	2,71
2002Q2	93,49	14,88	73,92	-28,36	20,26	0,59
2002Q3	128,12	11,08	62,21	41,56	15,07	4,99
2002Q4	99,62	16,38	62,86	43,38	18,51	19,46
2003Q1	84,87	14,04	70,91	31,57	20,13	1,20
2003Q2	97,16	14,51	70,35	-3,86	20,21	0,64
2003Q3	135,24	11,11	63,21	56,40	16,00	2,63
2003Q4	106,09	15,52	64,43	20,77	21,70	9,65
2004Q1	93,44	14,57	73,37	-11,59	26,54	-7,11
2004Q2	110,19	13,29	70,85	21,59	25,32	1,00
2004Q3	141,38	10,24	63,33	19,68	19,42	8,92

ANNEXE II : Tests of Unit Roots.

It is about testing the sets of observations of the variables kept by the model in order to verify their stationary that is a strong condition of the application of the linear regression by the method OLS.

In the case of the model that preoccupies us, we transform automatically the variables under a logarithmic shape, then we study their stationary. Here below is the result of ADF test attesting this stationary.

A. The variable of Public Expenses G (at 1987 constant price values). The retained Stationary Shape is the ratio G in GDP, **G/X**

Null Hypothesis: **G/X** has a unit root Exogenous: Constant Bandwidth: 5 (Newey-West using Bartlett kernel)			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		**-5.371902**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	
R-squared	0.283564	Mean dependent var	0.007184
Adjusted R-squared	0.272870	S.D. dependent var	0.038482
S.E. of regression	2.483159	Akaike info criterion	2.912049
Sum squared resid	413.1274	Schwarz criterion	4.685498
Log likelihood	-159.6497	F-statistic	4.750254
Durbin-Watson stat	2.134484	Prob(F-statistic)	26.51841

B. The variable of GDP Y (100= price 2000). The calculation of GDP permitted to get a set of observations having a stationary shape.

		Adj. t-Stat	Prob.*
Null Hypothesis: **Y** has a unit root			
Exogenous: Constant			
Bandwidth: 8 (Newey-West using Bartlett kernel)			
Phillips-Perron test statistic		**-5.770340**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	
R-squared	0.276887	Mean dependent var	1.370714
Adjusted R-squared	0.266253	S.D. dependent var	23.65361
S.E. of regression	20.26146	Akaike info criterion	8.883473
Sum squared resid	27915.82	Schwarz criterion	8.947716
Log likelihood	-308.9216	F-statistic	26.03786
Durbin-Watson stat	1.751803	Prob(F-statistic)	0.000003

C. The variable of Privat Expenses Z : The retained stationary shape is the ratio Z in GDP, **Z/X**

		Adj. t-Stat	Prob.*
Null Hypothesis: Z/X has a unit root			
Exogenous: Constant			
Bandwidth: 25 (Newey-West using Bartlett kernel)			
Phillips-Perron test statistic		**-7.392829**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	
R-squared	0.452329	Mean dependent var	-0.112990
Adjusted R-squared	0.444155	S.D. dependent var	9.644093
S.E. of regression	7.190154	Akaike info criterion	6.811859
Sum squared resid	3463.788	Schwarz criterion	6.876616
Log likelihood	-233.0092	F-statistic	55.33628
Durbin-Watson stat	1.830090	Prob(F-statistic)	0.000000

D. The Variable of Monetary basis M : The retained stationary shape is the ratio M /GDP, M / X

		Adj. t-Stat	Prob.*
Null Hypothesis: MX has a unit root			
Exogenous: Constant			
Bandwidth: 12 (Newey-West using Bartlett kernel)			
Phillips-Perron test statistic		**-5.372518**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	
R-squared	0.261108	Mean dependent var	-0.112990
Adjusted R-squared	0.250079	S.D. dependent var	9.644093
S.E. of regression	4.463037	Akaike info criterion	6.811859
Sum squared resid	1334.553	Schwarz criterion	6.876616
Log likelihood	-200.1042	F-statistic	55.33628
Durbin-Watson stat	1.917618	Prob(F-statistic)	0.000000

E. The variable of real interest rate over the three months banking deposits rr

		Adj. t-Stat	Prob.*
Null Hypothesis: RR_CREDITEUR_DE_3_MOIS_R has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West using Bartlett kernel)			
Phillips-Perron test statistic		**-11.4112357**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	
R-squared	0.659497	Mean dependent var	-0.675270
Adjusted R-squared	0.654414	S.D. dependent var	62.01093
S.E. of regression	36.45405	Akaike info criterion	10.05853
Sum squared resid	89036.15	Schwarz criterion	10.12329
Log likelihood	-345.0196	F-statistic	129.7677
Durbin-Watson stat	1.997721	Prob(F-statistic)	0.000000

F. Inflation : The retained stationary shape is the Inflation Rate, either P. This shape reflects the inflation growth rate in Turkey.

Null Hypothesis: TAUX-INFLATION has a unit root			
Exogenous: Constant			
Bandwidth: 2 (Newey-West using Bartlett kernel)			

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		**-9.099908**	**0.0000**
Test critical values:	1% level	-3.528515	
	5% level	-2.904198	
	10% level	-2.589562	

R-squared	0.554620	Mean dependent var	0.115942
Adjusted R-squared	0.547973	S.D. dependent var	14.55773
S.E. of regression	9.787594	Akaike info criterion	7.428665
Sum squared resid	6418.398	Schwarz criterion	7.493422
Log likelihood	-254.2890	F-statistic	83.43346
Durbin-Watson stat	1.987880	Prob(F-statistic)	0.000000

HILMI Nathalie & Alain SAFA

ANNEXE III : Estimation of the VAR model.

Vector Autoregression Estimates Date: 09/19/06 Time: 06:40 Sample (adjusted): 1987Q3 2004Q3 Included observations: 69 after adjustments Standard errors in ( ) & t-statistics in [ ]		
	Y	**G/X**
Y(-1)	0.278881 (0.09502) [2.93485]	**0.079874** **(0.01199)** **[6.66326]**
Y(-2)	0.008150 (0.14455) [0.05638]	**-0.005260** **(0.01824)** **[-0.28845]**
G/X(-1)	2.950364 (1.02792) [2.87022]	0.177332 (0.12967) [1.36755]
G/X(-2)	0.848614 (0.79086) [1.07302]	0.256838 (0.09977) [2.57438]
C	161.4621 (18.5941) [8.68352]	-14.20314 (2.34563) [-6.05515]
M/X	-0.924556 (0.32805) [-2.81838]	**0.077349** **(0.04138)** **[1.86911]**
R(1)	0.024601 (0.03940) [0.62433]	**0.003073** **(0.00497)** **[0.61830]**
Z/X	-1.826067 (0.29977) [-6.09147]	**0.189945** **(0.03782)** **[5.02284]**
R-squared Adj. R-squared Sum sq. resids S.E. equation F-statistic Log likelihood Akaike AIC Schwarz SC Mean dependent S.D. dependent	0.794094 0.770072 6080.813 10.06712 33.05646 -249.2629 7.566557 7.827676 85.23000 20.99467	0.813273 0.791489 96.76776 1.269959 37.33219 -108.4832 **3.425977** **3.687096** 12.41312 2.781153
Determinant resid covariance (dof adj.) Determinant resid covariance Log likelihood Akaike information criterion Schwarz criterion		114.6252 89.24104 -345.6812 10.63768 11.15992

HILMI Nathalie & Alain SAFA

22