APPROPRIATE ECONOMIC POLICIES AT DIFFERENT STAGES OF DEVELOPMENT
Victor Polterovich, Vladimir Popov

РАЦИОНАЛЬНАЯ ЭКОНОМИЧЕСКАЯ ПОЛИТИКА НА РАЗНЫХ СТАДИЯХ РАЗВИТИЯ

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INITIAL CONDITIONS AND ECONOMIC POLICIES

| Initial conditions	Level of technological development (GDP per capita)	
Quality of institutions (CPI index)	**LOW**	**HIGH**
LOW	•Accumulation of FOREX •Increase in gov.rev/GDP ratio •Decrease in tariff protection	No such countries
HIGH	•Accumulation of FOREX •Increase in gov.rev/GDP ratio •Increase in tariff protection	•Decrease in FOREX •Increase/decrease in gov.rev/GDP ratio •Decrease in tariff protection

INTRODUCTION

- In his famous essay, Economic Backwardness in Historical Perspective, Gerschenkron argued that relatively backward economies, such as Germany, France, Belgium and Russia during the nineteenth century, could rapidly catch up to more advanced economies by introducing "appropriate" economic institutions to encourage investment and technology adoption. He emphasized the role of long-term relationships between firms and banks, of large firms and of state intervention. Underlying this view is the notion that relatively backward economies can grow rapidly by investing in, and adopting, already existing technologies, or by pursuing what we call an investment-based growth strategy. If this assessment is correct, the institutions that are appropriate to such nations should encourage investment and technology adoption, even if this comes at the expense of various market rigidities and a relatively less competitive environment". (Acemoglu, Aghion Zilibotti, 2002a).

Introduction

- Two recent papers by Acemoglu, Aghion, Zilibotti (2002a,b) offer a model to demonstrate the dependence of economic policies on the distance to the technological frontier.
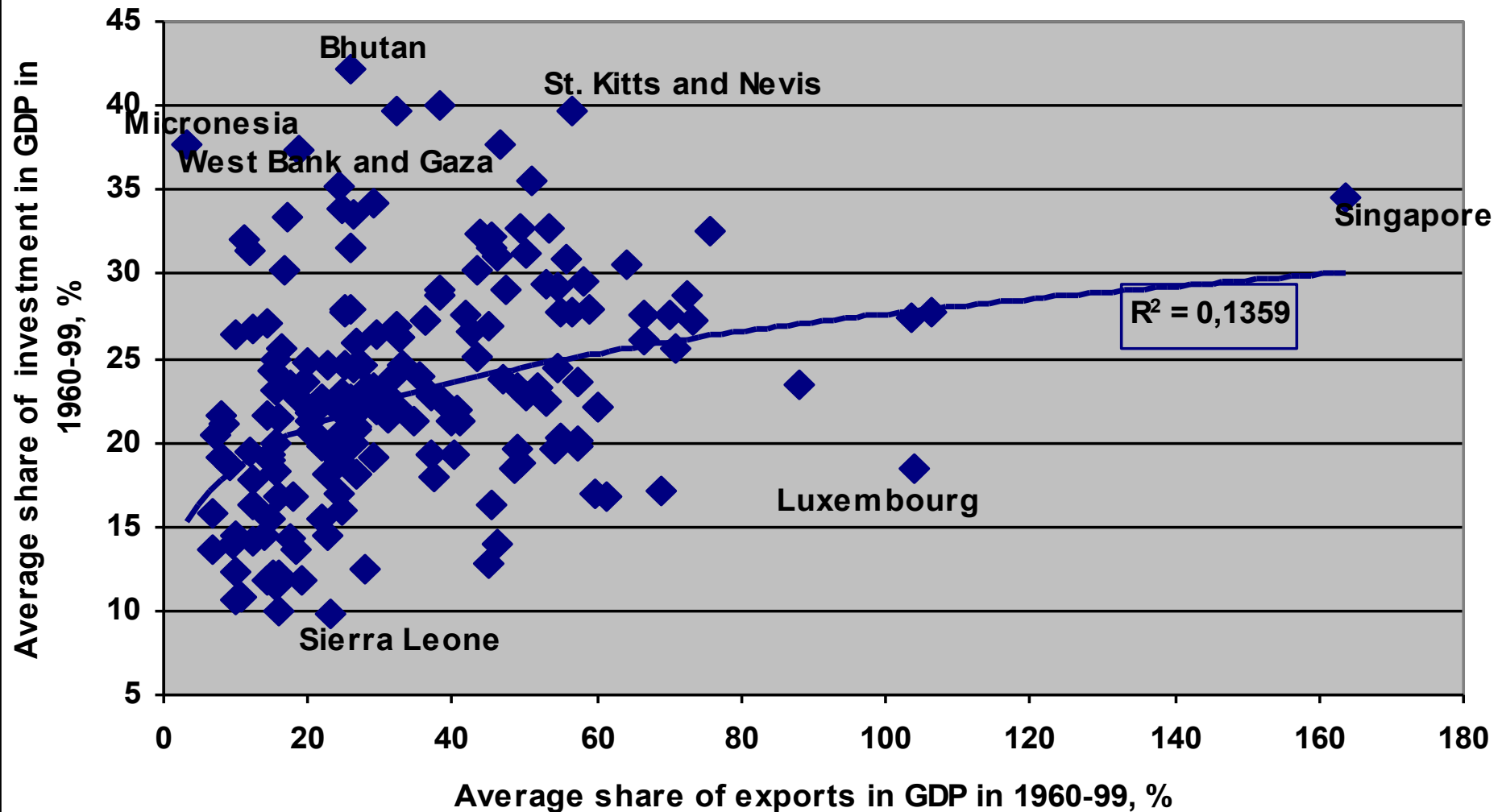
TARIFFS

Fig. 1. Increase in the ratio of exports to GDP and average annual growth rates of GDP per capita in 1960-99, %
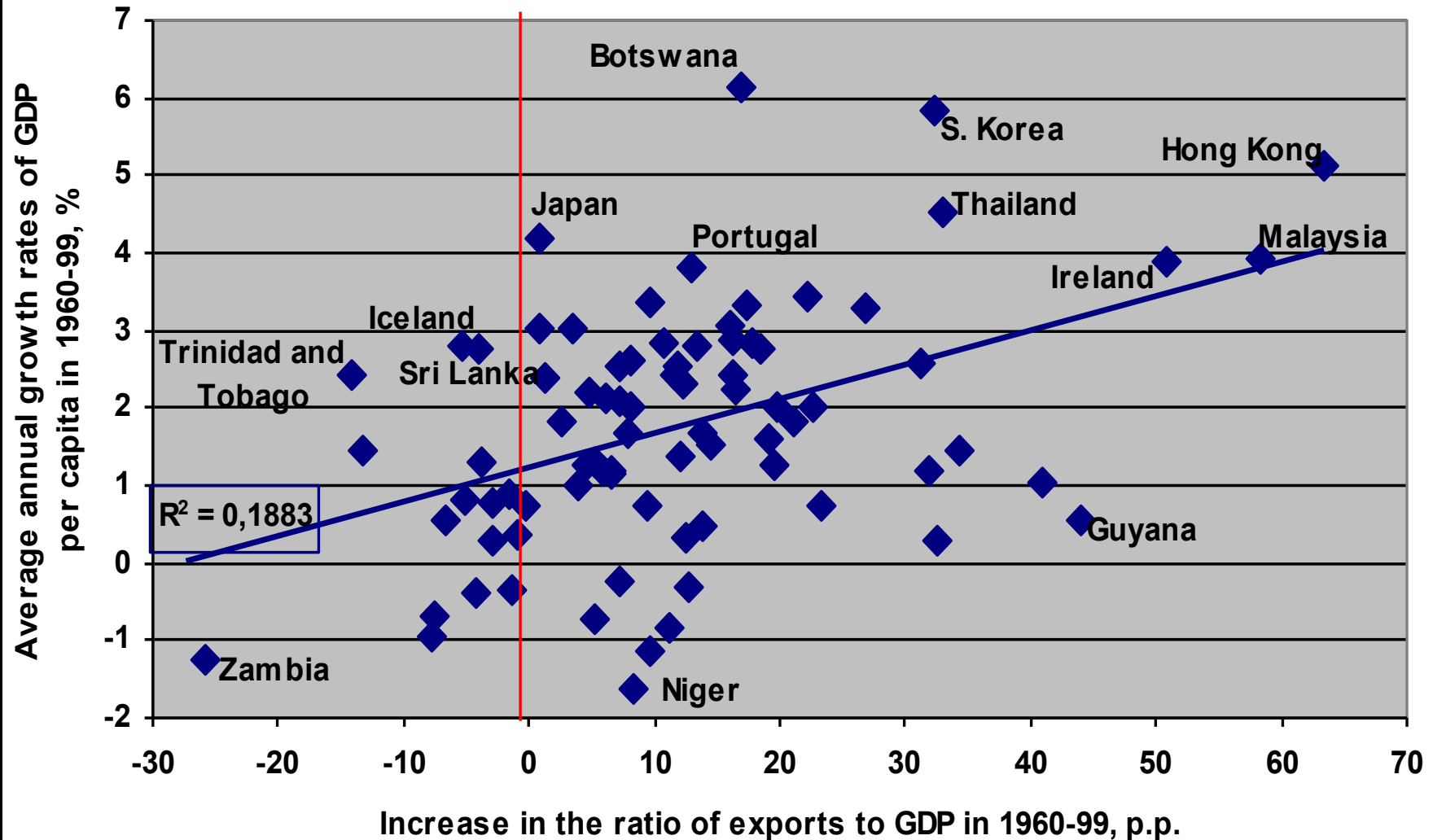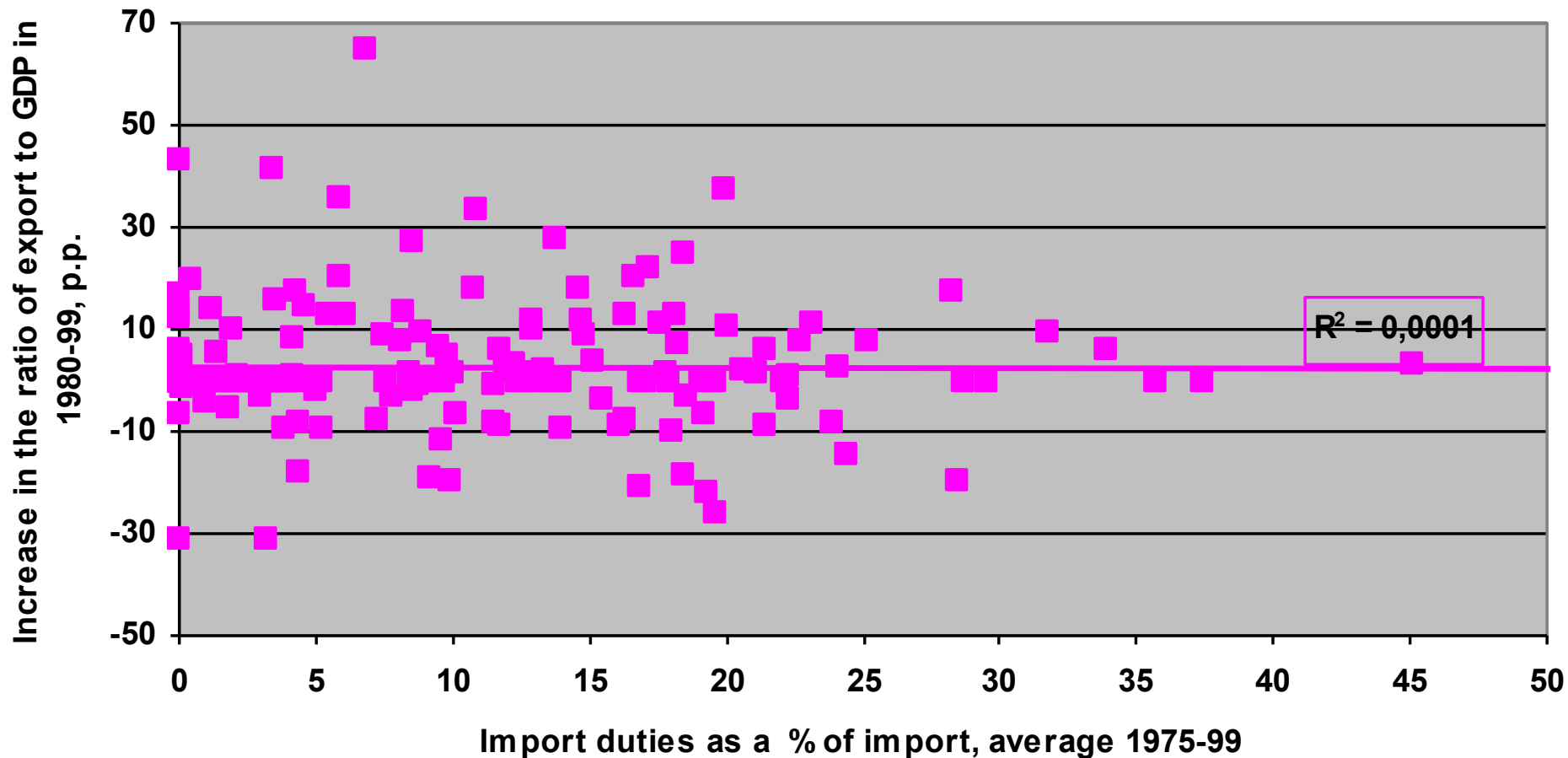
TARIFFS

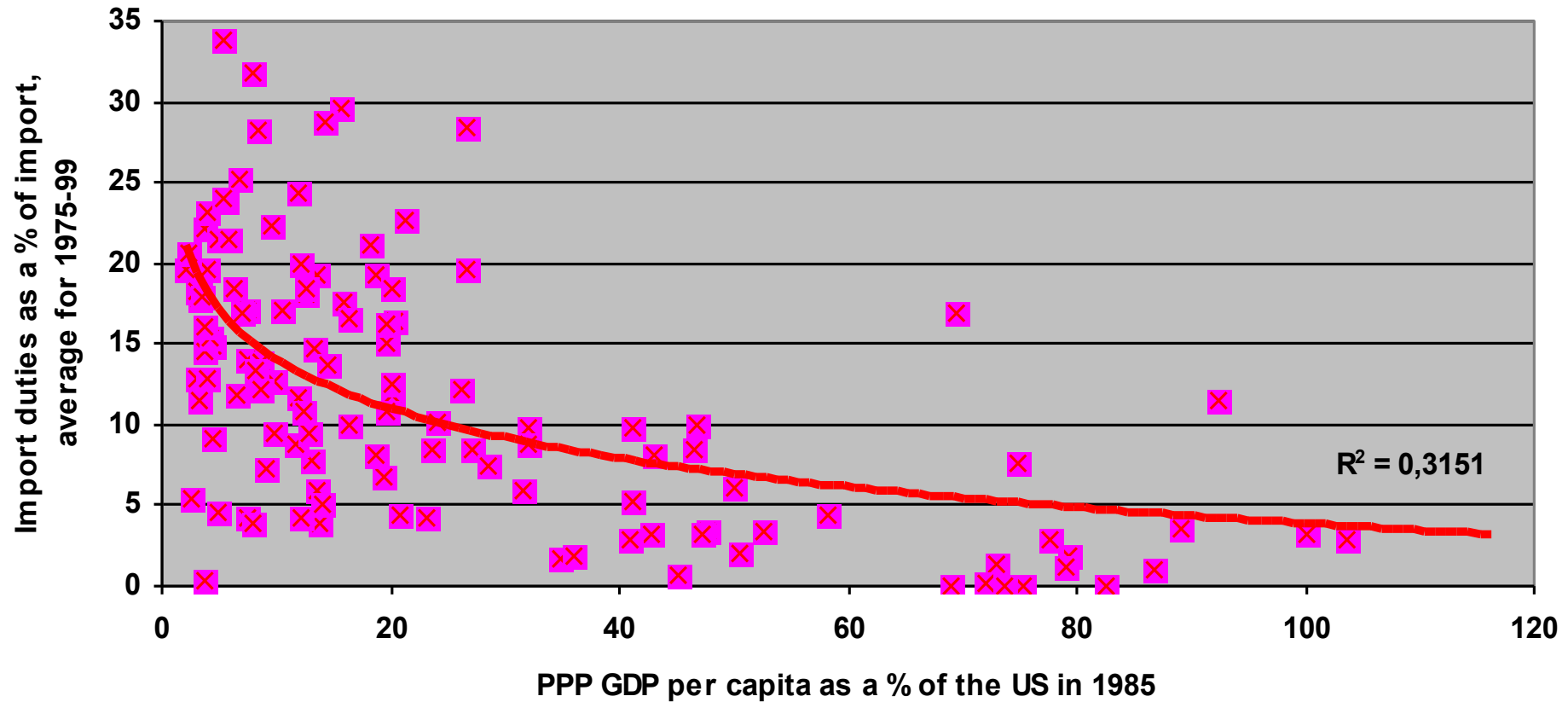Fig. 2. Average share of exports and investment in GDP in 1960-99, %

TARIFFS

Fig. 3. Import duties as a % of import in 1975-99 and the increase in export as a % of GDP in 1980-99, p.p.
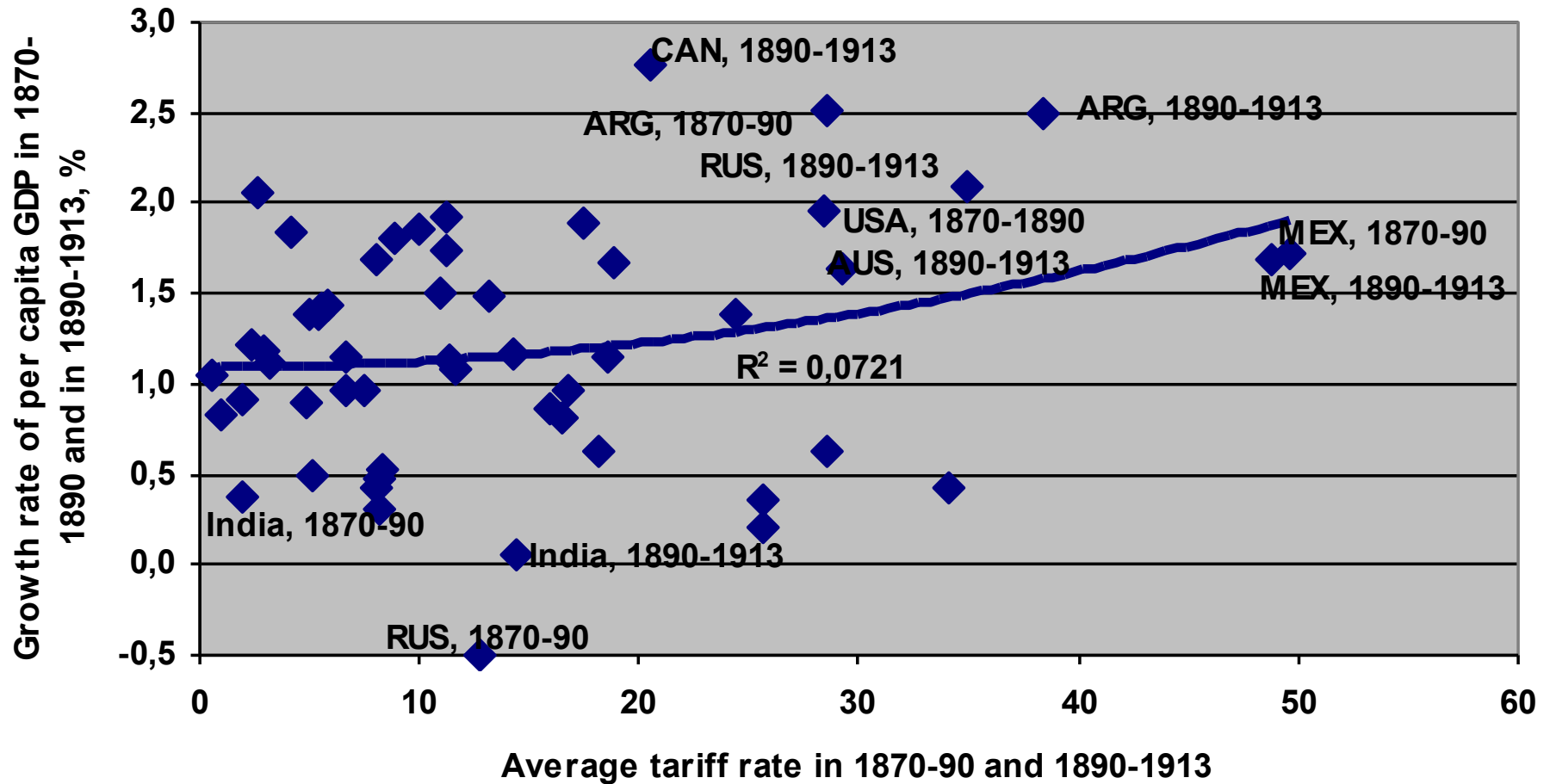
TARIFFS

Import duties as a % of import, average for 1975-99, and PPP GDP per capita as a % of the US in 1985

TARIFFS

Average tariff rate (% of import) and growth rate of per capita GDP (%) in 1870-90 and 1890-1913

Chart — Y-axis: Growth rate of per capita GDP in 1870-1890 and in 1890-1913, %. X-axis: Average tariff rate in 1870-90 and 1890-1913.

Labeled data points: CAN, 1890-1913; ARG, 1890-1913; ARG, 1870-90; RUS, 1890-1913; USA, 1870-1890; AUS, 1890-1913; MEX, 1870-90; MEX, 1890-1913; India, 1870-90; India, 1890-1913; RUS, 1870-90.

$R^2 = 0{,}0721$

TARIFFS

- We tried to find a GDP per capita threshold for the 19th century using data from (Irwin, 2002), but failed. The best equation linking growth rates in 1870-1913 to GDP per capita and tariff rates (27 countries, two periods – 1870-90 and 1890-1913 – 54 observations overall) is:

- Regression for 1870-1913

- GROWTH = 0.24 + 0.04*Y − 0.0004*Y2 − 0.05*T + 0.001*T^2 + 0.0006*Y*T,

- Where Y – GDP per capita in 1870 nor 1890 respectively, T – average tariff rates

- (R^2adj. = 33%, all coefficients significant at 11% level or less).

DATA - CPI

- Corruption perception index (CPI) for 1980-85 – these estimates are available from Transparency International for over 50 countries

- CPI = 2.3 + 0,07*Ycap75us,

- N=45, R2 =59%, T-statistics for Ycap75 coefficient is 9. 68.

- CORRres = 10 – [CPI – (2.3 + 0.07*Ycap75us)] = 12.3 – CPI + 0.07*Ycap75us

DATA: RISK

- RISK84-90 – average investment risk index for 1984-90, varies from 0 to 100, the higher, the better investment climate

- RISK = 62.1 + 0.19Ycap75us, N= 88, R^2=36%, T-statistics for Ycap75us coefficient is 3.95.

- RISKres = RISK84-90 – (62.1 + 0.19Ycap75us) +100

TARIFFS

- **GROWTH=CONST.+CONTR.VAR.+Tincr.(0.06–0.004Ycap75us–0.004CORRpos–0.005T)**

- **GROWTH, is the annual average growth rate of GDP per capita in 1975-99,**
- **the control variables are population growth rates during the period and net fuel imports (to control for "resource curse"),**
- **T – average import tariff as a % of import in 1975-99,**
- **Tincr. – increase in the level of this tariff (average tariff in 1980-99 as a % of average tariff in 1971-80),**
- **Ycap75us – PPP GDP per capita in 1975 as a % of the US level,**
- **CORR pos – positive residual corruption in 1975, calculated as explained earlier.**
- **R2=40%, N=39, all coefficients are significant at 5% level, except the last one (33%), but exclusion of the last variable (a multiple of T by Tincr.) does not ruin the regression and the coefficients do not change much.**

TARIFFS

- If import duties are included into growth regressions without the interaction terms with GDP per capita and/or a measure of institutional strength (corruption), the coefficient on import duties is not significant:

- But when interaction terms are included, all coefficients become statistically significant. Here is an additional equation that give similar thresholds on GDP per capita and corruption:

- GROWTH=CONST+CONTR.VAR+T(0.05–0.005Ycap75us–0.007Rpol)

- where Rpol is the indicator of the accumulation of foreign exchange reserves computed as explained later, in the third section, N=40, R2=40, all coefficients significant at 8% level or less, control variables – positive residual corruption and population growth rates.

TARIFFS

- GROWTH=CONST+CONTR.VAR.+T(0.005RISK–0.002Ycap75us–0.3)

- (N= 87, R^2 =42, all coefficients significant at 10% level or less, control variables are population growth rates, population density and total population).

- The equation implies that for a poor country (say, with the PPP GDP per capita of 20% of the US level or less) import duties stimulate growth only when investment climate is not very bad (RISK > 50%) – the expression in brackets in this case becomes positive.

GOVERNMENT

Government revenues to GDP ratio in 1971-75 and in 1995-99, %, and PPP GDP per capita in 1975 as a % of the US level
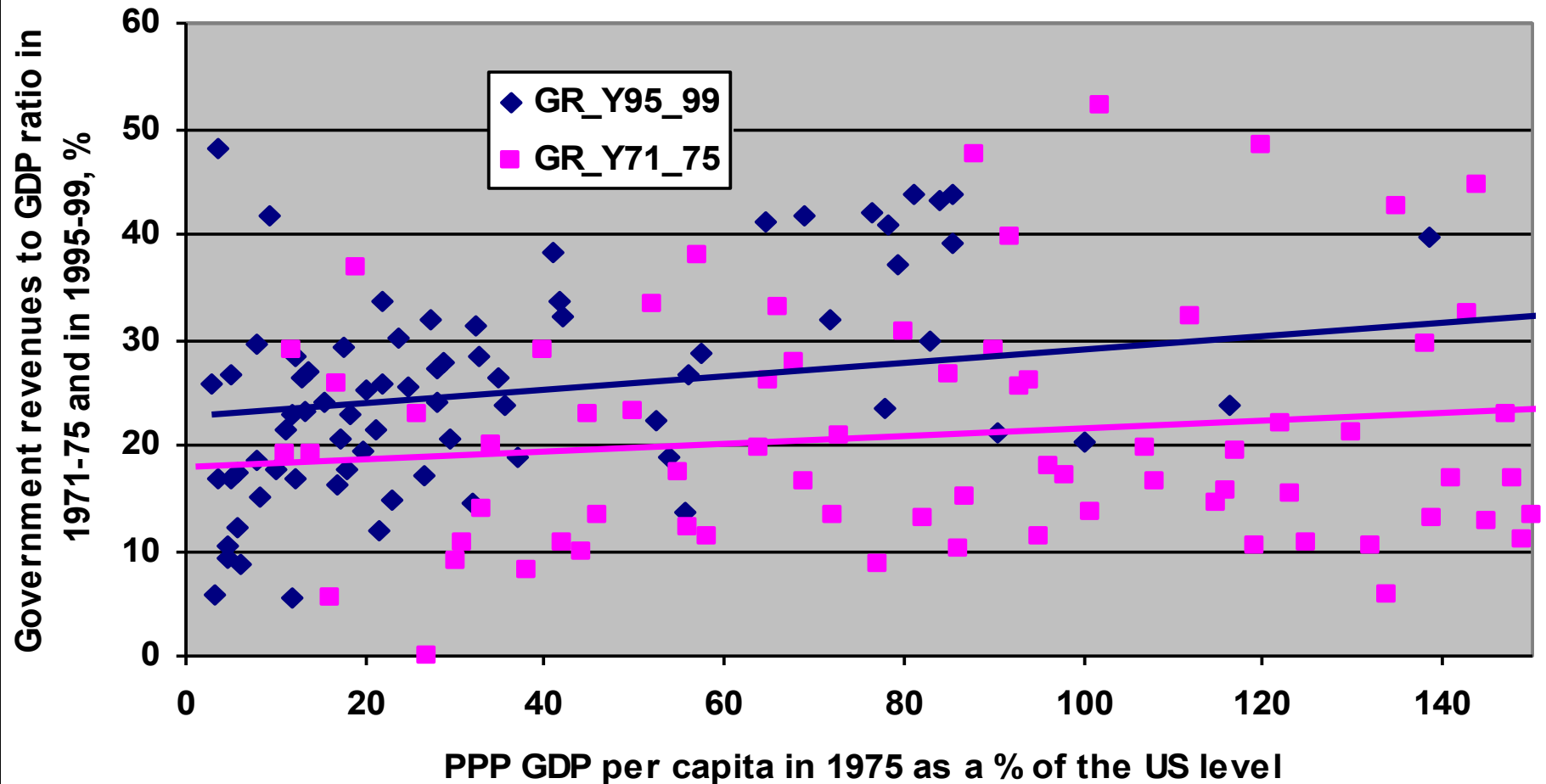
GOVERNMENT

- GROWTH = CONST. + CONTR. VAR.+ $0.08*G - 0.0003*G^2 - 0.0003*G*Ycap75us$

= CONST. + CONTR. VAR. + $G*(0.08 - 0.0003*G - 0.0003 * Ycap75us)$

- G – the share of government revenues in GDP in 1999 as a % of 1975,

- Ycap75us – PPP GDP per capita in 1975 as a % of the US level.

GOVERNMENT

- GROWTH = CONST. + CONTR. VAR. + G(0.02 - 0.000037Ycap75us*CORRpos)

-

  R2 = 53%, N=35, all coefficients significant at 6% level or less, the control variables are population growth rates and government effectiveness index in 2001.

GOVERNMENT

- To test the robustness of results, we ran regressions with another indicator of the size of the government – the policy determined level of government revenues to GDP ratio in 1995-99.

- This latter variable was computed as a residual from regression of the actual share of the government revenues to GDP in 1995-99 (GR_Y95_99) on the size of the PPP GDP of a country in 1999 in billion $ (Yppp99) and the level of PPP GDP per capita in 1999 as a % of the US level (Ycap99us):

- GR_Y95_99=20.3–0.003Yppp99+20.6Ycap99us

- (N=99, R^2=40%, all coefficients significant at less than 1% level).

- We call this residual "policy determined level of government revenues to GDP ratio", Gpol
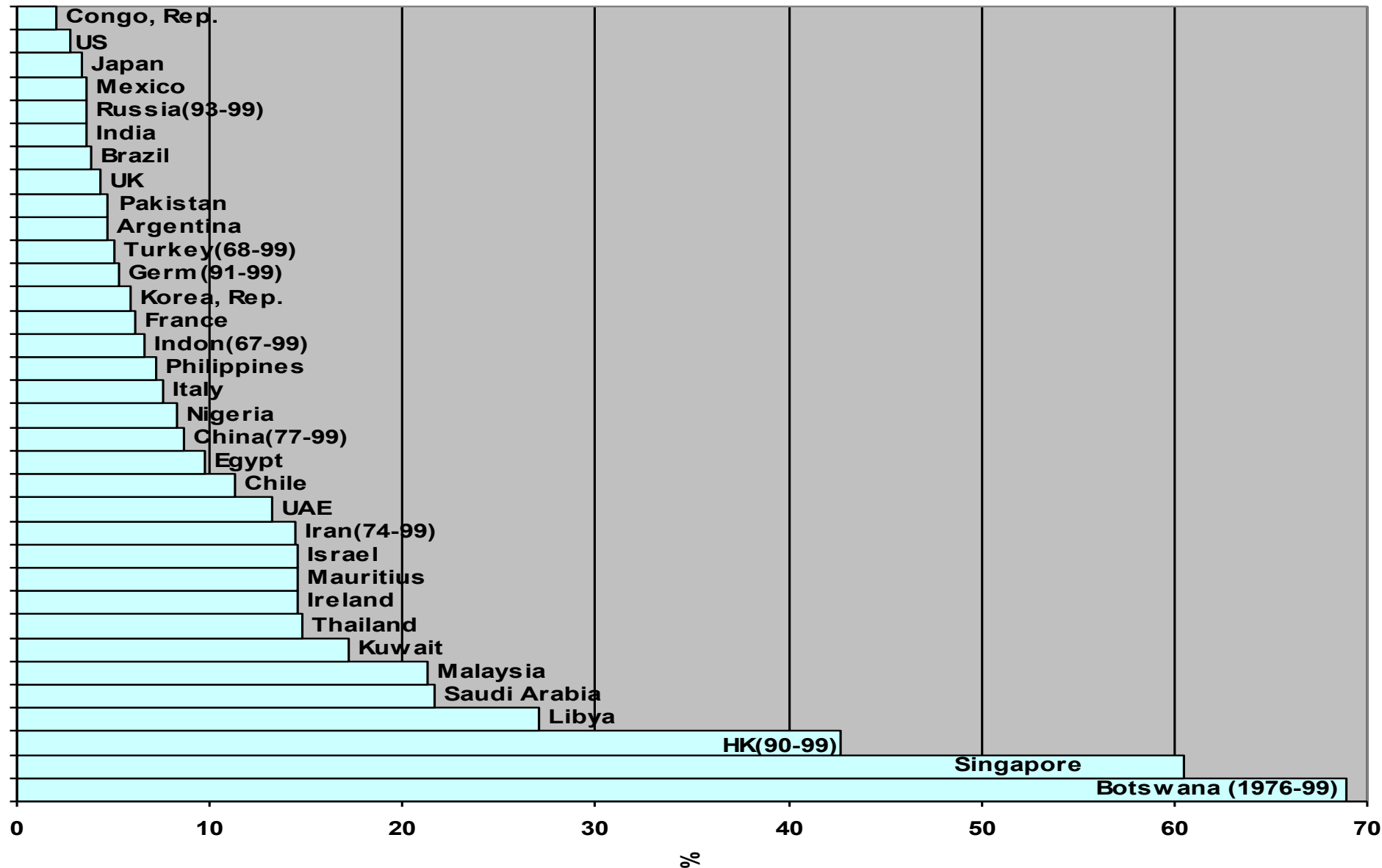
GOVERNMENT

- GROWTH = CONST. + CONTR. VAR.+ Gpol $(8.0 - 0.06Ycap75us - 0.6CORRpos)$,
- where all notation are same as above, control variables are the size of the country (PPP GDP in 1975) and growth rates of population in 1975-99, N=40, R2=52%, all coefficients significant at less than 1% level.

GOVERNMENT

- Another robustness test is to use a different indicator of the institutional quality – the investment climate index (RISK), average for 1984-90.

- GROWTH = CONST. + CONTR. VAR.+ Gpol (0.086RISK – 0.06Ycap75us – 3.12),

- where   N=65, R^2 = 44, all coefficients significant at less than 10% level, control variables are total PPPGDP in 1975, population density and population growth rate.

- The equation basically implies that for developing countries (say, PPP GDP per capita is lower than 50% of the US level) the increase in government revenues to GDP ratio was beneficial for growth only if they were relatively clean (RISK indicator should be higher than 71%), whereas for most developed countries this increase was detrimental.
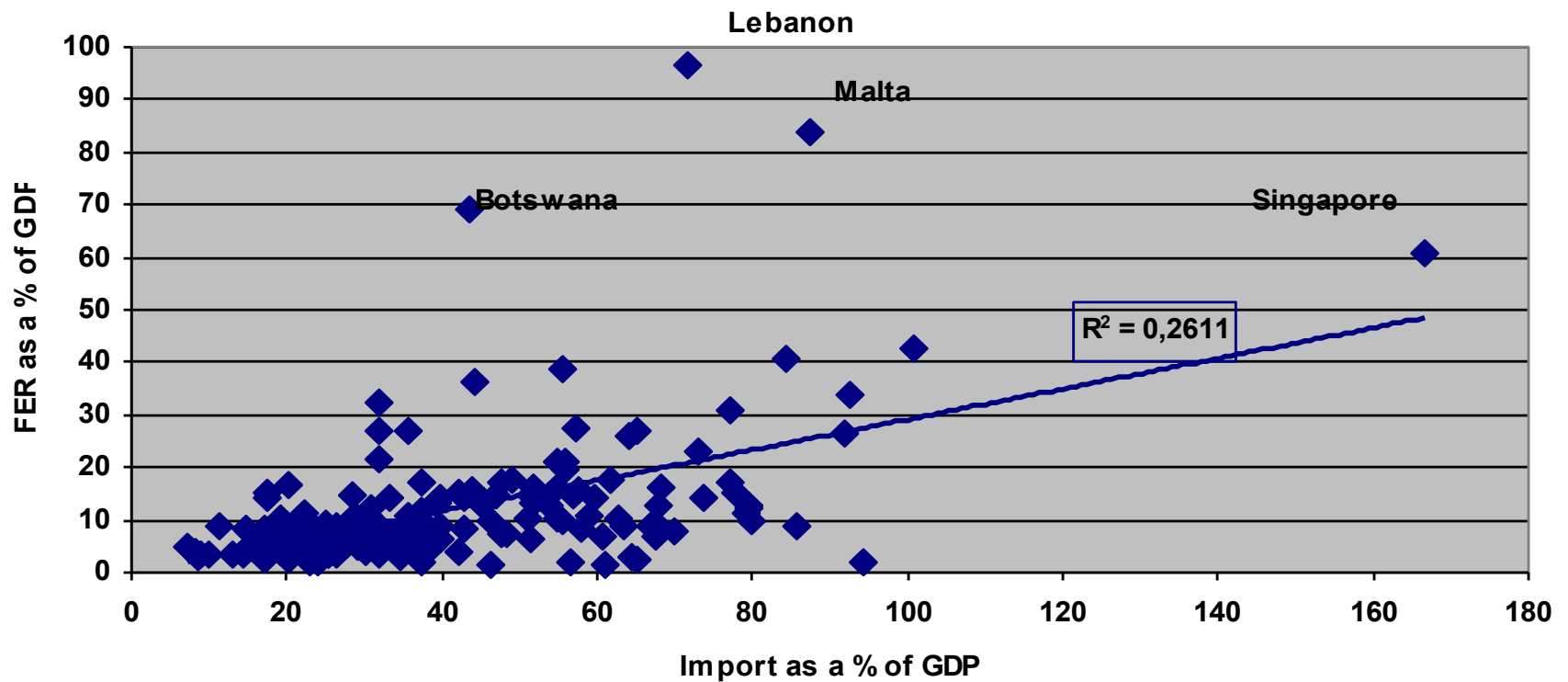
Foreign exchange reserves accumulation

Fig. 3.1. Foreign exchange reserves as a % of GDP, average ratios for 1960-99


Country	
Congo, Rep.	
US	
Japan	
Mexico	
Russia(93-99)	
India	
Brazil	
UK	
Pakistan	
Argentina	
Turkey(68-99)	
Germ(91-99)	
Korea, Rep.	
France	
Indon(67-99)	
Philippines	
Italy	
Nigeria	
China(77-99)	
Egypt	
Chile	
UAE	
Iran(74-99)	
Israel	
Mauritius	
Ireland	
Thailand	
Kuwait	
Malaysia	
Saudi Arabia	
Libya	
HK(90-99)	
Singapore	
Botswana (1976-99)	

%

0   10   20   30   40   50   60   70

Foreign exchange reserves accumulation

Fig. 3.2A. Average ratio of imports to GDP and average ratio of reserves to GDP in 1960-99, %
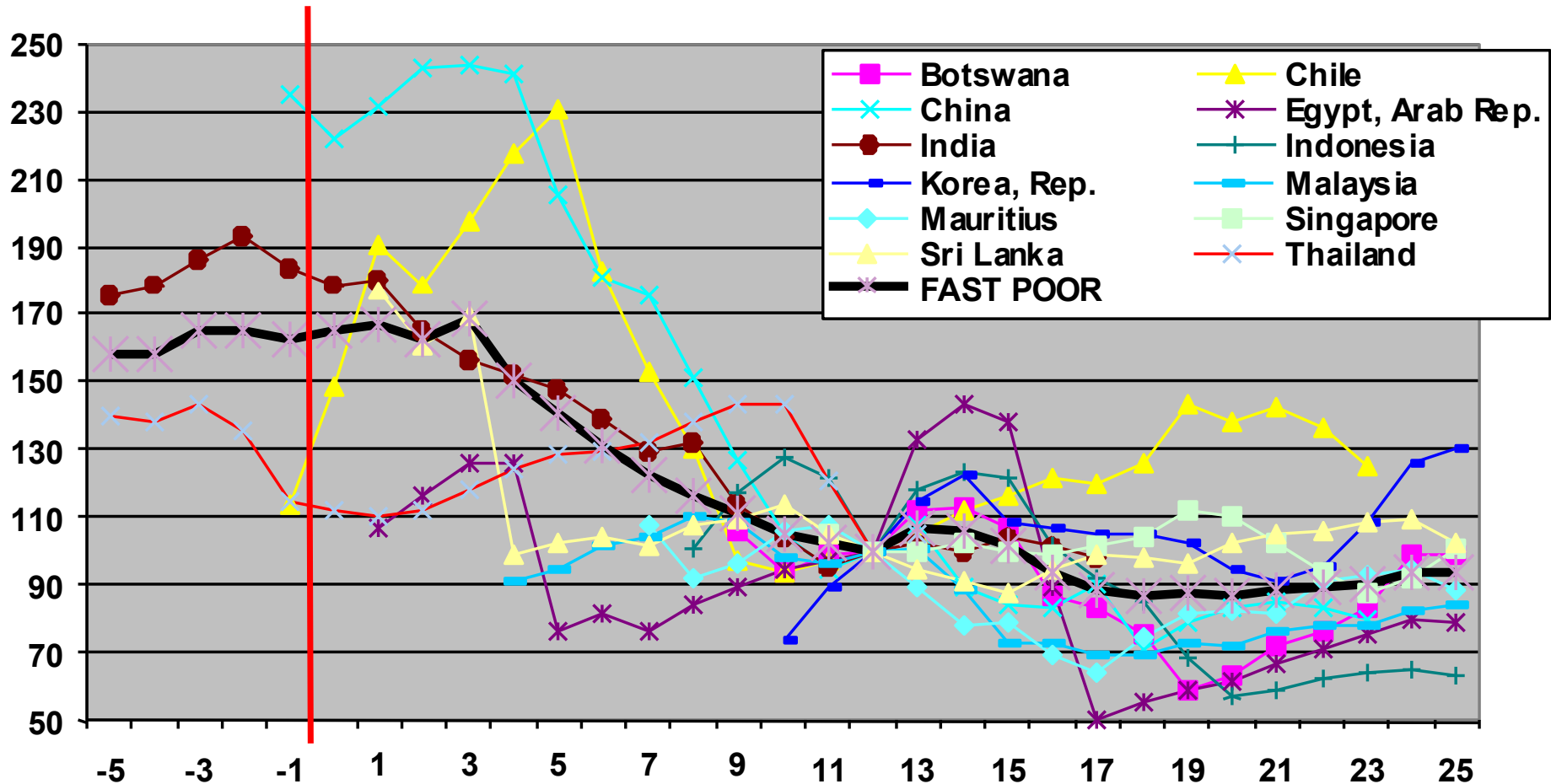
Foreign exchange reserves accumulation

Fig. 3.3. Average ratio of gross international reserves to GDP and average annual growth rates of GDP per capita in 1960-99, %,
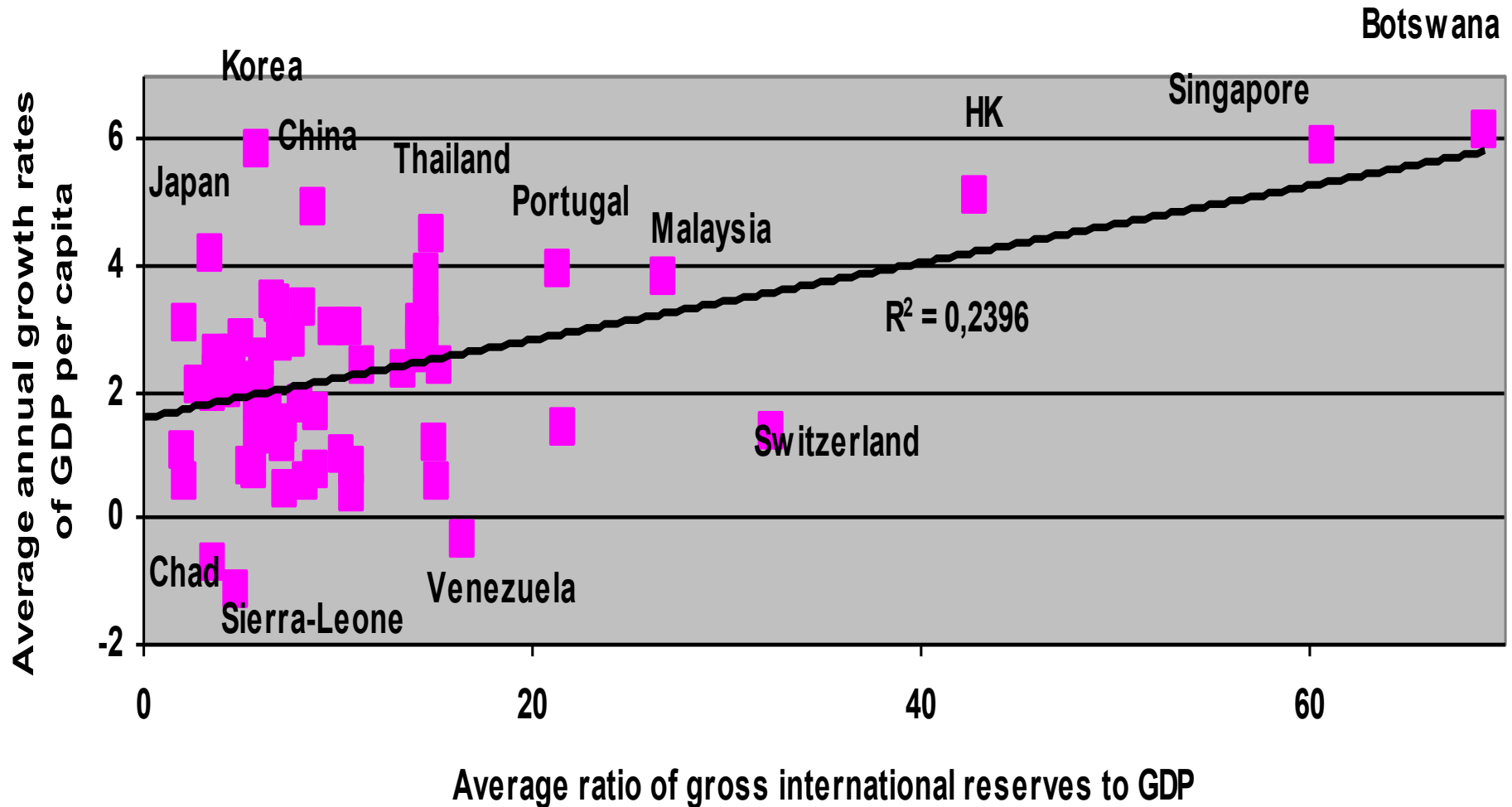
Foreign exchange reserves accumulation

Fig.6. Average real exchange rate versus the US $ (Year 12 = 100%) in fast growing developing economies, year "0" denotes the point of take-off

Foreign exchange reserves accumulation

- delta R = 38 − 11.4logYcap75 + 0.1(T/Y) + 0.24(delta T/Y)

(R2=34%, N=82, all coefficients significant at 0.1% level).

- Then we considered the residual as the policy-induced change in reserves.
- Afterwards we used the *policy induced change in foreign exchange reserves* as one of the explanatory variables in growth regressions together with import taxes and change in government revenues/GDP ratio

Foreign exchange reserves accumulation

- GROWTH= CONST.+CONTR.VAR.+ T(0.06–0.0027Ycap75us)+ Rpol (0.07-0.006T)
- The control variables are the rule of law index for 2001, the size of the economy in 1975, and the population growth rates in 1975-99.
- N=74, R2=44%, all coefficients are significant at less than 10% level, except for coefficients of Rpol (11%) and the PPP GDP in 1975 (16%).

Foreign exchange reserves accumulation

- GROWTH=CONST.+CONTR.VAR.+ G$(0.05-\ 0.0003Ycap75us-0.003CORRpos)+$ Rpol$(0.12 - 0.002Ycap75us)$

- This equation implies that the growth of government revenues/GDP ratio is good for most countries, excluding the richest ones and the most corrupt ones (if Ycap75us is higher than 100%, whereas CORRpos >7, the impact of the increase of government revenues/spending on growth becomes negative).

- It also allows to determine the threshold level of GDP per capita for the impact on growth of reserve accumulation: for countries with GDP per capita higher than 60% of the US level, the accumulation of reserves has a positive impact on growth; for richer countries the impact is negative.

Foreign exchange reserves accumulation

- We also experimented with another definition of *policy induced change in foreign exchange reserves* – a residual from regression linking the increase in reserves to GDP ratio to the following ratios: trade/GDP, increase in trade/GDP, external debt/GDP (ED/Y) and debt service/GDP (DS/Y):

$$\Delta R = 3.3 - 0.6(DS/Y) + 0.06(ED/Y) + 0.2(T/Y) + 0.28(\Delta T/Y)$$

- N=59, R^2=36%, all coefficients significant at less than 7%.

Foreign exchange reserves accumulation

- GROWTH=CONST.+CONTR.VAR.+T(0.001RISK–0.0038Ycap75us)+Rpol(0.23-0.014T),

- N=48, R^2 = 46, all coefficients significant at 7% or less, control variables – PPP GDP in 1975 and population growth rate.

- GROWTH=CONST.+CONTR.VAR.+Gpol(0.096RISK–6.3)+Rpol(0.31 – 0.017T),

- N=28, R2 = 61, all coefficients significant at 10% or less, control variables – PPP GDP in 1975, average ratio of government revenues to GDP in 1973-75.

Joint impact of all policies: T, G, and R

- **GROWTH = CONST. + CONTR.VAR. + +G*(0.074– 0.00027Ycap75us–0.005*CORres) +**

+ T*(0.00061*CPIincr – 0.077) +

+Rpol*(0.090 – 0.0014*Ycap75us)

- where CPIincr – corruption perception index in 1999-2003 as a % of 1980-85 level, characterizing the increase in the "cleanness" of a country,

- CORRres – residual positive corruption computed as explained earlier.

- All coefficients in this equation are significant at 1% level (except for Rpol*Ycap75us, which is significant at 5% level), N= 34, R2 = 67%. The control variables are population growth rates and size of the country (PPP GDP in 1975).

Joint impact of all policies: T, G, and R

– Other reasonable equations are the following:

- GROWTH=CONST+CONTR.VAR.+Gpol(3.1–0.39CORRres) +T(0.06–0.0057Ycap75us) +Rpol(0.11–0.0013Ycap75us),

- **N=37, R^2= 46%, control variables are land area and population growth rate, Gpol – is the policy determined level of government revenues to GDP computed as explained earlier, CORRres – positive residual corruption discussed earlier, all coefficient significant at a level of 9% or less.**

- GROWTH=CONST.+CONTR.VAR.+Gpol(0.043RISK–5.0)+ T(0.08–0.0025Ycap75us)+Rpol(0.29–0.002deltaG),

- **N=48, R^2=39, control variables are population density and the ratio of government revenues to GDP in 1973-75, RISK – is the investment climate index in 1984-90 used in previous regressions, all coefficients significant at 5% level or less.**
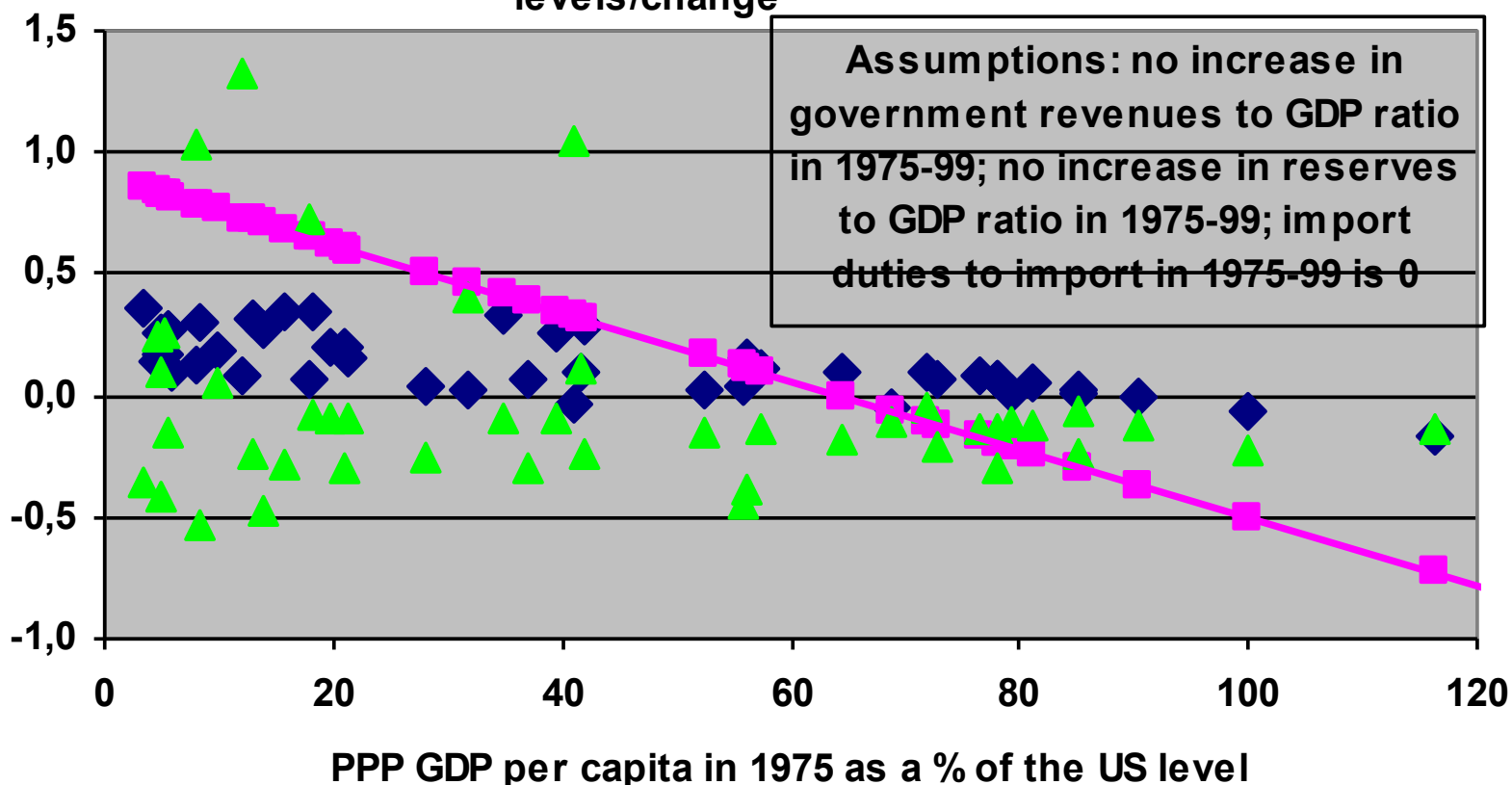
Joint impact of all policies: T, G, and R

- Consider now a hypothetical country with no increase in government revenues/GDP ratio in 1975-99 (=100%), no increase in policy determined level reserve/GDP ratio over 1975-99 period (Rpol = 0), and zero import tariffs in 1980-99 (T = 0).

- To see the impact of various policies on growth, we differentiate the equation (12) to get a convenient expression for the marginal impact of three types of policies on growth rates:

- dGROWTH = dG(0.074 − 0.00027*Ycap75us– 0.005*CORRres) + dT(0.00061*CPIincr − 0.077) + dRpol(0.090 − 0.0014*Ycap75us)

Joint impact of all policies: T, G, and R

Simulation: marginal impact on growth of the increase by 10 p.p. of (1) government revenues to GDP ratio, (2) reserves to GDP ratio, (3) import duties to import ratio depending on GDP per capita and corruption levels/change

Assumptions: no increase in government revenues to GDP ratio in 1975-99; no increase in reserves to GDP ratio in 1975-99; import duties to import in 1975-99 is 0

Marginal increase in annual average growth rates of GDP per capita due to increase by 10 p.p. in dG, dRpol and T

PPP GDP per capita in 1975 as a % of the US level

- ◆ dGR/dG
- ■ dGR/dR
- ▲ dGR/dT

Joint impact of all policies: T, G, and R

- Consider now the impact of three policies on particular countries – given their actual GDP per capita, corruption level and change in this level. Partial derivatives of growth on government revenues, tariffs, and reserve accumulation from equation (12) are now equal to:

- dGROWTH/dG = 0.074 − 0.0027*Ycap75us − 0.005*CORres,

- dGROWTH /dT = 0.00061*CPIincr − 0.077,

- dGROWTH/dRpol = 0.090 − 0.0014*Ycap75us.

Joint impact of all policies: T, G, and R

Increase in the corruption perception index in the 1980s-90s and PPP GDP per capita in 1975 in countries with different policy potential (G - gov. revenues to GDP ratio, R- reserves to GDP ratio, T- import duties to foreign trade turnover ratio, %)
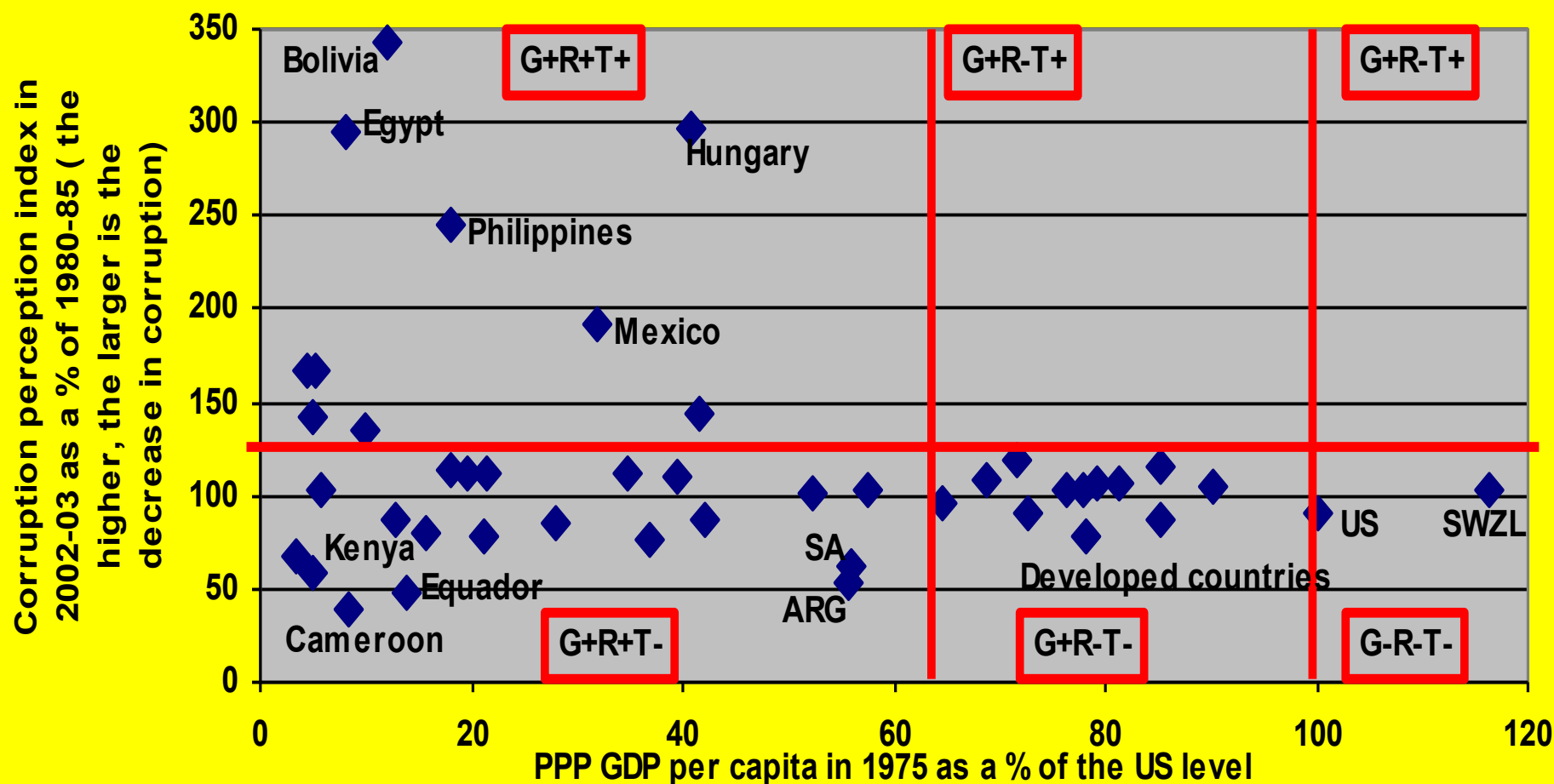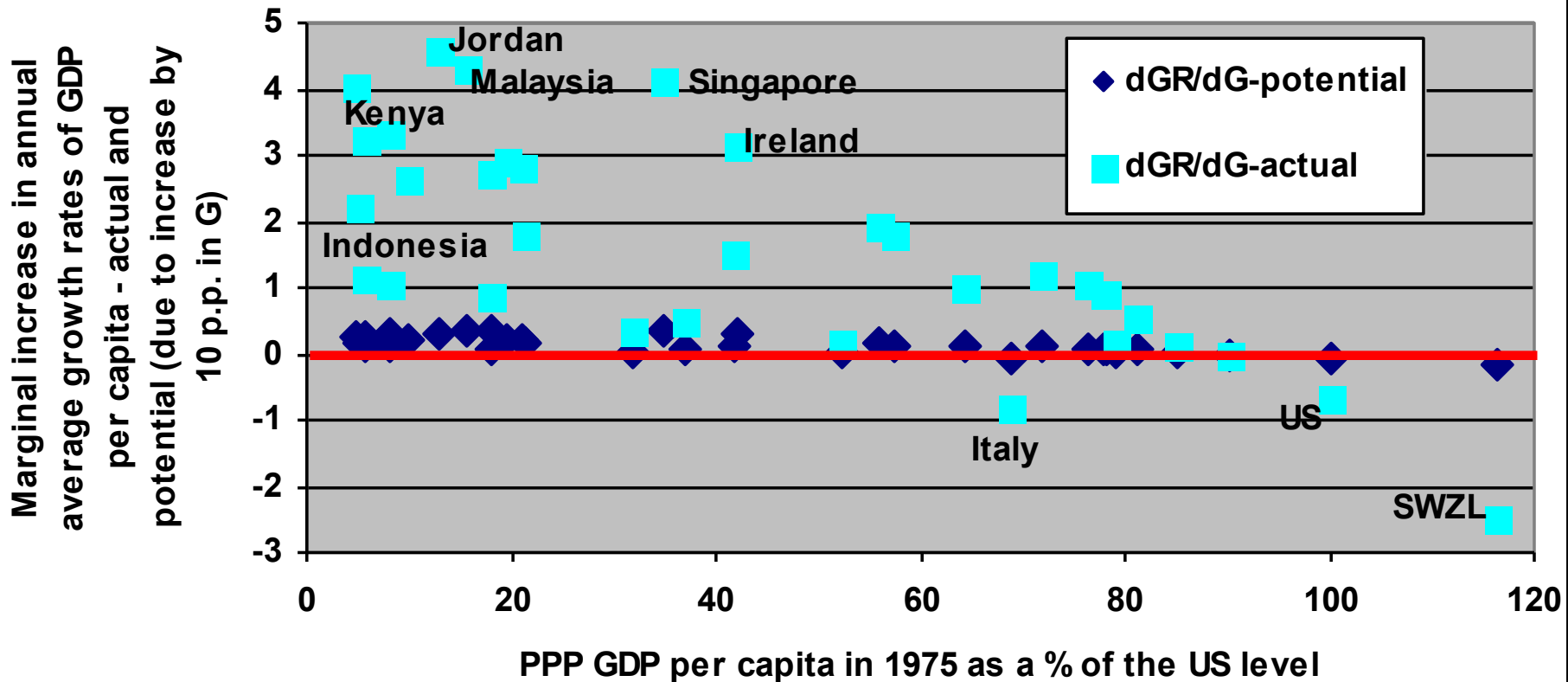
Joint impact of all policies: T, G, and R

| Groups of countries	PPP GDP per capita as a % of the US level	CPI in 2002-03 as a % of 1980-85 level	Appropriate policies
Poor-clean (10 countries)	Less than 65%	Over 126%	G+, R+, T+
Poor – corrupted (20 countries)	Less than 65%	Less than 126%	G+, R+, T-
Rich – clean (12 countries)	65-100%	Less than 126%	G+, R-, T-
Very rich – clean (2 countries)	Over 100%	Less than 126%	G-, R-, T-

Joint impact of all policies: T, G, and R

Marginal impact on growth of the increase by 10 p.p. of government revenues to GDP ratio and actual impact on growth of the increase in government revenues/GDP ratio
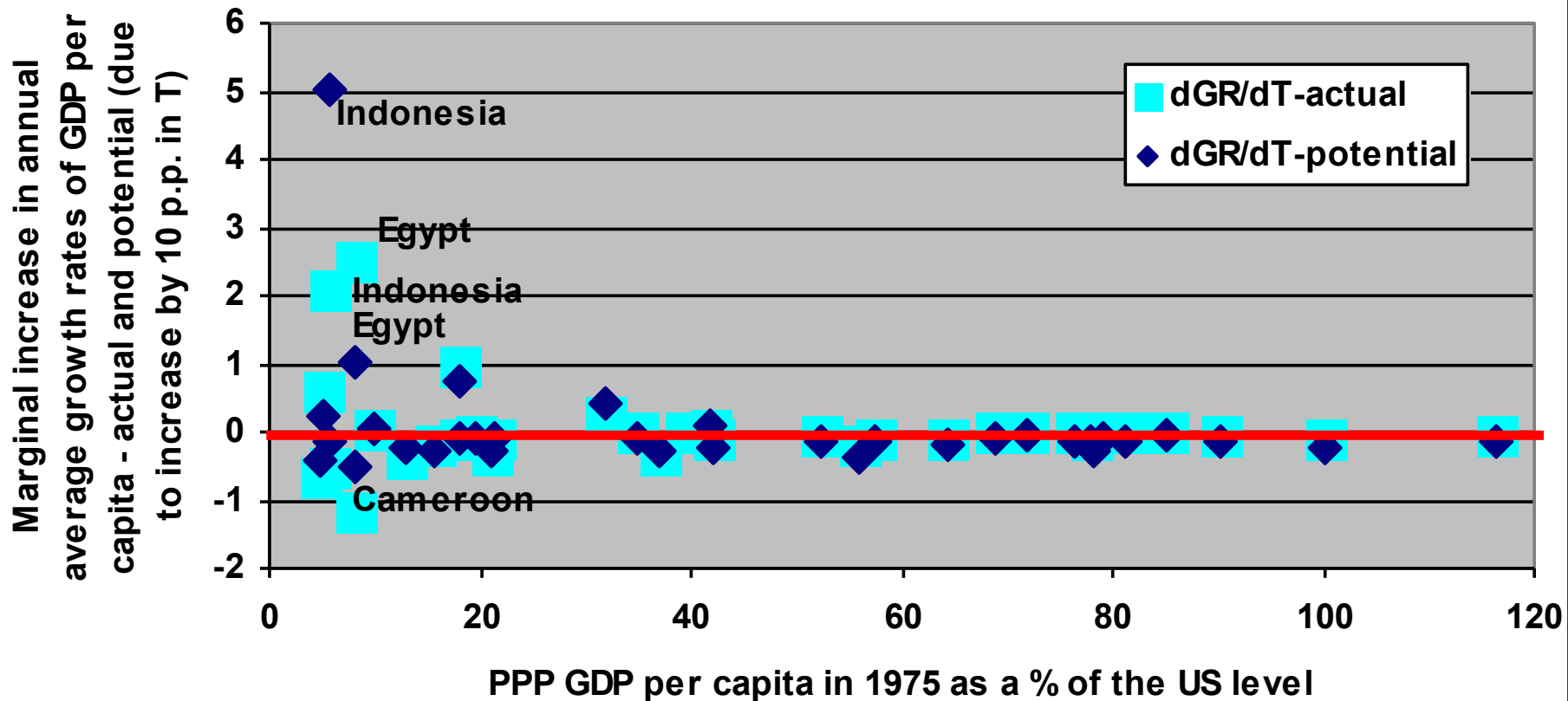
Joint impact of all policies: T, G, and R

Marginal impact on growth of the increase by 10 p.p. of reserves to GDP ratio in excess of objective needs and actual impact or reserve accumulation on growth
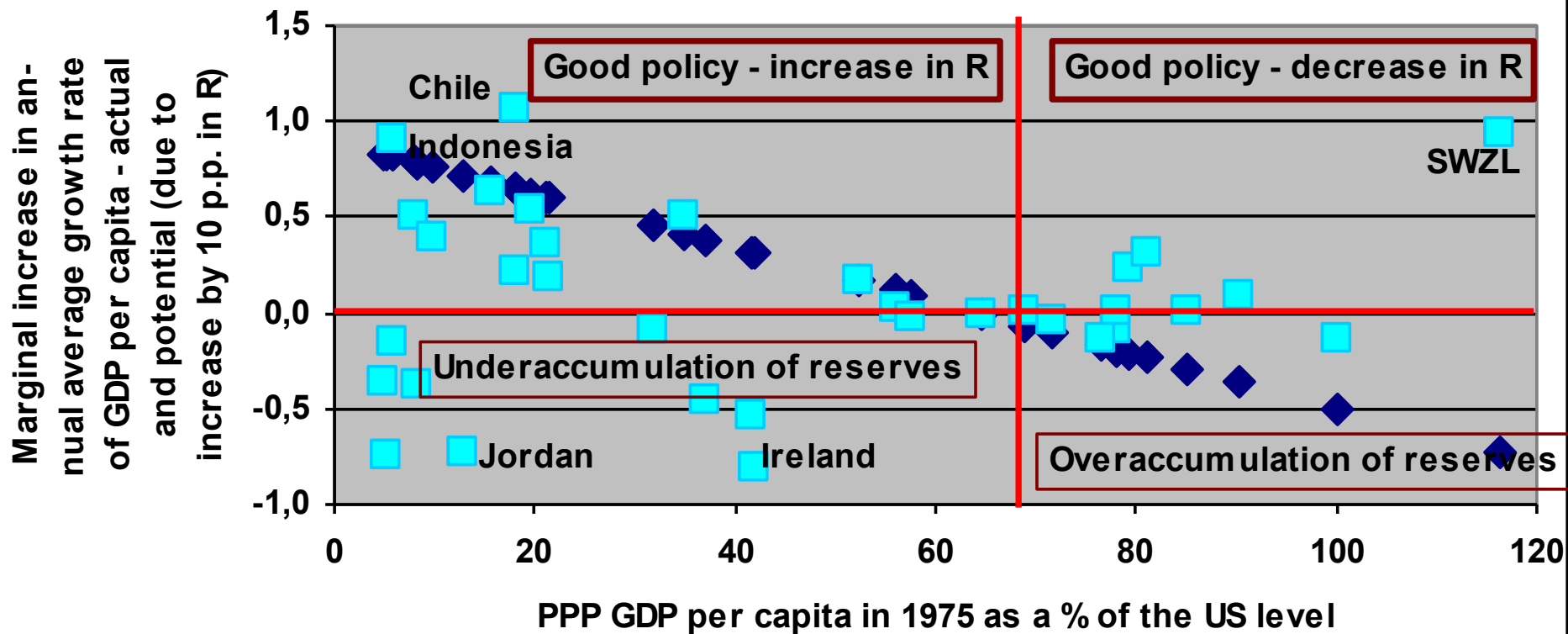
Joint impact of all policies: T, G, and R

Marginal impact on growth of the increase by 10 p.p. of import duties to import ratio and actual impact on growth of tariff protection

CONCLUSIONS: Joint impact of all policies: T, G, and R

Initial conditions	Level of technological development (GDP per capita)	
Quality of institutions (CPI index)	**LOW**	**HIGH**
LOW	•Accumulation of FOREX •Increase in gov.rev/GDP ratio •Decrease in tariff protection	No such countries
HIGH	•Accumulation of FOREX •Increase in gov.rev/GDP ratio •Increase in tariff protection	•Decrease in FOREX •Increase/decrease in gov.rev/GDP ratio •Decrease in tariff protection

Problems

- Endogeneity
- Trade off between growth and consumption
- Other policies