Military Spending, Investment and Economic Growth in Small Industrialising Economies

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Abstract

An enduring and important debate in economics concerns the effects of military spending on economic growth. It has generated a huge literature, with a variety of results and no clear consensus. The end of the Cold War led to marked reductions in military burdens and to renewed concerns on whether this was likely to lead to a 'peace dividend' or a 'peace penalty'. This paper revisits the debate using a sample of small industrialising economies. It estimates a growth equation and an investment equation, where investment is a function of growth and military expenditure. The data is used to consider the individual economies and to provide some panel time-series results, which show some evidence of a negative impact of military spending on growth and investment.

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1. Introduction

The economic effects of military spending have been debated over a number of years. Since Benoit (1973) suggested that military expenditure had a positive impact on development, a large body of empirical literature has developed, looking at cross country studies and time series case studies of individual economies, without achieving any clear consensus. The results do suggest that military expenditure has a negative impact on growth in advanced economies through it being at the expense of investment, but there is no evidence of a significant effect for developing economies. The difficulties of generalising across large groups of economies led to the growth of case studies, which while helping to gain an understanding of the dynamics of the relationship for individual countries, still make generalisation difficult (Dunne, 1995). At the same time the end of the Cold War should have heralded important changes for any military expenditure-growth relationship. The marked changes in military spending around the world have added to the variance of the data and made it more likely that any effect of military expenditure on growth will be picked up. There are also now enough post Cold War observations to make re-estimating the defence-growth relationship worthwhile.

This paper's contribution to the debate is to estimate growth and investment equations for a range of small-industrialising economies for the period 1960-98, using panel data methods. Section 2 provides a brief overview of the issues in the literature, with section 3 discussing the sample selection and data collection. Section 4 then develops the commonly used Feder-Ram growth model, but noting recent criticisms of it also develops an alternative Solow-Swan growth model. Section 5 then discusses the application of the models, using dynamic panel methods and section 6 presents the results for both models. Finally, section 7 presents some conclusions.

2. Economic Effects of Military Spending

Theoretically, any evaluation of the impact of military spending on growth is contingent on the theoretical perspective used. Neoclassical models are generally supply side with a focus on the trade off between 'guns and butter'. Keynesian models see military spending simply as one component of public expenditure and so of aggregate demand and focus on the demand side, although any effects of military expenditure on investment, employment or technology will have supply side implications through the production function. A group of institutional economists focus on the damaging impact of the military industrial complex on the economy and Marxists vary from the positive effects of the underconsumptionists, through preventing realisation crises to its possible negative impact on the profit rate (Dunne, 1990). When moving to empirical analyses it is necessary to determine the level of abstraction at which the analysis is to be presented and to operationalise the theory to form an applied model. This has led to a variety of empirical work from applied econometrics to more focussed institutional case study approaches. When statistical analysis is undertaken it is generally the neoclassical/Keynesian models that are used as these are most amenable to the creation of formal models, though some studies have adopted a more ad hoc approach. Studies also differ in terms of the country coverage, whether they use time series or cross section data, the time period covered and the empirical methods used (Dunne, 1996).

In general, the empirical analyses have identified a number of channels by which military spending can influence the economy and both can be positive or negative. It can take skilled labour away from civil production, but on the other hand can train workers, particularly in developing economies where the military may provide valuable skills. It can take the best capital equipment from civil industry to produce a high technology enclave, on the other hand there may be positive externalities of the development of the military sector on the civil sector. It can lead to damaging wars, but may maintain peace and lead to economic benefits from more prosperous allies. It can stimulate demand in a stagnant economy and lead to growth, but may create bottlenecks in a constrained economy. Finally, it may slow down development through the fostering of a militaristic ideology, but on the other hand nationalist attitudes may increase effort and output and the military and militaristic ideology may be used to control the workforce. Clearly whether the net effects are positive or negative is an empirical question and is likely to differ across countries (Deger and Sen, 1995, Ram 1995)

Following the ad hoc approach of Benoit's original study, which found a positive effect of military spending on growth in developing countries an impressive literature has been built up using econometric analyses of single equation reduced form models and simultaneous equation models, which model both direct and indirect effects (Smith, 2000). In addition, macroeconometric models have been used to simulate the likely impact of changes in military spending at country and international level (Gleditsch et al., 1996).

One can argue that the overall results tend to show an insignificant or negative impact of military spending on economic growth in developing countries and a clearer negative impact in developed economies, through military spending being at the expense of investment rather than consumption. This does, however, hide a diversity of literature and results. Many of the earlier cross-section analyses have found sample selection to be important and this led to calls for more case studies. Time series analyses of individual economies and groups of economies have improved understanding, but also produced a variety of results (Dunne, 1996). This suggests that working between these extremes, using cross-country studies of groups of similar economies with relatively long time series may be of value. This paper takes this approach, focusing upon a sample of small industrialising economies.

3. Data

The data for the empirical analysis is taken from the World Bank Economic Indicators (2000), with military burden data taken from the Stockholm International Peace Research Institute (SIPRI). A sample of countries that could be described as small industrialising economies were chosen and after losing a number of countries because of missing data a sample of 14 countries remained. The characteristics of these countries are given in Table 1.

Table 1: Sample Characteristics 1998

Country	Population Millions	Military Burden %	GNP per capita $ 1998	Rank
Chile	14.8	3.5	4990	66
Brazil	165.9	1.4	4630	68
Argentina	36.1	1.3	8030	55
Venezuela	23.2	1.3	3530	81
Spain	39.4	1.3	14100	39
South Africa	41.4	1.4	3310	83
Portugal	10.0	2.2	10670	48
Malaysia	22.2	1.6	3670	78
Greece	10.5	4.8	11740	46
Philippines	75.2	1.4	1050	132
India	979.7	2.2	440	161
Israel	6.0	8.6	16180	32
Pakistan	131.6	4.6	470	158
S. Korea	46.4	3.1	8600	51

Source: World Development Indicators, 2000 and SIPRI Yearbook 2001.

4. Analysing Military Expenditure and Growth

Econometric analyses of the relation between military spending and growth in developing economies have followed a numbers of different approaches in the literature. There are models based on neoclassical production functions, with the Feder-Ram variant being the most popular; Keynesian simultaneous systems augmented by an aggregate production function; more atheoretical statistical analyses using Granger causality and cointegration techniques (Dunne, 1996).

The simple Feder-Ram model has appealed to defence economists, mainly because of its ability to explicitly treat externality effects of the military on the non-military sector. In the basic model two distinct sectors military (M) and non-military (C) are assumed with labour L and capital K the divisible inputs, and the military sector is assumed to have an externality effect on the rest of the economy.

$$M = M\,(L_M\,, K_M\,) \tag{1}$$

$$C = C\,(\,L_C\,, K_C\,, M\,) \tag{2}$$

with

$$Q = M + C \tag{3}$$

$$K = K_M + K_C \tag{4}$$

$$L = L_M + L_C \tag{5}$$

If sectoral input productivities are allowed to differ such that the ratios of the marginal productivities for the sectors are:

$$M'_K / C'_K = M'_L / C'_L = 1 + \delta \tag{6}$$

Then military spending can have two different effects, the productivity differential δ and the externality effect ($\delta C / \delta M > 0$). Following Biswas and Ram (1986) and reformulating in terms of aggregate inputs, taking the total derivative of Q, dQ and then substituting and manipulating gives:

$$dQ/Q = \beta\, dL/L + \alpha\,(I / Y) + ((\delta / 1{+}\delta) - C'_M\,)\, dM/M\,(M / Q) \tag{7}$$

The coefficient on the last term is the sum of the externality and factor productivity differential effects of military spending. Following Biswas and Ram (1986) and assuming that the externality parameter is not C'_M but C'_M (M/C) and is denoted θ allows us to write.

$$dQ/Q = \beta\, dL/L + \alpha\, (I / Y) + ((\delta / 1+\delta) - \theta)\, dM/M\, (M / Q) + \theta\, dM/M \tag{8}$$

Separate estimates of θ and δ can be obtained.

To operationalise the model for empirical application the instantaneous rates of change of the variables are replaced by their discrete equivalents giving:

$$\Delta Y_t/Y_{t-1} = \alpha_0 + \alpha_1\ \Delta L_t/L_{t-1} + \alpha_2\, I_t/Y_{t-1} + \alpha_3\ \Delta M_t/M_{t-1}\, (M_t/Y_{t-1})$$

$$+ \alpha_4\, \Delta M_t/M_{t-1} \tag{9}$$

Initially, these models were used on cross sections, but increasingly have been applied to time series for individual countries.

Such models have, however, come under a lot of recent criticism (Birdi and Dunne, 2002; Dunne and Willenbockel, 2000), which leads us to consider the simple neoclassical Solow-Swan growth model used in Smith and Dunne (2002). This was developed by Mankiw et al. (1992) and used to study the economic impact of military spending by Knight et al. (1996). Output Y_t is determined by capital K_t, labour enhancing technology A_t, and labour L_t :

$$Y_t = K_t^{\alpha}\, (A_t L_t)^{1-\alpha} \tag{10}$$

Capital stock is gross investment I_t plus the depreciated capital stock of the previous period and output is devoted to consumption, investment, human capital and military expenditure. Taking the steady state equilibrium level of output as

$$\ln y_t^* = (\alpha/ 1-\alpha) \ln(1-c-m) - \ln(n+g+\delta) + gt \qquad (11)$$

with c and m shares of consumption and military spending in output, n the growth of labour force, g the growth of technology and δ the rate of capital depreciation.

Now $$\ln y_t = \kappa + (1-\lambda) \ln y_t^* + \lambda \ln y_{t-1} \qquad (12)$$

This type of relationship has been estimated on cross country data, with good results, but some criticism (Lee, Pesaran and Smith, 1997, Temple, 1999)

Now we have dealt with the growth effect of military spending and would expect from this model that military expenditure would have a negative effect on growth through its impact on investment. In this paper we assume that the demand for military spending is exogenous -a common assumption in most studies.

5. Estimation Methods

A major problem with time series analyses of the economic effect of military expenditure has been the relatively small amount of variation in the data over time. It is simply difficult to identify any particular effect of military spending, given the other changes that are taking place. The size of the cuts in military spending that followed the end of the Cold War has improved the situation for researchers. At the same time the development of panel data methods, which pool cross section and time series data, have also assisted in overcoming the lack of independent exogenous variation in the data, especially when used for a relatively homogenous group of countries (Murdoch et al., 1997). There is a problem with pooled estimates, however, as the cross section and time series parameter may be measuring different things, the former the long run and the latter the short run effects. The pooled relation is then a weighted average of the two (Smith and Dunne, 2002)

Panel data methods provide a variety of approaches to attempt to deal with some of these issues, with pooling the simplest form and fixed effect , random effect and random coefficient estimators providing more flexible approaches. The pooled OLS method simply estimates a model of the form:

$$y_{jt} = \alpha + \beta x_{jt} + u_{jt} \quad (13)$$

on all of the data, j=1,2,...N and t=1,2,...T. This implicitly assumes that all parameters are the same for each country. The most common panel estimator is the one way fixed effects estimator, which allows the intercept to differ across countries:

$$y_{jt} = \alpha_j + \beta x_{jt} + u_{jt} \quad (14)$$

This is equivalent to taking deviations from the mean of each group for the whole time period for each observation and then using these deviations in the regression. Taking deviations in this way means that only the within group variation is considered and the information in the between group cross sectional relation is ignored. The pooled estimates give both types of information, within and between, equal weight.

Time fixed effects can also be allowed for, separately or together in a two way fixed effect model:

$$y_{jt} = \alpha_t + \alpha_j + \beta x_{jt} + u_{jt} \quad (15)$$

This allows for a completely flexible trend common to all countries. A random effects model allows for the intercepts to be random, drawn from some probability distribution with a finite number of parameters. This gives an estimator that is between the pooled and fixed effects models, but we do not use it here.

With the relatively long time series available it has become possible to introduce dynamics to the panel data models. In dynamic models of the form:

$$y_{jt} = \alpha_j + \beta\, x_{jt} + \lambda\, x_{jt-1} + u_t \qquad (16)$$

the fixed effect estimator is not consistent as N, the number of groups, goes to infinity for fixed T because of lagged dependent variable bias, which biases λ downwards. It is, however, consistent as T goes to infinity. For samples where T is large, as it is here, the bias is small. If the parameters differ over the groups

$$y_{jt} = \alpha_j + \beta_j\, x_{jt} + \lambda_j\, x_{jt-1} + e_{jt} \qquad (17)$$

then there is a further heterogeneity bias. This arises because the error in the fixed effects equation is:

$$u_{jt} = e_{jt} + (\beta_j - \beta)\, x_{jt} + (\lambda_j - \lambda)\, y_{jt-1} \qquad (18)$$

which is correlated with the regressors. This will bias the estimate of λ upwards towards unity, in the standard case where the x_{jt} is positively serially correlated. The bias will be smaller in the long run effect $\beta/(1-\lambda)$ because the estimate of β is biased downwards and the estimate of λ biased upwards. When T is large this bias can be avoided by estimating each equation individually and then taking the weighted or unweighted average of the individual estimates. A common weighted average is the random coefficient model (RCM) estimator of Swamy (1970) discussed in Pesaran and Smith (1995).

6. Estimation Results

Taking our sample of 14 small industrialising over the period 1960-97, data for GDP, gross domestic fixed investment (constant 1995 US $) and population are combined with SIPRI data on military expenditure as a share of GDP.

Table 2: Average Investment Share, Military Burden and Growth

	AVSI	AVSM	AVDLY
Chile	.173	.038	.044
Brazil	.266	.015	.048
Argentina	.225	.024	.026
Venezuala	.231	.019	.029
Spain	.211	.029	.040
South Africa	.235	.030	.032
Portugal	.218	.046	.042
Malaysia	.264	.043	.068
Greece	.244	.052	.040
Philippines	.213	.017	.039
India	.217	.032	.044
Israel	.229	.158	.058
Pakistan	.178	.061	.056
South Korea	.237	.044	.077

AVSI: Average share of investment
AVSM: Average share of military spending
AVDLY Average growth of output

To estimate the relation between military expenditure and investment, a pooled OLS model is estimated following Smith (1980)

$$i_{jt} = \alpha + \beta m_{jt} + \gamma g_{jt} + u_{jt} \quad (19)$$

then a fixed effects

$$i_{jt} = \alpha_j + \beta m_{jt} + \gamma g_{jt} + u_{jt} \quad (20)$$

and a third form which estimates a separate regression for each country

$$i_{jt} = \alpha_j + \beta_j m_{jt} + \gamma_j g_{jt} + u_{jt} \quad (21)$$

and then computes the Swamy (1970) random coefficient model estimator of the mean of the coefficients.

This gave the results in Table 3

Table 3: Investment Equation Results

N=14	Pooled	Fixed one	Fixed two	RCM
m	-0.123	-0.111	-0.101	0.103
	(-0.51)	(-1.90)	(-1.05)	(0.17)
Δ ln y	0.443	0.398	0.394	0.373
	(0.76)	(6.55)	(6.72)	(5.20)
constant	0.209	0.211	-	0.212
	(8.14)	(48.5)	-	(16.1)

Without Israel

N=13	Pooled	Fixed one	Fixed two	RCM
m	-0.957	-0.622	-0.459	0.972
	(-1.52)	(-4.61)	(-2.51)	(0.15)
Δ ln y	0.778	0.396	0.369	0.357
	(1.28)	(6.30)	(6.03)	(4.71)
constant	0.222	0.228	-	0.214
	(8.49)	(39.0)	-	(15.3)

Notes:
Pooled:
RCM: Random coefficient model
Fixed one: One way fixed effects, with group effects
Fixed two: Two way fixed effects

Absolute t ratios in brackets

These results show a negative, though insignificant, impact of military burden (m) on the share of investment in output (i), except for the random coefficient estimates, with a significant positive effect of growth, except for the pooled results. Inspecting the plots of the country means of military spending, investment, and growth showed Israel to be something of an outlier. While there is no justification for excluding Israel a priori from the sample it is worth investigating the effect on parameters when it is dropped. The negative effect of military burden becomes significant for the fixed effects models, but less significant for the random coefficients model. This shows a clear difference between the cross section relationship, which is best represented in the pooled model, and the time series relationship which is represented by the random coefficient and fixed effects models.

Taking the Feder Ram model

$$\Delta Y_{it}/Y_{it-1} = \alpha_0 + \alpha_1 \ \Delta L_{it}/L_{it-1} + \alpha_2 \ I_{it}/Y_{it-1} + \alpha_3 \ \Delta M_{it}/M_{it-1} \ (M_{it}/Y_{it-1}) + \alpha_4 \Delta M_{it}/M_{it-1} \qquad (22)$$

and estimating this over the 14 countries gave the results in Table 4. Estimates are reported for a simple pooling of the data, the Swamy random coefficients or pooled mean estimator and for fixed country effects. A time trend is included to proxy technology and so fixed time effects are not considered.

Table 4: Feder-Ram Growth Equation Results

	Pooled	RCM	Fixed
Constant	0.054	-0.043	-
	(10.74)	(-0.60)	
$\Delta L_{it}/L_{it-1}$	0.202	0.098	0.025
	(1.68)	(0.05)	(12.6)
I_{it}/Y_{it-1}	0.002	0.412	0.002
	(1.03)	(2.70)	(0.80)
$\Delta M_{it}/M_{it-1}$ (M_{it}/Y_{it-1})	-0.007	-1.531	-0.074
	(-0.05)	(-0.68)	(-0.55)
$\Delta M_{it}/M_{it-1}$	0.018	0.092	0.015
	(1.47)	(0.83)	(1.34)
T	-0.0006	-0.0005	-0.0006
	(-3.59)	(-0.88)	(-3.93)
θ: Size	0.018	0.092	0.015
δ: Externality	0.011	-3.878	-0.056

Notes:
Pooled:
RCM: Random coefficient model
Fixed: Fixed effects
t ratios in brackets

These results are extremely poor with only a few of the variables showing significance across the three specifications. While the RCM results differ from the other two, in no specification are the military spending terms significant and the individual country results show them to be significant for only 2 of the fourteen countries. Clearly, this does not contradict the common finding of little significant effect of military spending, but the results of the Feder Ram growth are really rather poor.

Moving on to consider the alternative method of modelling the relationship, the Solow-Swan growth model, assuming the growth of technology less capital depreciation $(g+\delta)$ is 0.05, can be operationalised as:

$$\Delta \ln y_{jt} = \phi + \phi_1 \Delta \ln i_{jt} + \phi_2 \ln i_{jt-1} + \phi_3 \Delta \ln m_{jt} + \phi_4 \ln m_{jt-1}$$
$$+ \phi_5 \ln(n_{jt} + 0.05) + \phi_6 \ln y_{jt} + \phi_7 T + \phi_8 \Delta \ln y_{jt-1} + \phi_7 u_{jt} \qquad (23)$$

Which when estimated gives the results in Table 5.

Table 5: Solow Growth Equation Results

	Pooled	RCM	Fixed	OECD RCM
Constant	-0.034	0.973	-	1.074
	(1.47)	(1.81)		(2.53)
$\Delta \ln i_{jt}$	0.137	0.157	0.144	0.214
	(11.7)	(3.89)	(12.6)	(6.04)
$\ln i_{jt-1}$	0.018	0.041	0.042	0.037
	(2.81)	(1.35)	(4.90)	(1.56)
$\Delta \ln m_{jt}$	-0.014	-0.008	-0.021	-0.058
	(1.64)	(0.44)	(2.50)	(3.17)
$\ln m_{jt-1}$	0.006	-0.0004	-0.008	-0.003
	(2.82)	(0.02)	(1.94)	(0.21)
$\ln y_{jt}$	-0.003	-0.185	-0.038	-0.10
	(2.89)	(4.53)	(4.26)	(2.71)
$\ln(n_{jt} + 0.05)$	-0.039	-0.183	-0.043	-0.143
	(5.47)	(1.31	(3.84)	(3.11)
T	-0.0003	0.004	0.0004	0.002
	(2.18)	(2.15)	(1.49)	(1.96)
$\Delta \ln y_{jt-1}$	0.22	0.043	0.97	0.029
	(5.51)	(0.69)	(2.35)	(0.52)
Long run:				
i	6.0	0.22	1.10	0.27
m	3.0	-0.002	-0.26	-0.03

Notes:
Pooled:
RCM: Random coefficient model
Fixed: Fixed effects
RCM OECD: Random coefficient model results for same period for OECD countries, Dunne and Smith (2000)
Absolute t ratios in brackets

The pooled and fixed effects give relatively similar results, but different signs for lagged military share and hence the long run effect. The random coefficient results vary, but they are generally less significant than the fixed effects. The long run values for the pooled do not appear to make sense, being both large and positive for investment share and military burden. The results for the random coefficient and fixed estimates are more sensible and give a negative sign for the military burden, with the fixed effects giving the largest value. This shows a clear difference between the cross section relationship and the time series relationship. In the random coefficient model there is no evidence that y is Granger causal with respect to m, whereas in the pooled there is. As in the investment equation, this shows a clear difference between the cross section relationship, which is best represented in the pooled model, and the time series relationship which is represented by the random coefficient and fixed effects models.

Overall, the results are consistent with those for the OECD in Smith and Dunne (2002), which suggest that military spending does not have a positive effect on growth in the long run, but would appear to have a clear negative short run effect.

7. Conclusions

This paper has provided a contribution to the debate on the economic effects of military spending on economic growth, focusing upon a sample of small industrialising economies and using panel data techniques. The large changes in military spending in the post Cold War period, have increased the variation in the data making it more likely that empirical analyses would be able to distinguish any underlying macroeconomic relationship from noise.

Estimating the commonly used Feder-Ram model gave poor results, but a simple neoclassical growth equation was more successful. There was some evidence of a negative impact of military spending on growth and investment in the small industrialising economies. Certainly there was no evidence of any positive effect. This finding implies that cuts in military spending are unlikely to lead to macroeconomic problems for these economies and may even provide some cyclical advantages.

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Table A1: Individual country results

	Δ ln i_{jt}		ln i_{jt-1}		Δ ln m_{jt}		ln m_{jt-1}		ln y_{jt-1}		ln(n_{jt} +0.05)		trend		Δ lny_{jt-1}	
	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio	Coeff	T ratio
Chile	0.04	0.79	0.07	1.11	-0.01	-0.11	-0.05	-1.50	-0.32	-2.25	-0.14	-0.21	0.01	2.74	0.23	1.09
Brazil	0.28	3.49	0.14	1.66	-0.05	-2.00	-0.02	-0.69	-0.12	-0.75	-0.47	-0.42	0.00	0.05	0.01	0.08
Argentina	0.48	6.33	0.19	1.78	-0.02	-0.59	-0.01	-0.67	-0.35	-1.82	0.20	0.32	0.00	1.47	-0.02	-0.16
Venezuela	0.12	5.91	0.05	1.61	-0.06	-2.47	-0.06	-3.12	-0.32	-3.12	0.34	2.33	-0.00	-0.60	-0.12	-1.00
Spain	0.24	5.09	0.02	0.40	-0.05	-1.25	-0.05	-1.21	-0.02	-0.42	0.00	0.03	-0.00	-0.61	0.17	1.36
South Africa	0.25	10.89	0.13	2.84	0.01	0.30	0.01	0.60	-0.27	-2.73	0.08	0.66	0.00	2.16	-0.02	-0.24
Portugal	0.18	6.26	0.02	0.73	0.01	0.22	0.05	1.56	-0.08	-2.07	-0.03	-3.42	0.00	1.66	0.10	0.79
Malaysia	0.18	4.60	0.09	1.57	-0.03	-1.66	-0.01	-1.08	-0.34	-2.20	-0.37	-2.43	0.01	2.22	-0.16	-0.99
Greece	0.22	5.14	0.14	2.34	0.02	0.32	0.05	1.39	-0.17	-2.01	-0.03	-0.48	0.00	1.44	-0.23	-1.32
Philippines	0.13	3.60	0.01	0.22	0.07	3.63	0.03	1.35	-0.17	-2.44	-0.23	-1.63	0.00	0.56	0.26	2.16
India	-0.06	-0.52	-0.10	-0.67	-0.03	-0.39	0.00	0.04	-0.24	-1.58	-1.08	-1.33	0.00	1.75	0.05	0.23
Israel	0.12	2.54	0.06	1.86	-0.03	-1.04	0.06	2.62	-0.46	-3.62	-0.08	-1.72	0.01	3.17	0.37	2.33
Pakistan	-0.09	-1.16	-0.22	-1.79	0.16	2.88	0.09	2.21	-0.43	-3.25	-1.48	-2.96	0.01	1.84	-0.22	-1.20
S.Korea	0.09	2.86	0.03	0.95	-0.07	-1.64	-0.05	-1.91	-0.35	-3.30	-0.27	-1.42	0.02	2.66	0.16	1.02
Mean	0.16		0.04		-0.01		0.00		-0.26		-0.25		0.01		0.04	

Feder Ram

		I_{it}/Y_{it-1}		$\Delta L_{it}/L_{it-1}$		$\Delta M_{it}/M_{it-1}$ (M_{it}/Y_{it-1})		$\Delta M_{it}/M_{it-1}$		T	
Coeff	T ratio	Coefficient	T ratio	Coefficient	T ratio	Coefficient	T ratio	Coefficient	T ratio	Coefficient	T ratio
-0.05838	-1.8198	0.353529	2.39451	0.657901	1.10154	0.279354	0.161544	0.039682	0.424103	0.00109	1.331234
-0.1	-1.5726	0.432948	3.862941	0.104957	0.217438	1.4733	0.383871	-0.04772	-0.8484	-0.00026	-0.37545
-0.18673	-2.84775	0.728756	2.962654	1.273247	1.024867	-2.35975	-1.86057	0.106104	1.413376	0.00137	1.451536
-0.00696	-0.18685	0.246521	2.011424	-0.27406	-0.57029	-10.8527	-1.60361	0.145466	1.301138	-0.00036	-0.48518
-0.03907	-1.22323	0.427888	3.329332	-0.22275	-0.73079	11.89254	1.964648	-0.28406	-1.63916	-0.00089	-2.448
-0.04886	-0.99941	0.297498	2.614004	0.036751	0.042212	-6.07087	-1.166	0.220284	1.443853	0.000328	0.365587
-0.03322	-0.99735	0.470275	3.357268	-0.01472	-0.04409	-1.55203	-0.58716	0.118114	0.681523	-0.00148	-3.24395
0.020546	0.910702	0.199377	2.005051	0.488943	1.213942	-0.87241	-0.7145	0.035869	0.575169	-0.00099	-1.19469
-0.03863	-0.97897	0.333782	3.047587	-0.30941	-0.60951	-1.7327	-0.55784	0.136838	0.686756	-0.00031	-0.46512
-0.02447	-0.96642	0.377141	3.897947	-0.14157	-0.40372	-5.337	-3.01224	0.220862	4.640717	-0.00101	-2.94539
-0.19991	-2.14159	1.083361	2.536051	0.159918	0.241923	-0.19916	-0.04361	0.057756	0.313801	-0.00039	-0.50946
-0.02906	-0.74359	0.393128	3.085576	0.13552	0.354535	-0.14837	-0.5403	0.020655	0.27464	-0.00052	-0.72127
0.066044	3.754937	0.000197	0.175329	-0.2816	-0.57176	-7.11345	-2.18221	0.553837	2.482366	-0.00024	-0.63181
0.040048	1.341361	0.430865	2.478592	-0.23386	-0.52229	1.159817	0.236194	-0.0388	-0.14528	-0.00321	-2.50511
-0.04341	-0.60504	0.412519	2.697019	0.098519	0.053143	-1.53096	-0.68013	0.091777	0.8289	-0.00049	-0.88408