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Inflation and Growth:
The Role of Institutions

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Abstract

This paper investigates the effects of inflation on per capita income growth for 36 developed and developing countries by using structural vector autoregression models that are robust to the consideration of endogeneity by construction. The results show evidence for heterogeneity of such effects across countries that are shown to be further connected to the strength of their institutions. While the effects of inflation on growth are negative and significant in countries with stronger institutions, they are positive and significant in countries with weaker institutions.

JEL Classification: O11, O23, O43

Key Words: Economic Growth; Institutions; Inflation; Structural VAR

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Abstract

This paper investigates the effects of inflation on per capita income growth for 36 developed and developing countries by using structural vector autoregression models that are robust to the consideration of endogeneity by construction. The results show evidence for heterogeneity of such effects across countries that are shown to be further connected to the strength of their institutions. While the effects of inflation on growth are negative and significant in countries with stronger institutions, they are positive and significant in countries with weaker institutions.

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1 Introduction

Price stability is the main concern of monetary authorities (e.g., see Fischer (1996)), although benefits of economic growth are much larger than those of eliminating macroeconomic instability (e.g., see Lucas (1987)). Therefore, knowing the relationship between inflation and growth is essential to have an optimal balance between monetary and growth policies.

The theoretical literature provides mixed evidence on this subject, where the effects of inflation on growth have been explained by using the positive relationship between capital accumulation and economic growth. Studies such as by Tobin (1965) have shown that additional money can be used as substitute for capital and thus higher inflation results in higher capital accumulation (and growth), whereas studies such as by Stockman (1981) have shown that higher inflation results in less money to purchase capital goods and thus lower capital accumulation (and growth). Other studies have shown alternative mechanisms through which inflation can hurt growth; e.g., McKinnon (2010) has considered the reducing efficiency of the financial system due to high inflation, Tommasi (1994) has considered the diminishing value of acquiring information with inflation, and Beaudry, Caglayan, and Schiantarelli (2001) have considered increasing relative price variability with inflation that results in investment misallocation. To contribute more to this discussion, superneutrality of money implies that there is no relationship between inflation and growth (e.g., see Sidrauski (1967) or Lucas (1973)). Evidence provided by the empirical literature is also mixed. While studies such as by Fischer (1993) have shown a negative relationship between inflation and growth, those by Levine and Renelt (1992) or Ericsson, Irons, and Tryon (2001) have challenged the existence of such a relationship.

This paper contributes to this discussion by investigating the causal relationship between inflation and per capita income growth. This is achieved by using the implications of a structural vector autoregression (SVAR) model, because it is an important tool to capture causal relationships in a time-series framework as indicated in studies such as by Rubin (1974) and Imbens (2014). The main advantage of using a SVAR model in a time-series framework (compared to the cross-sectional or panel models in the literature) is having a structure identifying shocks that can be interpreted as the randomly-assigned treatments to capture the dynamic causal effects on each variable of interest (e.g., see Stock and Watson (2018)). In technical terms, these dynamic causal effects are captured by impulse response functions, and they are robust to the consideration of endogeneity by construction.

The empirical investigation is achieved for 36 countries over the period between 1970-2017, where control variables such as trade openness, financial development and government size are also used. Since the estimations are achieved for each country individually, the initial conditions of countries (e.g., initial human capital, initial development, initial institutions, etc.) are also controlled for (by estimated constant terms). All variables are represented as moving five-year averages to focus on the long-run relationship between inflation and income growth. The estimation results are further used to estimate the inflation elasticity of growth over time, which is defined as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. In order to investigate the effects of inflation on growth, we consider alternative inflation elasticities of growth measured one year, five years, ten years and twenty years after an inflation shock. Such an approach (especially when longer horizons are considered) corresponds to having a long-run investigation between inflation and income growth.

The estimated inflation elasticity of growth measures are highly heterogeneous across countries, providing evidence for significantly positive, significantly negative or insignificant relationships between inflation and growth. Consistent with the mixed evidence suggested by the literature (as discussed above), it is implied that the effects of inflation on growth depend on the country investigated. To have an explanation for this heterogeneity across countries, in a secondary analysis, we investigate the relationship between country-specific measures for inflation elasticity of growth and country-specific strength of institutions. The corresponding results show that the effects of inflation on growth are negative and significant in countries with stronger institutions, whereas they are positive and significant in countries with weaker institutions.

Regarding the economic intuition behind the results, on one hand, the positive effects of inflation on growth for countries with weaker institutions are consistent with studies such as by Porta, Lopez-de Silanes, Shleifer, and Vishny (1998) who have shown that weak institutions can result in poorer access to direct capital; therefore, additional money (and thus higher inflation) can be used as substitute for capital in these countries as suggested by Tobin (1965). Such a positive effect, for example, can be achieved through borrowing of governments from their (non-independent) central banks in countries with weak institutions to increase real investment (e.g., see Cukierman, Edwards, Tabellini, et al. (1992)). The negative effects of inflation on growth for countries with stronger institutions, on the other hand, are consistent with studies such as by Jung and Marshall (1986) who have shown that inflation can hurt growth due to political power of urban workers in countries with strong institutions, where governments can impose price controls to fight against inflation that would lead into shortages and thus lower growth.

The rest of the paper is organized as follows. The next section introduces the estimation methodology and data. Section 3 depicts the empirical results. Section 4 discusses the results by connecting them to the existing literature. The last section concludes by also depicting the corresponding policy implications.

2 Estimation Methodology and Data

Country-specific per capita income growth dynamics are investigated by the SVAR model of $z_t = (\Delta e_t, \Delta f_t, \Delta o_t, \Delta \pi_t, \Delta g_t)'$ that includes a standard set of explanatory variables that provide robust and widely accepted proxies for growth determinants. In particular, Δe_t is the change in government expenditure as a percent of gross domestic product (GDP), Δf_t is the change in domestic credit provided by financial sector as a percent of GDP, Δo_t is the change in trade openness measured as the sum of imports and exports as a percent of GDP, $\Delta \pi_t$ is the change in inflation of consumer prices in percentage terms, and Δg_t is the percentage change in GDP per capita measured in constant 2010 U.S. dollars. Data for $\Delta e_t, \Delta f_t, \Delta o_t, \Delta \pi_t$ and Δg_t are obtained from World Development Indicators (as of October 28, 2019).

It is important to emphasize that several country-specific characteristics, such as their initial conditions of human capital, development or institutions, are already controlled for in this framework (by estimated constant terms) due to having country-specific SVAR estimations. Moreover, nonlinearities or thresholds considered in panel or cross-sectional models in studies such as by Hansen (1999), Yilmazkuday (2011) and Yilmazkuday (2013) are also controlled for due to having country-specific analyses, where dynamics of each country are estimated individually. Since the interaction across all variables is considered in the struc-

tural equation system, this empirical framework is robust to the consideration of endogeneity by construction.

In order to have a balance between the number of countries and the number of data points, the sample covers 36 countries, 7 developed and 29 developing (listed in Appendix Table A.1), for the annual period between 1970 and 2017. All variables are represented as moving five-year averages to focus on the effects of inflation on long-run income growth. The corresponding SVAR model is given by:

$$B_o z_t = b + B_1 z_{t-1} + v_t \tag{1}$$

where v_t is the vector of serially and mutually uncorrelated structural innovations.[1] For estimation purposes, the model is expressed in reduced form as follows:

$$z_t = \alpha + A z_{t-1} + u_t \tag{2}$$

where $\alpha = B_o^{-1} b$, $A = B_o^{-1} B_1$, and it is postulated that the structural impact multiplier matrix B_o^{-1} has a recursive structure such that the reduced form errors u_t can be decomposed according to $u_t = B_o^{-1} v_t$, where the identification is achieved by triangular factorization. The recursive structure imposed on B_o^{-1} requires an ordering of the variables used in the estimation for which we consider the ordering in z_t given above. In particular, government expenditure is decided at the beginning of each (fiscal) year, domestic credit reacts to government expenditure contemporaneously, trade openness is affected by both government expenditure and domestic credit contemporaneously, inflation is affected by government expenditure, domes-

[1] The number of lags, which is one year, has been determined by comparing the log 10 of the marginal likelihood of the estimated models with one to ten lags.

tic credit and trade openness contemporaneously, and finally per capita income growth is affected by all variables for the sake of this investigation.

The estimation is achieved for each country individually by a Bayesian approach with independent normal-Wishart priors. This corresponds to generating posterior draws for the structural model parameters by transforming each reduced-form posterior draw. In the Bayesian framework, a total of 2,000 samples are drawn, where a burn-in sample of 1,000 draws is discarded. The remaining 1,000 draws are used to determine the structural impulse responses that are necessary in the estimation of inflation effects on income growth.

Once the SVAR estimation is achieved for each country individually, a secondary analysis is achieved to investigate the role of institutions on the relationship between inflation and per capita income growth. As this secondary analysis is subject to the generated regressor problem as indicated in studies such as by Pagan (1984), bootstrapping is used to estimate the statistical significance of the relationship between institutions and the effects of inflation on per capita income growth. In technical terms, bootstrapping is achieved by considering all 1,000 draws coming from the Bayesian estimations of individual countries. Specifically, for each country, impulse responses are randomly drawn from 1,000 Bayesian draws to be further used in secondary regressions across countries; this is achieved for 1,000 times, where we focus on the 68% credible intervals (as in the Bayesian estimation) to decide on the significance of the relationship between institutions and the effects of inflation on per capita income growth.

The strength of institutions at the country level is measured by "voice and accountability" that is obtained from Worldwide Governance Indicators (as of October 4, 2019). Specifically, "voice and accountability" is constructed by using information on the accountability of public officials, the operation of institutions in accordance with the constitution, reliability of the state budget, reliability of basis economic statistics, and the public communication of

economic policy, among others. Therefore, "voice and accountability" is a perfect candidate to measure the ingredients of a successful monetary policy that include accountability, transparency, or the rule of law as indicated in studies such as by Bernanke and Mishkin (1997), Svensson (2000) and Koyama and Johnson (2015). Since this country-specific measure of "voice and accountability" is highly stable over time as it is shown in Appendix Figure A.1 for the years of 1996 and 2017, we consider the average of annual values between 1996 and 2017 to measure the strength of country-specific institutions.

3 Implications for Inflation Elasticity of Growth

We would like to investigate the effects of inflation on per capita income growth. In order to have a standard measure across countries (so that we can achieve a cross-country comparison later on), we focus on the inflation elasticity of growth defined as follows for each country:

$$\varepsilon = \frac{\text{Cumulative Response of } \Delta g_t}{\text{Cumulative Response of } \Delta \pi_t} \tag{3}$$

which can be calculated for any period after an inflation shock. In the Bayesian estimation, the right hand side of Equation 3 is calculated for each of the 1,000 successful draws. While the median of this distribution is considered as the Bayesian estimator of ε, the 16th and 84th quantiles of the same distribution are used to construct the 68 percent credible interval.

3.1 Elasticity Estimates

The estimation results are given in Figures 1-6, where the inflation elasticity of growth ε is given for each country over time following an inflation shock. As is evident, countries have

highly different elasticity measures over time, suggesting alternative effects of inflation on growth across countries. In particular, the effects of inflation on growth are positive and significant for countries such as Cameroon, Egypt, Gabon, Malaysia and Panama for any period after an inflation shock, whereas they are negative and significant for other countries such as Costa Rica, Denmark, Dominican Republic, Ecuador, Indonesia, Japan, Kenya, Korea, Madagascar, Mexico, Morocco, Norway, Philippines, Senegal, Turkey, United Kingdom and United States for any period following an inflation shock.

Regarding the magnitudes, inflation elasticity of growth ε measures at the country level one year, five years, ten years and twenty years after an inflation shock are given in Tables 1-4, respectively. According to these tables, there is evidence for increasing effects of inflation on growth over time. In particular, one-year inflation elasticity of growth ε has an average and a median of about -0.1 across countries, with a range between -0.5 (for Japan) and 0.7 (for Panama). Similarly, five-year inflation elasticity of growth ε has an average and a median of about -0.1 across countries, with a range between -1.1 (for Philippines) and 1.2 (for Panama). Ten-year inflation elasticity of growth ε has an average of about -0.2 and a median of about -0.1 across countries, with a range between -2.1 (for Philippines) and 1.4 (for Panama).

In the long run, twenty-year inflation elasticity of growth ε has an average of about -0.3 and a median of about -0.2 across countries, with a range between -3.3 (for Philippines) and 1.5 (for Panama). Advanced economies such as Denmark, Japan, Norway, United Kingdom and United States have negative long-run ε estimates of around -1, whereas less-developed economies such as Cameroon, Cote d'Ivoire and Gabon have positive long-run ε estimates of around 0.5.

Overall, there is evidence for heterogeneity across countries regarding the inflation elasticity of growth ε, independent of the time horizon considered. We further investigate this heterogeneity across countries in the following subsection.

3.2 The Role of Institutions

In order to have an explanation for the heterogeneity across countries regarding the effects of inflation on growth, we achieve a secondary analysis by comparing the inflation elasticity of growth with institutional strength across countries in Figure 7. To consider alternative time horizons for robustness, we consider inflation elasticity of growth ε estimates measured one year, five years, ten years and twenty years after an inflation shock.

The results in Figure 7 suggest that there is a negative and statistically significant relationship (determined by bootstrapping) between the measures of inflation elasticity of growth and the strength of institutions measured by voice and accountability independent of the time horizon considered, although the explanatory power changes between time horizons. In particular, the relationship is weaker in the short-run (i.e., one year after the shock) and stronger in the long-run (starting from five years after the shock).

It is implied that countries with stronger institutions experience negative effects of inflation on growth, whereas countries with weaker institutions experience positive effects of inflation on growth. Based on the estimation strategy, by construction, these results are robust to the consideration of not only endogeneity but also several control variables including trade openness, financial development, and government size, where country-specific initial conditions are also controlled for (by estimated constant terms) due to having country-specific SVAR estimations.

4 Discussion of Results

This section discusses the economic intuition behind the empirical results by connecting them to the existing literature. In particular, the results show that the effects of inflation on growth are positive and significant in countries with weaker institutions, whereas they are negative and significant in countries with stronger institutions. This result is consistent with earlier empirical analyses such as by Ibarra and Trupkin (2016) who have shown evidence for lower negative effects of inflation in countries with weaker institutions or by Khan and Hanif (2018) who have shown evidence for negative effects of inflation on growth in countries with stronger institutions. Nevertheless, in contrast to these studies that have compared the magnitude of negative effects of inflation on growth across countries using panel regressions, this paper has shown by considering the causal effects of inflation on growth that such effects can be significantly positive, significantly negative or insignificant based on the country investigated (due to using country-specific SVAR estimations), consistent with the theoretical literature that provides such a mixed evidence as well.

Regarding the economic intuition behind the results, on one hand, the positive effects of inflation on growth for countries with weaker institutions are consistent with studies such as by Porta, Lopez-de Silanes, Shleifer, and Vishny (1998) who have shown that weak institutions can result in poorer access to direct capital; therefore, additional money (and thus higher inflation) can be used as substitute for capital in these countries as suggested by Tobin (1965). Such a positive effect, for example, can be achieved through borrowing of governments from their (non-independent) central banks in countries with weak institutions to increase real investment (e.g., see Cukierman, Edwards, Tabellini, et al. (1992)). The negative effects of inflation on growth for countries with stronger institutions, on the other

hand, are consistent with studies such as by Jung and Marshall (1986) who have shown that inflation can hurt growth due to political power of urban workers in countries with strong institutions, where governments can impose price controls to fight against inflation that would lead into shortages and thus lower growth.

The mixed evidence across countries is also consistent with the traditional notion that anticipated inflation has little or no effect on economic growth (e.g., see Fischer (1981), Taylor (1981) or Cukierman (1983)), which is mostly the case in countries with weaker institutions due to the lack of an independent central bank, whereas unanticipated inflation has negative effects on economic growth, which is mostly the case in countries with stronger institutions through accountability or stability.

5 Conclusion

This paper has investigated the causal relationship between inflation and per capita income growth by using the implications of a SVAR model, which is robust to the consideration of endogeneity by construction. The investigation has been achieved for 36 countries over the period between 1970-2017, where control variables such as trade openness, financial development and government size have also been used. The SVAR estimation results have been used to estimate the inflation elasticity of growth over time, which is defined as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock.

The estimated inflation elasticity of growth measures have been shown to be highly heterogeneous across countries, providing evidence for significantly positive, significantly negative or insignificant relationships between inflation and long-run growth. Consistent with

the mixed evidence suggested by the literature, it is implied that the effects of inflation on growth depend on the country investigated. To have an explanation for this heterogeneity across countries, in a secondary analysis, the relationship between country-specific measures of inflation elasticity of growth and country-specific strength of institutions has been investigated. The corresponding results have shown that the effects of inflation on growth are negative and significant in countries with stronger institutions, whereas they are positive and significant in countries with weaker institutions.

The empirical results of this paper have several policy implications. On the one hand, as inflation results in higher long-run growth in countries with weaker institutions, additional money supply can be used as substitute for poorer access to direct capital in these countries; this can be achieved, for example, through borrowing of governments from their (non-independent) central banks to increase real investment. On the other hand, as inflation results in lower growth in countries with stronger institutions, monetary authorities can focus more on the price stability (compared to the short-run economic volatility) to promote long-run growth in these countries, consistent with earlier studies such as by Lucas (1987) who have shown that the benefits of economic growth are much larger than those of eliminating macroeconomic instability.

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Table 1 - One-Year Inflation Elasticity of Growth

	Long-Run Inflation Elasticity of Growth		
Country	Estimate	Lower Bound	Upper Bound
Australia	-0.039	-0.143	0.052
Burkina Faso	-0.016	-0.085	0.049
Cameroon	0.116	0.009	0.228
Costa Rica	-0.282	-0.331	-0.239
Cote d'Ivoire	0.078	-0.072	0.226
Denmark	-0.263	-0.428	-0.104
Dominican Republic	-0.101	-0.173	-0.041
Ecuador	-0.098	-0.128	-0.071
Egypt, Arab Rep.	0.071	0.008	0.133
El Salvador	-0.053	-0.173	0.071
Gabon	0.233	0.061	0.398
Guatemala	-0.086	-0.147	-0.021
India	0.003	-0.066	0.069
Indonesia	-0.202	-0.263	-0.140
Japan	-0.534	-0.631	-0.432
Kenya	-0.133	-0.225	-0.045
Korea, Rep.	-0.245	-0.363	-0.134
Madagascar	-0.191	-0.260	-0.125
Malaysia	0.192	0.006	0.381
Mexico	-0.062	-0.116	-0.014
Morocco	-0.228	-0.391	-0.082
Niger	-0.079	-0.218	0.057
Norway	-0.283	-0.415	-0.137
Pakistan	-0.021	-0.100	0.051
Panama	0.695	0.440	0.986
Paraguay	0.007	-0.126	0.141
Philippines	-0.352	-0.429	-0.276
Saudi Arabia	-0.113	-0.283	0.058
Senegal	-0.142	-0.211	-0.069
Singapore	0.132	0.009	0.261
Sweden	-0.054	-0.194	0.099
Thailand	0.017	-0.095	0.130
Turkey	-0.146	-0.193	-0.095
United Kingdom	-0.228	-0.357	-0.094
United States	-0.180	-0.354	0.003
Uruguay	-0.073	-0.107	-0.036
Average	-0.074	-0.182	0.034
Median	-0.082	-0.173	-0.005
Minimum	-0.534	-0.631	-0.432
Maximum	0.695	0.440	0.986

Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both after one year following an inflation shock. Lower and upper bounds correspond to the 68% credible intervals. Measures of government traditions and institutions represent averages between 1996-2017.

Table 2 - Five-Year Inflation Elasticity of Growth

	Long-Run Inflation Elasticity of Growth		
Country	Estimate	Lower Bound	Upper Bound
Australia	-0.084	-0.233	0.035
Burkina Faso	0.016	-0.097	0.128
Cameroon	0.276	0.062	0.515
Costa Rica	-0.720	-0.948	-0.548
Cote d'Ivoire	0.247	-0.046	0.534
Denmark	-0.484	-0.780	-0.248
Dominican Republic	-0.178	-0.316	-0.075
Ecuador	-0.138	-0.197	-0.088
Egypt, Arab Rep.	0.103	0.015	0.204
El Salvador	-0.089	-0.258	0.105
Gabon	0.398	0.120	0.724
Guatemala	-0.089	-0.196	0.020
India	0.007	-0.107	0.132
Indonesia	-0.445	-0.620	-0.292
Japan	-0.883	-1.133	-0.687
Kenya	-0.230	-0.419	-0.084
Korea, Rep.	-0.542	-0.840	-0.294
Madagascar	-0.297	-0.431	-0.168
Malaysia	0.261	-0.020	0.531
Mexico	-0.102	-0.201	-0.024
Morocco	-0.247	-0.467	-0.062
Niger	-0.041	-0.258	0.158
Norway	-0.520	-0.816	-0.263
Pakistan	-0.072	-0.185	0.032
Panama	1.167	0.716	1.701
Paraguay	0.063	-0.162	0.297
Philippines	-1.050	-1.451	-0.755
Saudi Arabia	0.016	-0.248	0.251
Senegal	-0.223	-0.379	-0.087
Singapore	0.106	-0.066	0.274
Sweden	-0.164	-0.439	0.091
Thailand	-0.059	-0.249	0.108
Turkey	-0.254	-0.379	-0.150
United Kingdom	-0.513	-0.810	-0.261
United States	-0.430	-0.706	-0.182
Uruguay	-0.043	-0.096	0.012
Average	-0.145	-0.351	0.044
Median	-0.095	-0.253	0.016
Minimum	-1.050	-1.451	-0.755
Maximum	1.167	0.716	1.701

Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both after five years following an inflation shock. Lower and upper bounds correspond to the 68% credible intervals. Measures of government traditions and institutions represent averages between 1996-2017.

Table 3 - Ten-Year Inflation Elasticity of Growth

	Long-Run Inflation Elasticity of Growth		
Country	Estimate	Lower Bound	Upper Bound
Australia	-0.119	-0.318	0.035
Burkina Faso	0.034	-0.098	0.169
Cameroon	0.418	0.080	0.776
Costa Rica	-1.428	-2.617	-0.915
Cote d'Ivoire	0.412	-0.020	0.832
Denmark	-0.663	-1.119	-0.339
Dominican Republic	-0.234	-0.434	-0.095
Ecuador	-0.177	-0.280	-0.101
Egypt, Arab Rep.	0.140	0.009	0.289
El Salvador	-0.091	-0.360	0.188
Gabon	0.476	0.092	0.929
Guatemala	-0.080	-0.244	0.070
India	0.015	-0.149	0.207
Indonesia	-0.701	-1.088	-0.428
Japan	-1.196	-1.626	-0.874
Kenya	-0.320	-0.612	-0.114
Korea, Rep.	-0.914	-1.521	-0.481
Madagascar	-0.362	-0.594	-0.175
Malaysia	0.296	-0.054	0.656
Mexico	-0.143	-0.317	-0.025
Morocco	-0.236	-0.506	-0.031
Niger	-0.023	-0.289	0.230
Norway	-0.718	-1.235	-0.309
Pakistan	-0.115	-0.268	0.022
Panama	1.452	0.821	2.163
Paraguay	0.144	-0.189	0.472
Philippines	-2.072	-3.454	-1.316
Saudi Arabia	0.084	-0.269	0.412
Senegal	-0.300	-0.559	-0.094
Singapore	0.092	-0.124	0.295
Sweden	-0.272	-0.739	0.085
Thailand	-0.116	-0.376	0.110
Turkey	-0.375	-0.701	-0.196
United Kingdom	-0.779	-1.364	-0.365
United States	-0.634	-1.052	-0.285
Uruguay	-0.010	-0.085	0.068
Average	-0.237	-0.602	0.052
Median	-0.131	-0.339	0.028
Minimum	-2.072	-3.454	-1.316
Maximum	1.452	0.821	2.163

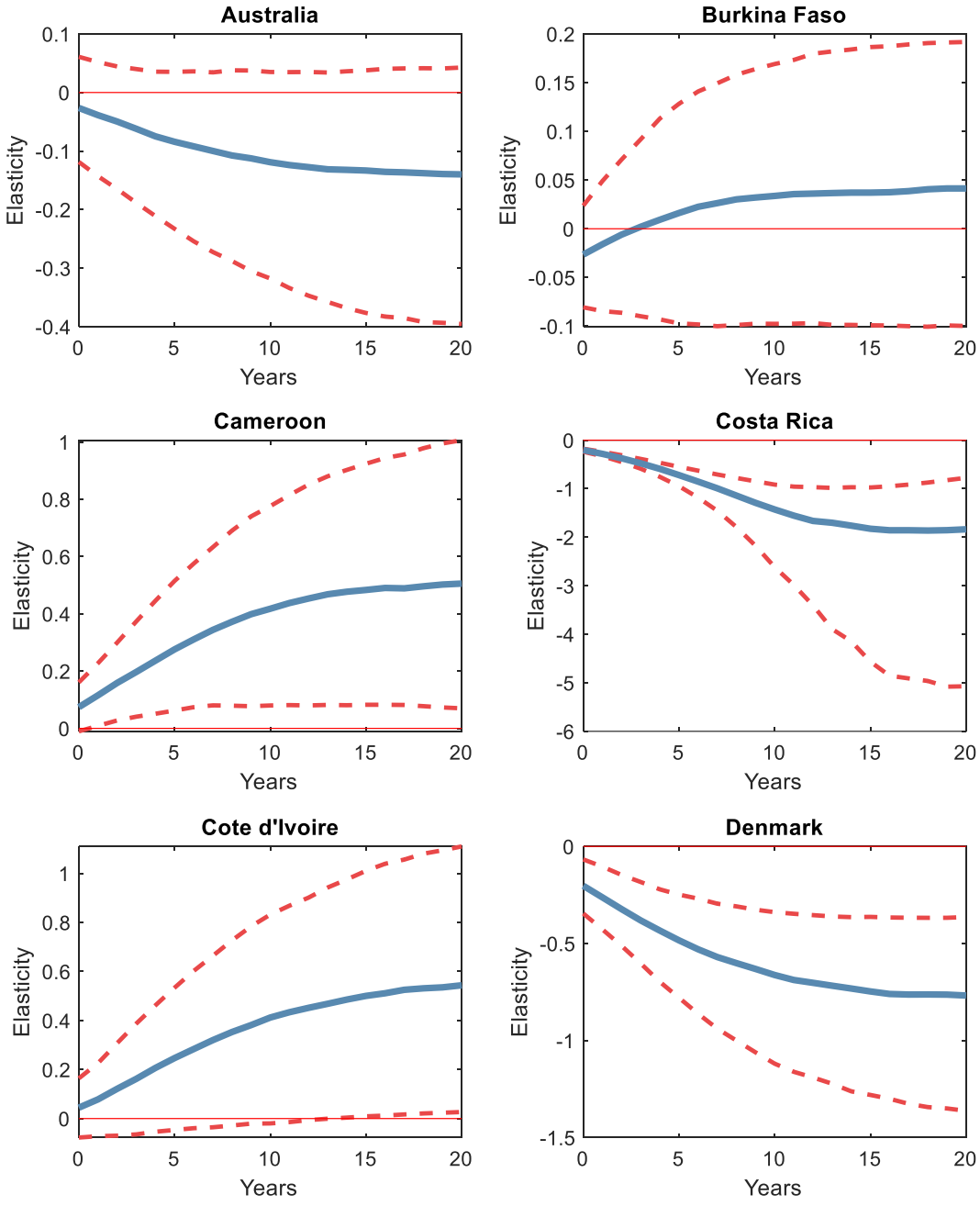
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both after ten years following an inflation shock. Lower and upper bounds correspond to the 68% credible intervals. Measures of government traditions and institutions represent averages between 1996-2017.

Table 4 - Twenty-Year Inflation Elasticity of Growth

	Long-Run Inflation Elasticity of Growth		
Country	Estimate	Lower Bound	Upper Bound
Australia	-0.140	-0.395	0.043
Burkina Faso	0.041	-0.100	0.192
Cameroon	0.506	0.070	1.006
Costa Rica	-1.836	-5.072	-0.776
Cote d'Ivoire	0.544	0.027	1.110
Denmark	-0.768	-1.362	-0.364
Dominican Republic	-0.267	-0.529	-0.098
Ecuador	-0.215	-0.395	-0.106
Egypt, Arab Rep.	0.170	-0.007	0.382
El Salvador	-0.050	-0.450	0.340
Gabon	0.505	0.028	1.034
Guatemala	-0.058	-0.264	0.132
India	0.024	-0.208	0.297
Indonesia	-0.957	-1.832	-0.521
Japan	-1.405	-2.054	-0.957
Kenya	-0.377	-0.780	-0.127
Korea, Rep.	-1.467	-2.902	-0.697
Madagascar	-0.383	-0.722	-0.153
Malaysia	0.305	-0.090	0.732
Mexico	-0.165	-0.440	-0.018
Morocco	-0.227	-0.527	-0.004
Niger	-0.011	-0.306	0.275
Norway	-0.799	-1.638	-0.168
Pakistan	-0.142	-0.354	0.017
Panama	1.486	0.744	2.367
Paraguay	0.229	-0.180	0.636
Philippines	-3.309	-8.313	-1.446
Saudi Arabia	0.133	-0.297	0.521
Senegal	-0.366	-0.788	-0.098
Singapore	0.080	-0.171	0.313
Sweden	-0.356	-1.051	0.088
Thailand	-0.116	-0.425	0.146
Turkey	-0.458	-1.104	-0.185
United Kingdom	-0.821	-1.934	-0.296
United States	-0.757	-1.356	-0.333
Uruguay	0.020	-0.076	0.125
Average	-0.317	-0.979	0.095
Median	-0.154	-0.433	0.030
Minimum	-3.309	-8.313	-1.446
Maximum	1.486	0.744	2.367

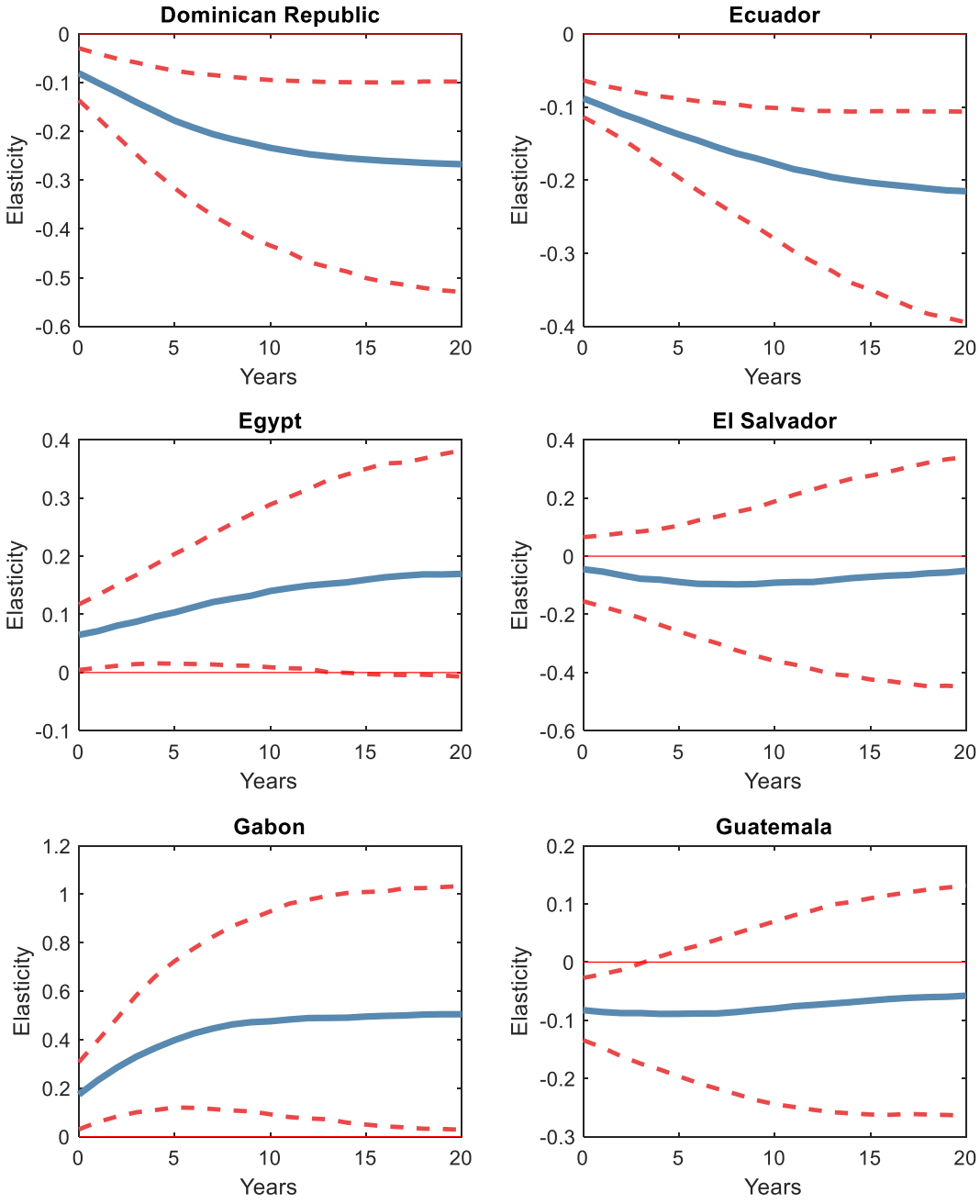
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both after twenty years following an inflation shock. Lower and upper bounds correspond to the 68% credible intervals. Measures of government traditions and institutions represent averages between 1996-2017.

Figure 1 – Inflation Elasticity of Growth over Time #1



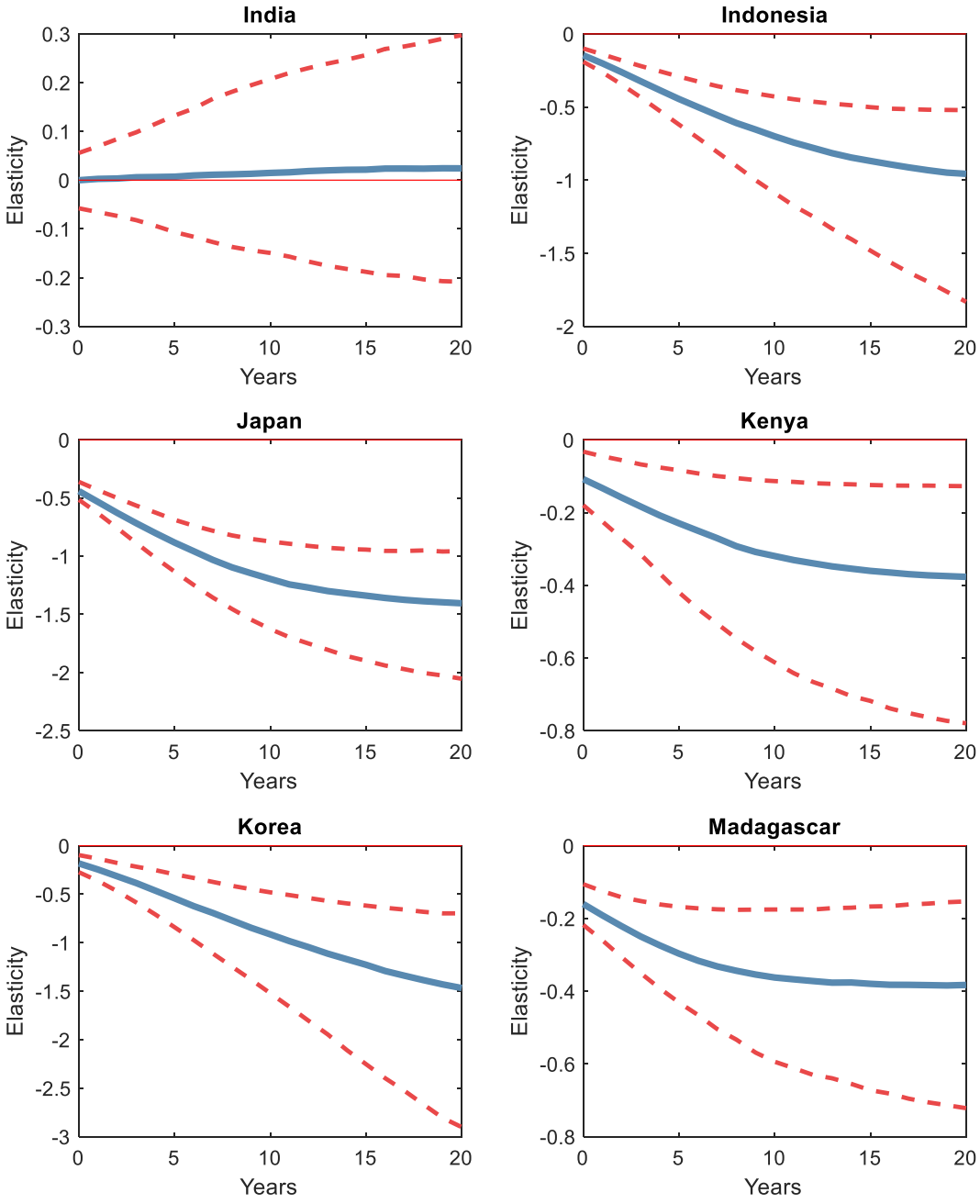
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 2 – Inflation Elasticity of Growth over Time #2



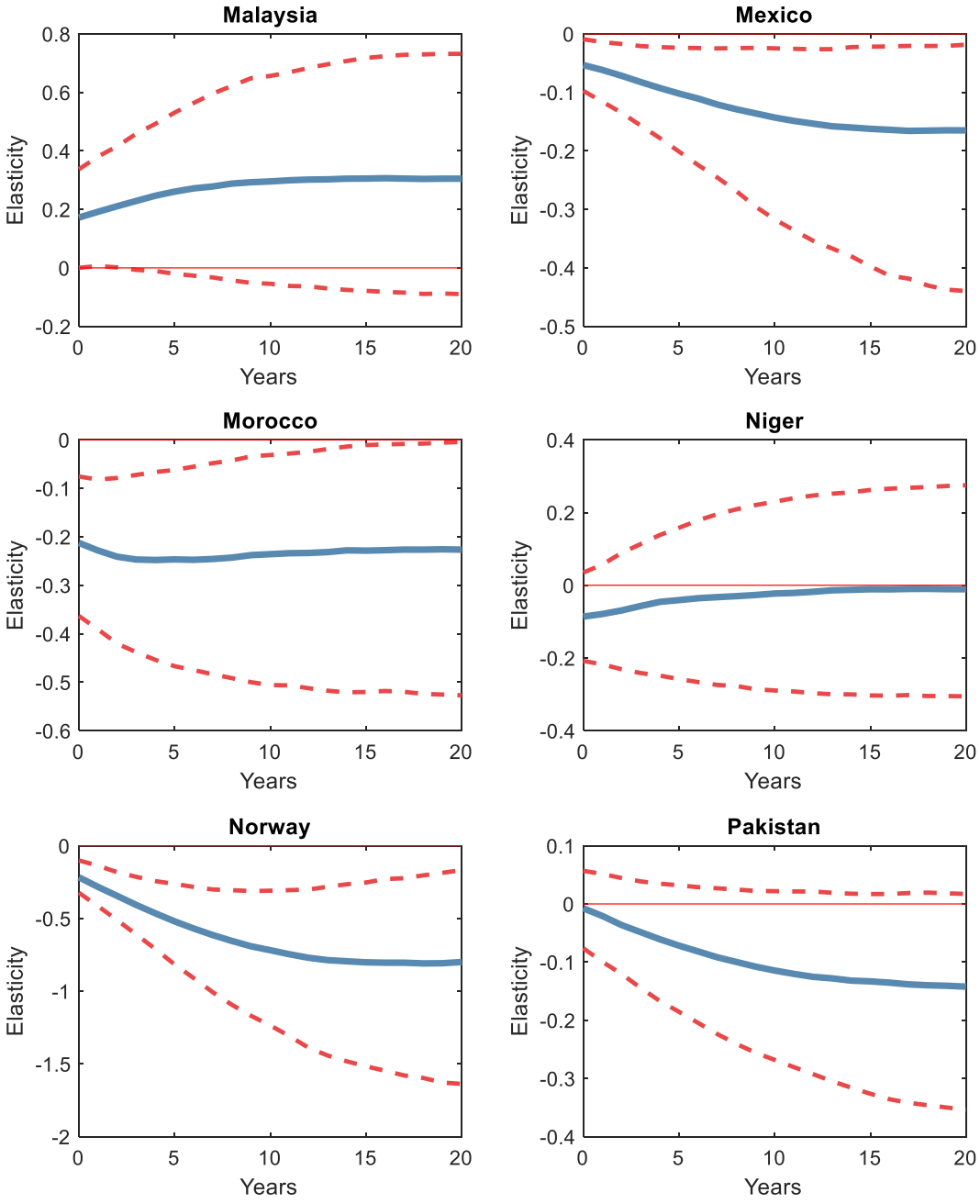
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 3 – Inflation Elasticity of Growth over Time #3



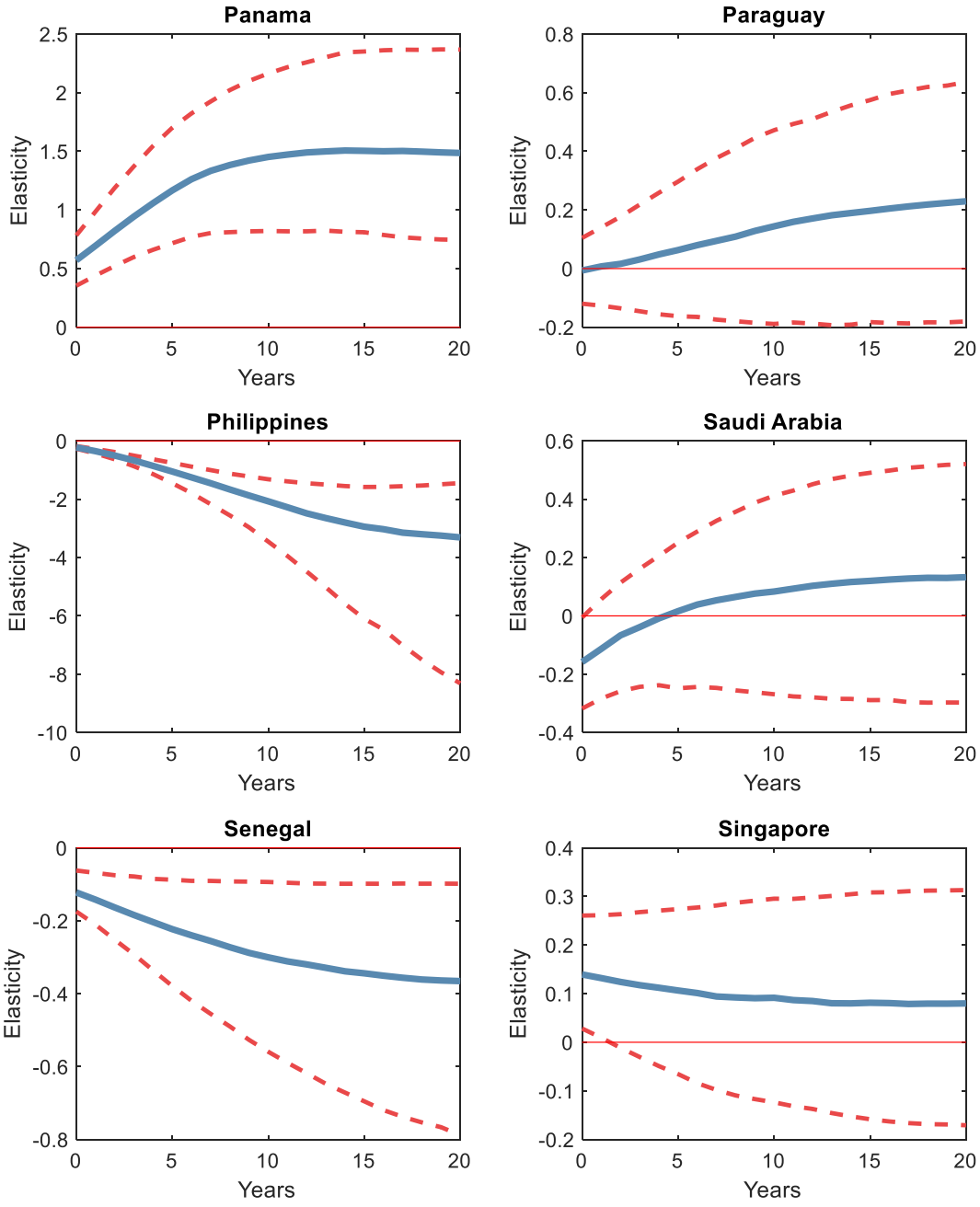
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 4 – Inflation Elasticity of Growth over Time #4



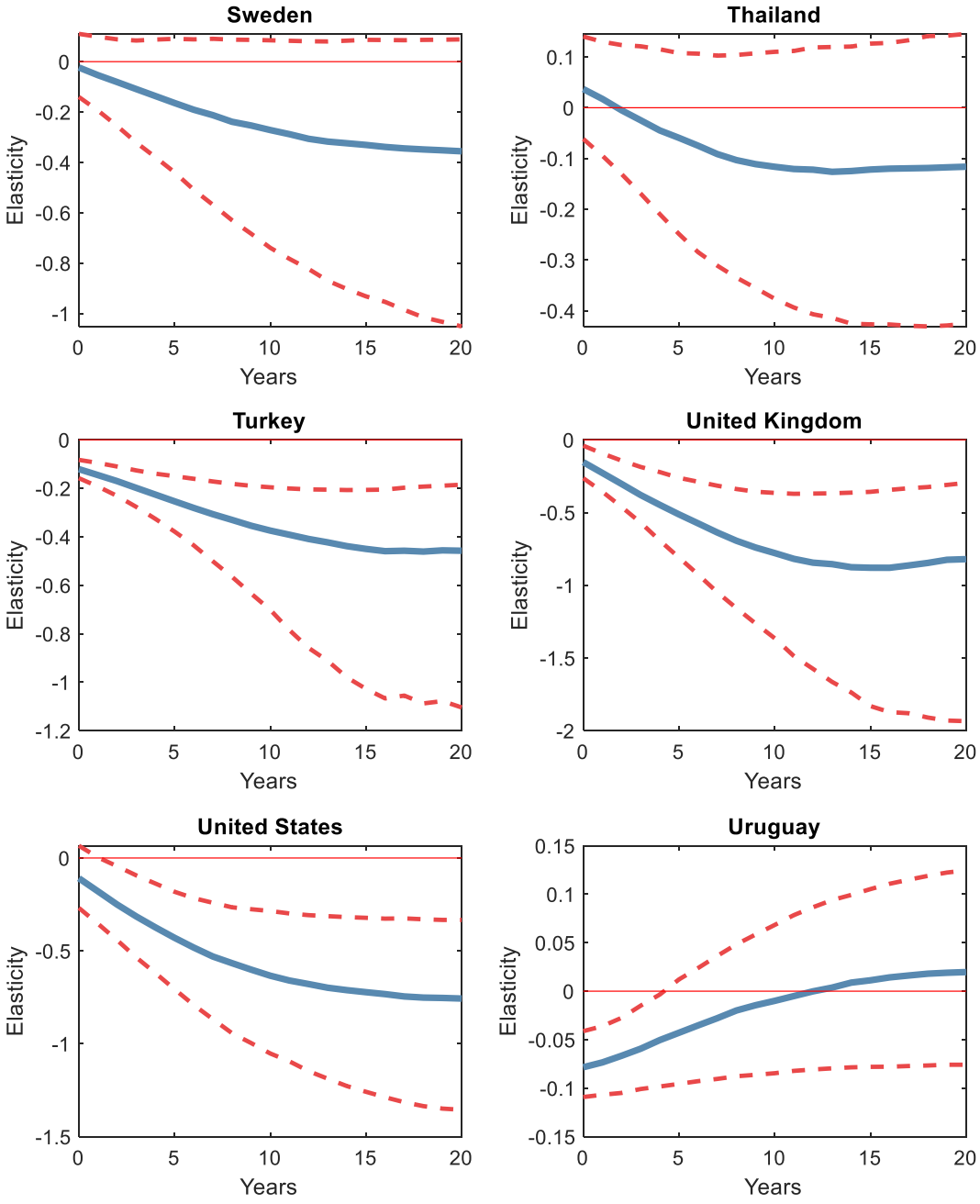
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 5 – Inflation Elasticity of Growth over Time #5



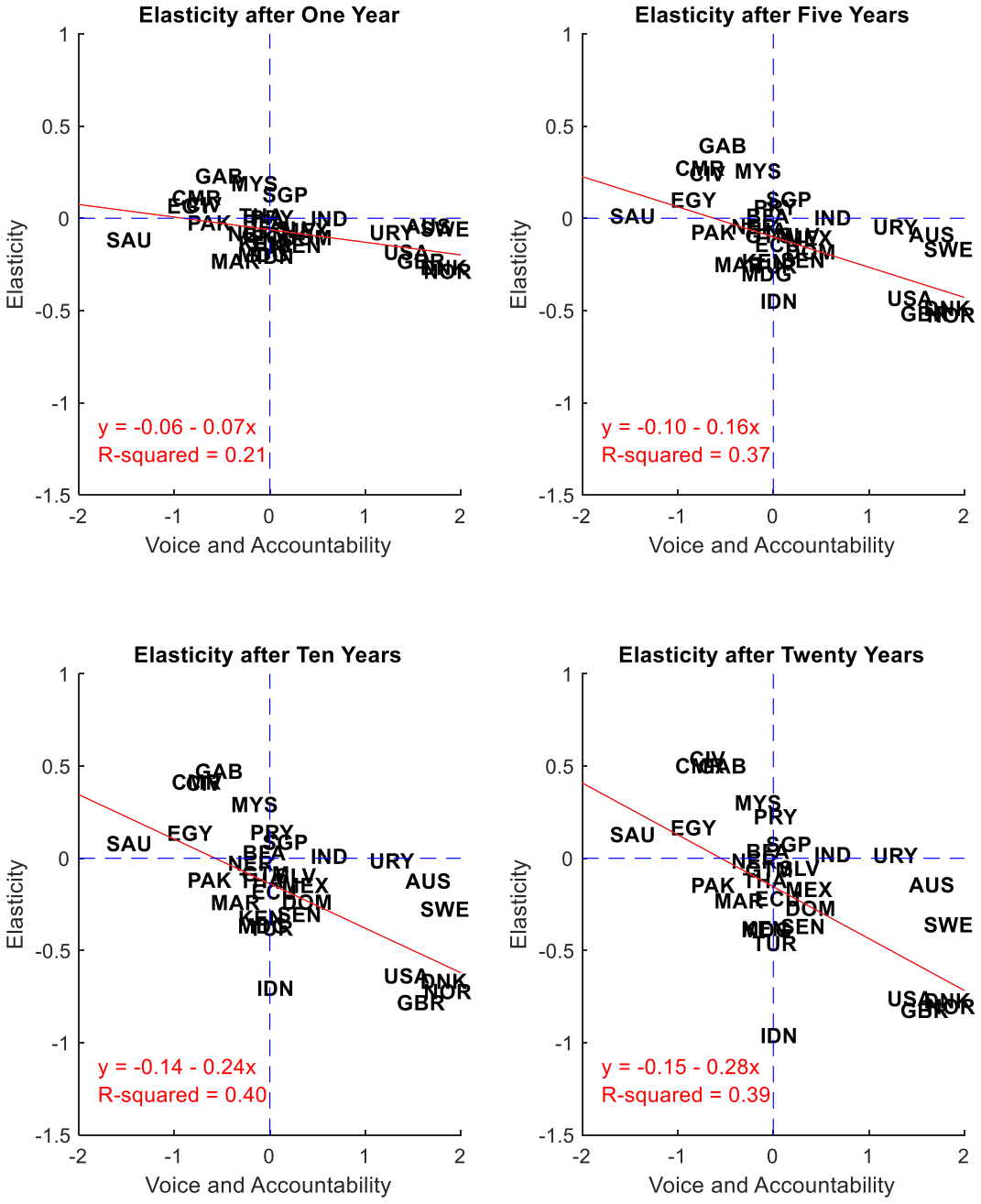
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 6 – Inflation Elasticity of Growth over Time #6



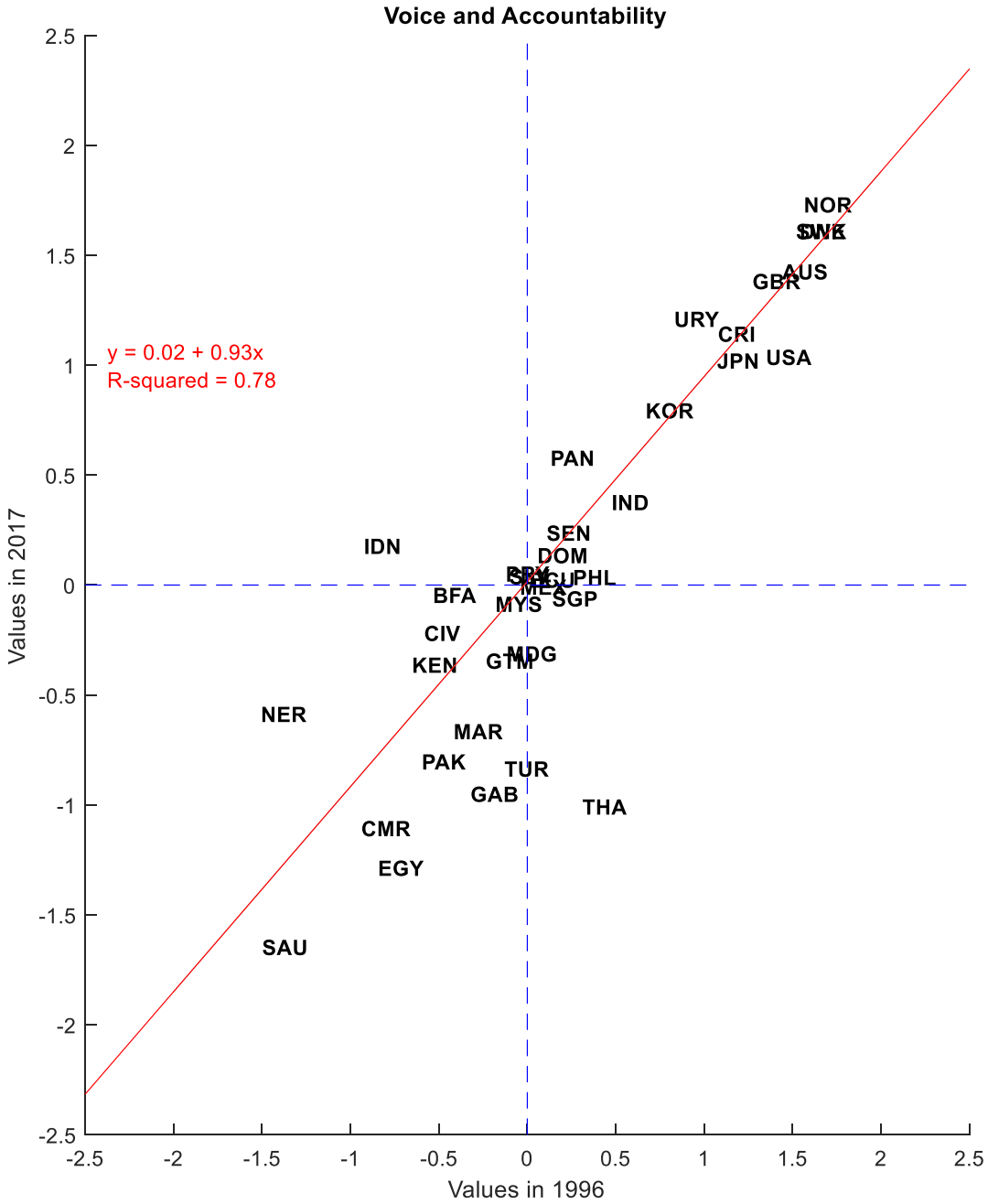
Notes: Inflation elasticity of growth is calculated as the cumulative response of growth divided by the cumulative response of inflation, both following an inflation shock. The solid lines represent the estimates, while dashed lines represent lower and upper bounds that correspond to the 68% credible intervals.

Figure 7 – Inflation Elasticity of Growth versus Institutions



Notes: Elasticity measures correspond to the estimates represented in Figures 1-6 after ignoring outlier countries. All estimated slopes (represented by coefficients in front of x) are statistically significant based on the 68% credible intervals obtained by bootstrapping that is detailed in the main text.

Figure A.1 – Institutions for 1996 versus 2017



Source: Worldwide Governance Indicators (as of October 4, 2019).