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Working Paper

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Working Papers in Economics and Management, No. 06-2025

Provided in Cooperation with:

Faculty of Business Administration and Economics, Bielefeld University

Suggested Citation: Owusu, Benjamin Kwaw; Bökemeier, Bettina (2025) : The economic growth and inflation nexus: New empirical assessment for emerging market economies, Working Papers in Economics and Management, No. 06-2025, Bielefeld University, Faculty of Business Administration and Economics, Bielefeld,
<https://doi.org/10.4119/unibi/3007021>

This Version is available at:

<https://hdl.handle.net/10419/333578>

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The Economic Growth and Inflation Nexus: New Empirical Assessment for Emerging Market Economies

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The Economic Growth and Inflation Nexus: New Empirical Assessment for Emerging Market Economies

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Abstract

This paper empirically studies the relationship between economic growth and inflation for a selected group of emerging market economies. We applied panel linear estimators, namely, static fixed effects and a dynamic GMM estimator to a sample of 31 countries. Our preliminary results point to the negative impact of inflation on economic growth. We further relaxed the linearity assumption and applied a dynamic threshold GMM model where the threshold variable (inflation) and other regressors are considered endogenous. Our subsequent results indicate that it is reasonable to distinguish between different inflation regimes, as we find a positive impact of inflation on economic growth in a low inflation regime. In contrast, high inflation exerts a negative effect on growth. Thus, we claim that inflation is not harmful to economic growth per se, but it needs to be considered in which inflation regime/situation the economy is situated. We find a threshold of about 2% above which inflation harms the economy.

JEL: O47, E31

Keywords: Economic Growth, Inflation, Emerging Markets, Panel Estimations, Panel threshold models

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1 Introduction

Shaped by the multiple crises in the past decades, several economies around the world have been afflicted by low economic growth rates and slow recovery pace, and attempts to respond to the economic downturns by way of fiscal and monetary instruments could sometimes come at the cost of a general increase in prices (inflation). This occurrence was not limited to the emerging market (EM) countries but affected many economies independent of their development status. Even though the intensity might have differed, the implications are rather common: central banks and governments adjust policies to counter the situation in order to bring inflation under control and provide incentives and initiatives to guide the economy back to the output path.

While several empirical country or panel studies found relevant thresholds and a negative relationship, these analyses suggest that particularly high inflation periods contribute mostly to the growth-inflation relationship (for instance, see Barro (2013)). Bruno and Easterly (1998) estimated a threshold model and found a negative relationship between inflation and growth with a high inflation threshold level above 40%. In a similar vein, Kremer et al. (2013) discover with a dynamic threshold model the relevant inflation levels for economic growth with a panel for over 50 years of observations of 124 non-industrialized as well as industrialized economies suggesting a value of 2% for industrialized and 17% for non-industrialized economies respectively, beyond which inflation might become harmful to economic growth. Moreover, Vinayagathan (2013) analyzed the economic growth and inflation relationship using a dynamic threshold model for a panel of 32 Asian economies. The study found a threshold value of about 5% beyond which inflation has a statistically significant negative impact on growth, while below that threshold, the effect was not significant.

Moreover, Baharumshah et al. (2016) studied the inflation growth nexus for 94 emerging and developing countries employing a system GMM for non-overlapping intervals (data spanning the 1970's). They find that only in non-inflation crisis countries does inflation harm economic growth. Moreover, inflation uncertainty might support growth (for moderate values and though not offsetting the negative effects when compared). They also find a negative growth effect of high inflation rates, while low inflation might positively affect growth for particular model specifications. A recent literature survey is provided for instance in Akinsola and Odhiambo (2017)

Even though the inflation-growth nexus research is not new, we deem it feasible to revisit this topic with a very structural panel econometric approach, imposing testable and realistic assumptions regarding the data-generating process aimed at addressing limitations from previous papers. Our study considers annual macroeconomic variables for 31 selected Emerging Market economies for the period from 2000 to 2019. Starting from a baseline model of standard fixed effect (fixed and time effects), we extend to dynamic Panel models (GMM), and finally allow for non-linearities of the reaction coefficient in the GMM estimators. Preliminary results from our baseline panel linear static and dynamic (GMM) models all indicate the negative effects of inflation on economic growth.

Relaxing the linearity assumption and resorting to panel threshold (regime-switching) dynamic GMM model, we find that inflation is not harmful to economic growth per se for EM economies, but it needs to be considered in which inflation regime/situation the economy is situated. Based on the outcomes measured by the CPI proxy in the low inflation regime, the effect is positive, while it switches signs and becomes negative for high inflation regimes. From the estimates, the other standard macroeconomic controls exert the expected effects, and the threshold value separating the two regimes is about 2% for our full sample specification. Next, we estimate models for sub-samples of the data based on geographical location and cultural distinctions. We show that the earlier full sample results are supported in terms of a more pronounced negative effect in the high inflation regime, once the coefficient is statistically significant, at least for the miscellaneous group. For a sub-sample of Latin America or Africa, the coefficients did not appear to be statistically significant.

The main contribution of our study is as follows: firstly, we apply a dynamic panel threshold estimator to study the impact of inflation on economic growth where the transition variable (inflation) is considered endogenous. Previous studies (closely related to our study) on this topic in the panel data context notably Kremer et. al (2013) and Vinayagathan (2013) assumed exogeneity of the transition variable which is a strict assumption considering the possibility of reverse causality from the direction of economic growth to inflation, which if true could lead to bias estimates and wrong inference. Secondly, we allow for a two-way fixed effect (with individual and time effects) in our dynamic threshold panel model and argue that since our data covers the period of tumultuous financial/economic crisis, ignoring time effects as done by previous papers could result in

model misspecification and, hence, unreliable estimates and inference.

Beginning from a baseline static linear model, this study follows a very structural approach for model specification which entails testing for the presence of effects in the error component model, selecting the appropriate specification of the effects, and finally, ensuring the slope coefficient can be appropriately pooled for inference. The model is extended to allow for dynamism via inclusion of the lagged dependent variable to capture the inertia behavior of growth. Finally, we relax the pooling assumption and exploit the non-linearities in the slope coefficient based on our threshold/transition variable.

The rest of the paper is organized as follows: Section 2 briefly introduces the methodology and describes the data set. Section 3 presents and discusses the results, both for the main specification as well as for sub-samples. Section 4 concludes. All additional information related to the study can be found in the appendix.

2 Methodology and data

This section begins by describing the econometric model set-up and a discussion of the dataset used for the study. Regarding the methodology, we proceed with a baseline model of a panel linear fixed effects model, after which we consider a dynamic linear model due to the inertial effects of our independent variable (real GDP growth rate variable). Next, we estimate a non-linear model where the non-linearity is in the coefficient of the model. Specifically, we consider a dynamic regime switching model where the regime is based on a certain transition variable such that the non-linearity of the coefficient is reflected in the regimes of the transition variable.

Before delving into the model estimation, we begin by carefully specifying our model and providing a pre-test to ensure soundness in the model specification.

Consider a panel linear model of the form:

$$\mathbf{y}_{it} = \alpha + \beta \mathbf{X}_{it} + \mathbf{u}_{it} \quad (1)$$

$$\mathbf{u}_{it} = \mu_i + \lambda_t + e_{it} \quad (2)$$

Where \mathbf{y}_{it} represents the dependent variable, \mathbf{X}_{it} is the covariate with parameter β measuring the effect of the covariate on the dependent variable. The error term \mathbf{u}_{it} in

(2) can be further decomposed into μ_i and λ_t which are the individual and time effects respectively and an idiosyncratic error term \mathbf{e}_{it} . Finally, the i 's are the individual countries in the panel data, whilst the t 's are the time dimension.

The above (1) and (2) depict a panel model with individual and time effects known as the two-way error component model since individual and time effects are modeled. We do not impose any assumption on the effects, namely, whether these effects are fixed parameters and correlate with the error term (fixed effects) or would be kept as part of the error term and not estimated separately (random effects). The Hausmann test is used to decide which model specification is more appropriate. Under the null hypothesis of the Hausmann test, there is no correlation between the effects and the regressors and hence the random effect is more appropriate. Table 5 in the appendix presents results of the test for the model (CPI and GDP deflator measures of inflation), of which the p-values point to rejection of the null, suggesting that fixed effects specification would be more appropriate for the data.

Next, we test for the significance of individual and or time effects in our panel data sample. Allowing for individual effects in a panel data context is standard practice because the countries in the sample are heterogeneous, and therefore, by employing panel data analysis, we can account for these unobserved effects, which are unique to each country as opposed to treating all countries as one country/individual. We assume the significance of time effects because our sample also includes periods during the global financial crisis, where most economies were badly affected by the shock, especially to GDP growth. Hence, it is feasible to include time effects in the model. We employ the F-test of stability and specify the following, namely: a two-way model, a model with individual effects only and a model with time effect only. Table 6 and Table 6 in the appendix imply that the model which considers both individual and time effects is more appropriate based on p-values of the tests.

Finally, we ascertain if the parameters (coefficients) in the panel specification can be pooled across the cross-sectional units for the countries. An important question that arises in panel studies is whether the parameters in (1) vary over time across countries or are constant. In other words, is it feasible to draw inference using one constant coefficient to represent all the countries in the panel (so-called pooling assumption)?. The pooling assumption represents a stringent restriction which may come at some risk because the

estimator will be biased if the pooling restrictions are false, implying that the data does not support the pooling of the parameter/slope in such an instance. Regarding the pooling hypothesis, the idea is to compare a restricted model consisting of constant parameters over the cross-sections to an unrestricted model with variable parameters. We apply the Chow test (based on the F-test of stability) for the panel coefficients, under the assumption that the residuals of the error term are normally distributed and homoskedastic (see Baltagi (2021)). Applying the test, we compare a linear model with fixed effects "within-estimator" (variable intercept but identical slope coefficient), to a panel variable coefficient model. The result displayed in Table 8 reveals a non-rejection of the null hypothesis of model stability, which implies that the model parameters can be pooled, and hence indicates that the fixed effects model is comparable to a panel variable coefficient model. From the above tests, we adopt a fixed effects model with both individual and time effects as our model specification from 1 and 2. Additionally, since pooling of model parameters is given based on the tests, we can reliably draw inference from the parameter estimates.

2.1 Data set

Our data set comprises annual macroeconomic information for 31 selected Emerging Market economies for the period from 2000 to 2019. Countries in the sample includes; Albania, Botswana, Brazil, Cameroon, Chile, Columbia, Costa Rica, Croatia, Dominican Republic, Egypt, El Salvador, Guatemala, Honduras, Hungary, India, Kenya, Mali, Mexico, Morocco, Nigeria, North Macedonia, Panama, Paraguay, Peru, Philippines, Poland, Romania, Saudi Arabia, South Africa, Tunisia and Ukraine. They were selected due to data availability for the period of study based on the variables under consideration.

Generally, our macroeconomic variables¹ are taken from the International Monetary Fund and refer to ready-made annual series.

For our estimations, the proxy for economic growth is the annual real GDP growth rate (% change), which represents our response or independent variable. Our main regressor or dependent variable of interest is inflation, which is proxied by the CPI annual change in percentages. Alternatively, we also measured inflation by the change in GDP deflator

¹This covers the real GDP growth rate, investment (gross fixed capital formation), the fiscal balance, savings (gross domestics savings), trade openness, the current account ratio, both inflation measures (GDP deflator & CPI) as well as the GDP PPP share, see IMF (2022).

for the sake of robustness. As will be seen in the subsequent discussions, using these two proxies for inflation does not affect the direction of the result much. Both of these central variables are taken from IMF (2022)'s International Financial Statistics.

Next, another important variable which explains economic output derived from the standard literature is investment. We control for investment proxied by the gross fixed capital formation relative to GDP ratio in percent. We consider the government sector's position by accounting for the fiscal balance (measured as the general government net lending/net borrowing) relative to GDP in %. We account for the domestic savings of the economy by including the ratio of domestic savings relative to output. Since most developing economies rely on foreign direct investment (FDI), we control for FDI corresponding to the net outflows (% of GDP).

Based on the economics literature, trade is an essential pillar of economic growth, thus, we include trade openness (the sum of imports and exports of a country) ratio to GDP as well as the current account relative to GDP. Including another measure of size, we added the GDP in purchasing power parity as a share of total/ world production. Additionally, three more labor/employment variables are added to explain the growth rate, since we believe these variables could impact GDP growth. They are the labor force participation rate (measured in % of total population ages 15-64), the employment share of workers in industry (% of total employment) and finally the technology proxy, which represents the ratio of the population with internet access (% of the population). These three variables were derived from the World Bank (2022) World Development Indicators. Regarding the institutional variables, the source of the Government Effectiveness index is from the World Bank (2025). The Financial development regressor is a summarized index taken from the IMF (2025)'s Financial Development Database, which is an indication regarding the development of the financial markets and institutions for each country.²

All summary statistics of the utilized variables can be found in Table 7 in the appendix. It can be observed that the real GDP growth amounted to 3.9% on average for the whole panel, with values ranging from about -15% to almost 15% annually. The mean of inflation is about 4.9 percent for the CPI measure, with also a large range of values between -3.1% to 51.5% in distribution.³ The panel's average of investment to GDP ratio was 22.2%

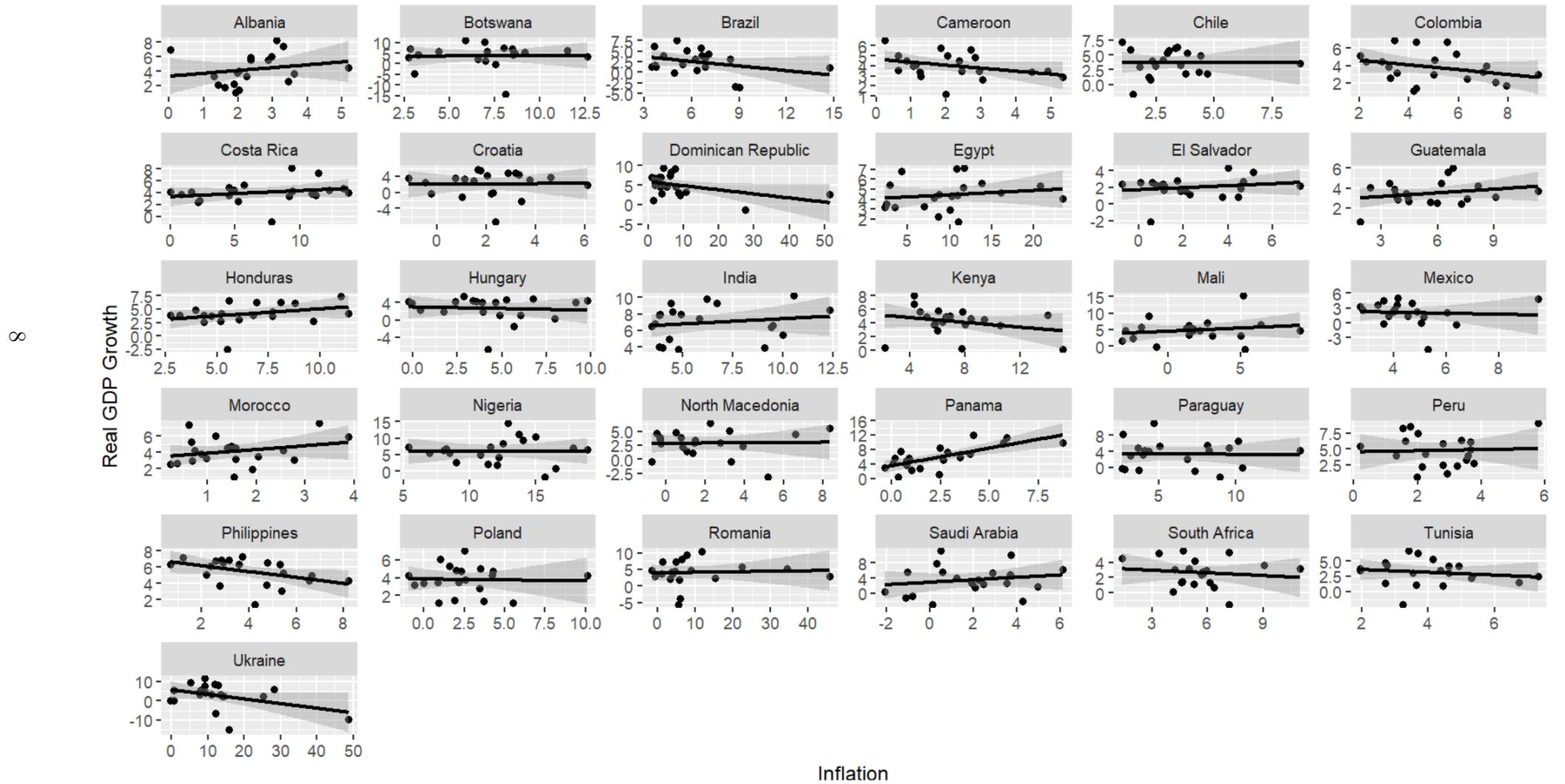
²Note that the Government effectiveness, Financial Development Index and the GDP share in purchasing power parity were scaled by 100.

³The alternative measure of the GDP deflator spreads across a similar amplitude.

with a low standard deviation, while the fiscal balance has a deficit of 2.6% on average.

The countries in the data set are characterized by a high degree of trade openness, with a mean of 72,6%. On the country individual characteristics Figure 1 shows a country-level scatter plot for inflation and economic growth. The correlation plot does not spell out a clear, distinct pattern, while there might be a positive correlation between inflation and growth. For instance, in the case of Panama or Honduras, the shape of the Philippine graph indicates the opposite. For many other economies in the sample, no specific or recognizable pattern is obvious. Well, these plots only show correlation and do not help with inference since other control variables have not been taken into account. In the subsequent sub-sections, we provide an econometric specification for the inflation economic growth nexus where control variables (confounders in causal inference terms) are included in the model.

Figure 1: scatter (correlation plot) plot



3 Empirical results

This section discusses the empirical procedure and estimated results. We utilise a stepwise approach to analyse the relationship between inflation and economic growth, starting with a common two-way fixed effects model with 'Inflation' to be considered as our variable of interest. Then, to capture the dynamics of an economic growth model, we proceed with the difference GMM Arellano and Bond (1991) estimator, which includes the lagged dependent variable, that is, GDP growth, as a regressor to measure the inertial behaviour of a growing economy. The above linear models estimate a common estimator/coefficient for the inflation effect, that is, they treat the inflation influence on economic growth alike for all inflation values. In the third specification, we extend the dynamic GMM model to accommodate non-linearities in the reaction coefficient. This is rather feasible because if the linearity assumption is not consistent with the data-generating process, our estimates will not be biased and unreliable. Moreover, there is evidence from literature regarding the non-linear effects of inflation on economic growth (See Kramer et. al (2016)). Hence, exploring a threshold model seems plausible.

3.1 Static Linear Model - Panel fixed effects

Our baseline model consists of a panel linear fixed effects (FE) model with individual and time effects given by

$$\mathbf{y}_{it} = \mu_i + \lambda_t + \beta \mathbf{X}_{it} + \phi_j \sum_{j=1}^N \mathbf{Z}_{it}^j + \mathbf{e}_{it} \quad (3)$$

where \mathbf{y}_{it} is the dependent variable (real GDP growth), μ_i represents the individual fixed effects, λ_t represents the time effects, \mathbf{X}_{it} is the co-variate of interest (Inflation) while β measures the impact of the co-variate on the dependent variable. \mathbf{Z}_{it} represents all other variables that explain the dependent variables and have therefore been controlled for. ϕ 's on the other hand, measure the impact of the controls on the dependent variables. \mathbf{e}_{it} represents the idiosyncratic errors.

Table 1: Model: Two-way fixed effects model

<i>Response variable: Real GDP growth rate</i>												
	<i>Inflation proxy: CPI (%)</i>						<i>Inflation proxy: GDP deflator (%)</i>					
	Mod I	Mod II	Mod III	Mod IV	Mod V	Mod VI	Mod VII	Mod VIII	Mod IX	Mod X	Mod XI	Mod XII
Inflation	-0.1577*** (0.00265)	-0.1561*** (0.0267)	-0.1671*** (0.0270)	-0.1622*** (0.0265)	-0.1576*** (0.0265)	-0.1780*** (0.0277)	-0.1059*** (0.0245)	-0.1038*** (0.0247)	-0.1100*** (0.0249)	-0.1088*** (0.0245)	-0.1061*** (0.0245)	-0.1149*** (0.0252)
GFCF (Investment)	0.1604*** (0.0444)	0.1580*** (0.0448)	0.1590*** (0.0443)	0.1575*** (0.0443)	0.1603*** (0.0445)	0.1411*** (0.0454)	0.1622*** (0.0457)	0.1580*** (0.0461)	0.1614*** (0.0457)	0.1596*** (0.0457)	0.1615*** (0.0458)	0.1447*** (0.0463)
Current account bal	-0.0669 (0.0427)	-0.0680 (0.0429)	-0.0509 (0.0438)	-0.0713* (0.0427)	-0.0671 (0.0430)	-0.0585 (0.0440)	-0.0552 (0.0439)	-0.0573 (0.0440)	-0.0453 (0.0451)	-0.0589 (0.0439)	-0.0567 (0.0441)	-0.0515 (0.0451)
Fiscal balance	0.0962*** (0.0365)	0.0965*** (0.0365)	0.0912** (0.0366)	0.0981*** (0.0364)	0.0965*** (0.0371)	0.0984*** (0.0369)	0.1084*** (0.0930)	0.1087*** (0.0372)	0.1060*** (0.0373)	0.1103*** (0.0508)	0.1103*** (0.0377)	0.1152*** (0.0377)
Gross Domestic Savings	0.1234*** (0.0389)	0.1232*** (0.0390)	0.1193*** (0.0390)	0.1206*** (0.0389)	0.1235*** (0.0391)	0.1210*** (0.0391)	0.1494*** (0.0930)	0.1485*** (0.0399)	0.1477*** (0.0400)	0.1478*** (0.0399)	0.1504*** (0.0401)	0.1461*** (0.0401)
Foreign Direct Invest.	-0.0060 (0.0204)	-0.0062 (0.0014)	-0.0061 (0.0204)	-0.0048 (0.0204)	-0.0060 (0.0205)	-0.0049 (0.0203)	-0.0065 (0.0208)	-0.0068 (0.0208)	-0.0066 (0.0208)	-0.0055 (0.0207)	-0.0064 (0.0208)	-0.0056 (0.0207)
Trade Openess Index	0.0010*** (0.0000)	0.0329*** (0.0103)	0.0327*** (0.0103)	0.0364*** (0.01044)	0.0332*** (0.0103)	0.0350*** (0.0104)	0.0253** (0.0103)	0.0248** (0.0104)	0.0247** (0.0103)	0.0278** (0.0104)	0.0252** (0.0103)	0.0270** (0.0105)
Govt effectiveness index	0.0040 (0.0068)	0.0040 (0.0067)	0.0021 (0.0068)	0.0056 (0.0068)	0.0041 (0.0068)	0.0053 (0.0070)	0.0027 (0.0069)	0.0026 (0.0069)	0.0013 (0.0071)	0.0041 (0.0070)	0.0029 (0.0070)	0.0029 (0.0071)
Fin. dev. Index	-0.1941*** (0.0342)	-0.1933*** (0.0342)	-0.1831*** (0.0348)	-0.1760*** (0.0355)	-0.1944*** (0.0349)	-0.1586*** (0.0370)	-0.2067*** (0.0354)	-0.2049*** (0.0355)	-0.2004*** (0.0360)	-0.1910*** (0.0367)	-0.2091*** (0.0362)	-0.1765*** (0.0382)
Lab. part.rate		0.0187 (0.0465)				0.0620 (0.0515)	-0.0003*** (0.0000)	0.0327 (0.0472)				0.0678 (0.0526)
Employment industry			0.1240 (0.0773)			0.1950** (0.0866)			0.0751 (0.0781)			0.1510* (0.0878)
Internet. Population				-0.0275* (0.0152)		-0.0416** (0.0166)				-0.0244 (0.0155)		-0.0371** (0.0169)
GDP PPP					-0.0281 (0.5548)	-0.7858 (0.6512)					-0.1858 (0.5643)	-0.7651 (0.6669)
Number of observations	558	558	558	558	558	558	558	558	558	558	558	558
R ²	0.21	0.21	0.21	0.22	0.21	0.23	0.19	0.19	0.19	0.19	0.19	0.20
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*, ** and *** indicates statistical significance at 10%, 5% and 1% level respectively. Standard errors are based on HAC estimator, hence they are robust against auto correlation and heteroskedasticity.

The above model is then estimated by a two-way panel fixed effects-within estimator. Results from our estimations are presented in Table 1.⁴

The relationship we are interested in considers the connection between the dependent variable, the real GDP growth rate, and inflation, which is presented by two different proxies, one with the CPI change in % (left part of table 1, Mod I to VI) and the other with the GDP Deflator in % (right part of table 1, Mod VII to XII). The outcomes for both distinctions reveal that the effect is statistically significantly negative throughout all specifications of the model, while the CPI coefficients tend to be a little stronger/bigger than the deflator proxy. Thus, based on the FE model, our empirical evidence indicates that an increase in inflation reduces economic growth in emerging market countries. All the other included core macroeconomic variables, which are statistically significant, exert the expected effects: investment (positive coefficients) enhances growth, as well as balanced budgets have a positive influence on output growth, so does trade. Interestingly, the status of financial development has a negative impact on economic growth, which could be interpreted in a way that higher progress in participating in financial markets does not drive growth positively. This could sound puzzling at first though. However, the channel of influence of the financial markets and institutions in these countries to economic could be ambiguous. We also tested the effects of other variables in the model and found that only industry employment and internet access share of the population tend to affect growth, however, they don't constantly show statistical significance.

Hence, as a main result from the FE model, it can be stated that there is a statistically significant negative inflation coefficient, reflected in all our model specifications. Thus, if there is a surge in inflation this affects the economic output situation negatively and reduces economic growth. This is also in line with the central findings from several literature contributions.

However, as mentioned above, such an FE model does not consider the fact that to appropriately capture the growth dynamics of an economy, it is reasonable to imply and take into account the dynamic nature of the circumstances by including a lagged growth rate variable on the right-hand side of 3. The Generalized Method of Moments (GMM) approach is appropriate for estimating such dynamic models, especially the endogeneity induced by including the lagged dependent variable. Thus, as a next step, we apply the

⁴All conducted pre-diagnostics and suitability tests can be found in the appendix.

difference GMM to our Emerging market dataset to capture the dynamics of economic growth. The results can be found in Table 2.

3.2 Dynamic Linear Model

We consider a dynamic model of the form

$$\mathbf{y}_{it} = \mu_i + \lambda_t + \mathbf{y}_{i,t-1} + \beta \mathbf{X}_{it} + \phi_j \sum_{j=1}^N \mathbf{Z}_{it}^j + \mathbf{u}_{it} \quad (4)$$

Here, a first lag of the dependent variable is included at the right-hand side of the 4, which then renders the model dynamic. A dynamic model of this form is characterized by the evidence of persistent autocorrelation due to the inclusion of the lagged dependent variable. Eliminating the individual and time effects through first differencing leads to correlation between the lagged difference of the dependent variable and the error term, and hence leads to endogeneity (Baltagi, 2021). We, therefore, apply the panel GMM estimator from Arellano and Bond (1991), where the endogeneity problem is circumvented using lags of the variables as potential instruments for the model. The validity of the instruments is confirmed by conducting the Sargan test of over-identifying restrictions. That is to test if residuals do not correlate with the instruments. Details on the instruments can be found at the bottom of the table.

Table 2: Model: Difference GMM

	<i>Response variable: Real GDP growth rate</i>											
	<i>Inflation proxy: CPI (%)</i>						<i>Inflation proxy: GDP deflator (%)</i>					
	Mod I	Mod II	Mod III	Mod IV	Mod V	Mod VI	Mod VII	Mod VIII	Mod IX	Mod X	Mod XI	Mod XII
Lagged GDP growth	-0.3066** (0.0550)	-0.2840*** (0.0506)	-0.2746*** (0.0574)	-0.3241*** (0.0528)	-0.2891*** (0.0579)	-0.2380*** (0.0649)	-0.7892*** (0.0698)	-0.3118*** (0.0541)	-0.2894*** (0.0667)	-0.8263*** (0.0636)	-0.787*** (0.0646)	-0.2729*** (0.0738)
Inflation	-0.4985*** (0.1140)	-0.4998*** (0.1132)	-0.4237*** (0.0997)	-0.4779*** (0.1126)	-0.4463*** (0.1041)	-0.4474*** (0.0962)	-0.0884** (0.0391)	-0.3363*** (0.0917)	-0.2744*** (0.0827)	-0.0869** (0.0416)	-0.0893** (0.0397)	-0.2872*** (0.0729)
GFCF (Investment)	-0.4292 (0.6308)	-0.2258 (0.5925)	-0.1716 (0.6763)	-0.1403 (0.6039)	-0.4952 (0.5861)	0.1820 (0.6641)	0.6769 (0.4993)	0.1992 (0.4800)	0.2005 (0.5577)	0.9739* (0.5501)	0.6213 (0.4784)	0.4992 (0.4934)
Current account bal	0.0411 (0.3361)	0.0931 (0.3430)	0.0240 (0.3487)	0.0321 (0.2867)	-0.0774 (0.2994)	0.1480 (0.3207)	0.0527 (0.3080)	0.1988 (0.2979)	0.1196 (0.3229)	0.0347 (0.3271)	0.0359 (0.3165)	0.2037 (0.2626)
Fiscal balance	0.3080** (0.1314)	0.2929*** (0.1343)	0.3610*** (0.1318)	0.2833** (0.1225)	0.3124** (0.1275)	0.2764* (0.1429)	0.1159 (0.1655)	0.3259* (0.1918)	0.04198** (0.1909)	0.0746 (0.1727)	0.1173 (0.1590)	0.3153* (0.1647)
Gross Domestic Savings	-0.0811 (0.3223)	-0.1462 (0.2975)	-0.0859 (0.3465)	-0.1445 (0.2970)	-0.0401 (0.3159)	-0.1049 (0.3164)	0.1724 (0.3194)	0.0837 (0.3481)	0.0723 (0.3695)	0.2324 (0.3282)	0.1617 (0.3129)	0.0655 (0.3134)
Foreign Direct Invest.	-0.0241 (0.0409)	-0.0283 (0.0463)	-0.0151 (0.0305)	-0.0242 (0.0371)	-0.0233 (0.0377)	-0.0167 (0.0391)	0.0304** (0.0135)	-0.0324 (0.0460)	-0.0137 (0.0253)	0.0325** (0.0164)	0.0281** (0.0134)	-0.0201 (0.0352)
Trade Openness Index	0.4247*** (0.1328)	0.4280*** (0.1352)	0.3319** (0.1298)	0.3854*** (0.1208)	0.3887*** (0.1278)	0.3881*** (0.1397)	0.0659 (0.0997)	0.3302*** (0.1028)	0.2300** (0.1119)	0.0042 (0.1242)	0.0730 (0.0996)	0.2371** (0.0994)
Govt effectiveness index	-0.1127 (0.0701)	-0.1177** (0.0573)	-0.0901 (0.0622)	-0.1390** (0.0620)	-0.1028 (0.0000)	-0.0669 (0.0510)	-0.0348 (0.0425)	-0.1301*** (0.0452)	-0.0847 (0.0695)	-0.0409 (0.0415)	-0.0366 (0.0421)	-0.0596 (0.0503)
Fin. dev. Index	0.5364 (0.3932)	0.2847 (0.3446)	0.4871 (0.3608)	0.2003 (0.3964)	0.1042 (0.3985)	-0.2178 (0.3915)	0.3781* (0.2255)	0.0493 (0.4153)	-0.0137 (0.0253)	0.0409 (0.2548)	0.2217 (0.1976)	-0.3882 (0.3656)
Lab. part.rate		-0.9972 (0.6465)				-2.3592*** (0.9035)		-1.0868 (0.6887)				-2.0697** (0.8725)
Employment industry			-1.9549 (1.2215)			-0.6789 (0.9528)			-2.5943* (1.4207)			-0.8346 (1.0037)
Internet Population				0.1287 (0.2300)		0.1229 (0.2115)				0.2187 (0.1727)		0.2273 (0.1974)
GDP PPP					-0.1176 (0.0876)	-0.1597* (0.0827)					0.0108 (0.0355)	-0.1558* (0.0839)
Number of observations	558	558	558	558	558	558	558	558	558	558	558	558
Sargan Test	31 (0.66)	31(0.74)	31(0.74)	31(0.74)	31(0.70)	31 (0.81)	31(0.10)	31(0.66)	31(0.66)	31(0.10)	31(0.10)	31(0.87)
Auto. test (1)	-2.45 (0.01)	-2.74(0.006)	-2.57(0.01)	-2.73(0.01)	-2.53 (0.01)	-2.03 (0.04)	-2.07(0.04)	-2.62(0.01)	-2.34(0.02)	-1.95(0.05)	-2.05(0.04)	-2.35(0.02)
Auto. test (2)	-1.15 (0.24)	-0.34(0.72)	-1.23(0.22)	-0.47(0.64)	-1.56(0.12)	-0.32 (0.75)	-1.24(0.22)	-1.43(0.15)	-1.43(0.15)	-0.78(0.43)	-1.59(0.11)	-1.58(0.11)
Wald test (coef)	95.82 (0.00)	113.79(0.00)	249.19(0.00)	120.62(0.00)	330.95(0.00)	187.57(0.00)	577.27(0.00)	147.64(0.00)	168.51(0.00)	521.14(0.00)	1063.69(0.00)	259.85(0.00)
Wald test (time dummies)	45.63 (0.00)	52.76(0.00)	48.18(0.00)	59.87(0.00)	56.74(0.00)	31.28 (0.01)	143.08(0.00)	92.99(0.00)	63.62(0.00)	219.59(0.009)	137.21(0.00)	56.00(0.00)
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*, ** and *** indicates statistical significance at 10%, 5% and 1% level respectively. Standard errors are based on the HAC estimator and hence, robust against heteroskedasticity and auto-correlation. 2 regressors are used as instruments.

The outcomes presented in Table 2 support the findings from the FE model above, that there is again a statistically significant negative effect of inflation on economic growth. This holds for all twelve models, whereas the coefficients are a little larger for the CPI proxy as compared to the GDP deflator measure. Regarding the dynamic effect, there is inertial behavior in terms of a statistically significant negative coefficient of the lagged dependent variable, that is, real GDP growth.

For the macro controls, the outcomes are not as stringent as in the FE model above, as they do not exert statistically significant effects throughout all the specifications. It shows that the positive effect of the public finance in terms of a balanced budget is quite stable and the positive effect of trade openness as well, but for the rest of the variables, the picture is not that clear. In the same vain, this also holds for the additional added controls such as the share of labor participation or employment in industry. No clear cut statically significant effect can be derived. Nevertheless, the main story from Table 2 which points to a consistent negative statistically significant coefficient of inflation should be re-emphasized. Both, the FE and the GMM acknowledge a negative influence of rising inflation on the economic growth situation for the selected EM group of countries.

However, it should be noted that both of these estimation techniques, FE as well as GMM, treat the inflation conditions as all equal/alike. Meaning, they both do not distinguish whether an economy is situated in a high or low inflation environment. However, for the economic performance and growth perspective, it might matter which inflation circumstances the country faces. So, in the next step, we consider a threshold GMM estimator, which takes the non-linearity of the coefficient into account. The regimes are determined data data-driven and separated by a threshold variable. For this approach, inflation is the regime-determining variable, and two different regimes are assumed, so we distinguish between high and low inflation situations.

3.3 Dynamic Non-linear Model (Regime switching)

In this section, we consider a dynamic panel threshold model according to Seo and Shin (2016). The model is a general GMM approach (Arellano and Bond (1998) framework) based on the first difference fixed effects transformation. The regime switching/threshold component of the model stems from an extension of the panel threshold model according to Hansen (1999, 2000).

Consider the following dynamic model of the form

$$\mathbf{y}_{it} = (1, \mathbf{X}_{it})\beta_1 1(s_{it} \leq \phi) + (1, \mathbf{X}_{it})\beta_2 1(s_{it} > \phi) + \mathbf{u}_{it} \quad (5)$$

$$\mathbf{u}_{it} = \mu_i + \lambda_t + \nu_{it} \quad (6)$$

Where \mathbf{y}_{it} is our dependent variable of interest, \mathbf{X}_{it} represents vector of regressors which also includes the lagged dependent variable ($\mathbf{y}_{i,t-1}$), and 1. is an indicator function. The transition variable is given by s_{it} , and ϕ is the threshold parameter. The parameters β_1 and β_2 measure the impact of the regressors on the dependent variable for the different regimes. The residual given by \mathbf{u}_{it} can be decomposed into an individual unobserved effect μ_i , time effects λ_t and a zero-mean idiosyncratic error term given by ν_{it} . Two important points are worth noting here.

First of all, the model considers a two-way fixed effect, namely individual and time effects, which seems plausible, especially given that our data spans the period which includes the global financial crisis. Hence, allowing not only for individual effects but also for time effects is a reasonable assumption to capture the time effects of the financial crisis. Besides, our previous test from the baseline model confirms the significance of time effects. Secondly, the model assumes $\mathbb{E}(\nu_{it}\mathbf{X}_{it}) \neq 0$, and $\mathbb{E}(\nu_{it}s_{it}) \neq 0$ implying that both regressors and transition variables are endogenous. These assumptions, particularly the endogeneity of the transition variable, could be crucial because there is the possibility of inflation impacting GDP growth in a bi-directional manner, leading to the so-called "reverse causality" issues. Specifically, there is also the possibility of economic growth spurring aggregate demand and, when it exceeds the productive capacity of the economy, leading to increases in the general price level (demand-pull inflation). Hence, assuming the endogeneity of our transition variable (inflation) seems plausible to account for endogeneity emanating from Inflation. To deal with the fixed effects (individual and time), the model considers the first difference transformation of (5) and (6) in a similar manner as Arellano and Bond (1991), where the correlation between the regressor and the effects is allowed. The lags of the regressors are used as instruments to circumvent the endogeneity problems. Since the threshold variable is considered endogenous, it is not included as part of the instrument set. The threshold parameter is estimated by allowing for fixed and diminishing threshold effects according to Hansen (2000). For a detailed discussion

of the dynamic threshold GMM, see Seo and Shin (2016).

The regime switching GMM outcomes distinguish between the two inflation regimes namely, a low inflation regime (Regime I as the left part of table 3 with Mod I(a) to Mod VI(a)) and a high inflation regime (Regime II as the left part of table 3 with Mod I(b) to Mod VI(b)). Regarding the regime distinction, only threshold values for models V and VI are statistically significant, with threshold values of 2.7% and 2.0% inflation, respectively, so we focus on the interpretation of those two models.

The most crucial new insight is that now, once the distinction by inflation conditions is taken into consideration, it shows that the coefficient is not constantly statistically significantly negative. Quite the contrary: for the low inflation regime (Mod V(a) and Mod VI(a)), the effect of inflation is significantly positive. So for low values of inflation (below 2.7 or 2.0 percent, respectively), there appears to be a growth-enhancing effect. However, if inflation becomes high, as represented by the high inflation regime and visible in Mod V(b) and Mod VI(b) of Table 3, inflation becomes harmful to economic growth.

Table 3: Model: Dynamic threshold GMM

<i>Response variable: Real GDP growth rate. Inflation proxy: CPI (%)</i>												
	<i>Regime I (Low inflation)</i>						<i>Regime II (High inflation)</i>					
	Mod I(a)	Mod II((a)	Mod III(a)	Mod IV(a)	Mod V(a)	Mod VI(a)	Mod I(b)	Mod II(b)	Mod III(b)	Mod IV(b)	Mod V(b)	Mod VI(b)
Lagged GDP growth	-2.3347*** (0.0000)	-0.6667* (0.0506)	-0.2746*** (0.0006)	-2.654*** (0.0097)	0.7322*** (0.0000)	-0.2562*** (0.0000)	2.1844*** (0.0000)	0.9919*** (0.0000)	-0.0816 (0.7853)	3.0087*** (0.0072)	-1.0140*** (0.0000)	-0.0233 (0.1139)
Inflation	-2.9917** (0.0227)	-1.5365*** (0.0000)	-3.5082*** (0.0000)	-2.643 (0.1673)	5.1286*** (0.0000)	0.5067*** (0.0000)	2.4788*** (0.0000)	1.4425*** (0.0000)	3.1701*** (0.0000)	2.9208*** (0.0005)	-3.7409*** (0.0000)	-0.6308*** (0.0000)
GFCF (Investment)	-3.3984*** (0.0000)	0.32856** (0.0290)	-0.1716 (0.1331)	-1.9076 (0.2033)	-4.2952*** (0.0000)	0.7292*** (0.0000)	3.1841*** (0.0000)	0.17426 (0.6846)	2.1206*** (0.0000)	4.4161*** (0.0020)	6.6167*** (0.0000)	-1.0063*** (0.0000)
Current account bal	1.1480 (0.5147)	-0.7862 (0.3430)	-1.6145*** (0.0050)	0.0321 (0.4513)	-1.4333*** (0.0000)	-1.7996*** (0.0000)	-1.2616*** (0.0000)	1.0416*** (0.0000)	0.5894*** (0.0000)	-0.1592 (0.2554)	2.4481*** (0.0000)	0.9848*** (0.0000)
Fiscal balance	1.8199*** (0.0157)	0.34755 (0.1343)	0.3610 (0.3043)	2.7205* (0.0668)	-0.28055*** (0.0000)	-0.8368*** (0.0000)	-1.05616*** (0.0000)	-0.7892 (0.2043)	-0.2679 (0.5038)	-3.5578 (0.1976)	-0.2157*** (0.0000)	-1.1428*** (0.0000)
Gross Domestic Savings	0.3665 (0.8205)	0.37127 (0.2975)	-0.3281 (0.6598)	-3.5878* (0.0844)	3.8805*** (0.0000)	1.3510*** (0.0000)	-1.1730*** (0.0000)	-0.1815*** (0.0002)	-0.5110*** (0.0000)	1.8532*** (0.0000)	-3.4959*** (0.0000)	1.0590*** (0.0000)
Foreign Direct Invest.	-0.3088 (0.4565)	-0.0499 (0.7911)	-0.1436 (0.3543)	-0.1247 (0.8549)	-0.1268 (0.5976)	-0.0781 (0.6926)	0.4000 (0.4767)	-0.7175*** (0.0000)	0.3884* (0.0693)	0.5489 (0.3843)	1.3264*** (0.0000)	0.3224*** (0.0000)
Trade Openness Index	0.5808 (0.5776)	0.3072 (0.1352)	0.5063*** (0.0016)	0.8212 (0.5333)	-0.0721 (0.1278)	0.3833*** (0.0000)	0.1070*** (0.0000)	0.4199*** (0.0000)	0.1484*** (0.0000)	-0.0835*** (0.0000)	0.3574*** (0.0000)	0.1507*** (0.0000)
Govt effectiveness index	-0.5575 (0.5695)	-0.00721** (0.0573)	-0.1538 (0.6442)	-0.7444** (0.0439)	-0.2681*** (0.0000)	-0.0203 (0.5678)	-0.0013 (0.9699)	-0.1640*** (0.0000)	0.0798*** (0.0001)	0.05978*** (0.0010)	0.0821*** (0.0000)	0.1632*** (0.0000)
Fin. dev. Index	-0.0852 (0.9161)	0.23702* (0.0851)	0.2501 (0.2700)	0.5058 (0.8408)	-0.8716*** (0.0000)	0.3455*** (0.0058)	-0.2905*** (0.0000)	0.3858*** (0.0000)	-0.5399*** (0.0000)	-1.7874*** (0.0000)	0.4141*** (0.0000)	1.5289*** (0.0000)
Lab. part.rate		-0.30583 (0.6662)				-1.0937* (0.0502)		0.2273*** (0.0000)				-0.5836*** (0.0000)
Employment industry			2.6114 (0.6770)			1.6034*** (0.0000)			-0.1327*** (0.0000)			2.5425*** (0.0000)
Internet Population				0.2293 (0.1049)		1.1263*** (0.0000)				-0.0195 (0.7047)		-0.8746*** (0.0000)
GDP PPP					0.0055*** (0.0000)	-0.00746*** (0.0000)					-0.0038*** (0.0000)	0.0023*** (0.0000)
Threshold value(c)	3.2	6.3	4.6	3.6	2.7***	2.0***	3.2	6.3	4.6	3.6	2.7***	2.0***
Number of observations	558	558	558	558	558	558	558	558	558	558	558	558

Where *, ** and *** indicates statistical significance at 10%, 5% and 1% level respectively. Above estimates are based on two-step optimal GMM estimator with HAC standard errors. P-values are reported in parenthesis. Instruments consists of two 2 lags of all regressors

Regarding the other controls, the distinction between high and low inflation regimes seems to matter for some other macroeconomic variables too, as they tend to switch signs or become significant, such as investment, for instance or government effectiveness. However, the main results show that a distinction between high and low inflation provides additional insight and questions the general perception that inflation is generally harmful to economic growth. We have seen that the level of inflation matters for examining its effect on economic growth, as different responses of growth to different inflation levels can be observed from Table 3.

3.4 Further Insights: Sub-samples

In this section, we separate the sample into sub-samples based on the geographical location of the countries. By this, we obtain three groups, namely, Latin America, Africa and Others. The Latin America (LA) group consist of 12 countries⁵ and the Africa (AF) group is made up of 9 countries⁶. The miscellaneous group consists of all the other economies, ranging from Emerging Europe to Asia, in a final 'Other' group with 10 members. The results of the estimation applying the regime switching (threshold) GMM to each sub-sample based on the CPI inflation proxy can be found in Table 4 below.

⁵The Latin American countries are Brazil, Chile, Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay and Peru.

⁶The African countries are Botswana, Cameroon, Egypt, Kenya, Mali, Morocco, Nigeria, South Africa and Tunisia.

Table 4: Model: Dynamic threshold GMM - Subsample

<i>Response variable: Real GDP growth rate. Inflation proxy: CPI (%)</i>												
	<i>Regime I (Low inflation)</i>						<i>Regime II (High inflation)</i>					
	Latin I(a)	Latin II(a)	Africa I(a)	Africa II(a)	Other I(a)	Other I(b)	Latin I(b)	Latin II(b)	Africa I(b)	Africa II(b)	Other I(b)	Other I(b)
Lagged GDP growth	-0.3446*** (0.0000)	-0.2038*** (0.0000)	-0.1642 (0.7749)	-0.3626*** (0.0001)	-0.0737*** (0.0000)	-0.1101 (0.3411)	0.2770** (0.0463)	-0.0982* (0.0511)	-0.1676 (0.6807)	-0.3276 (0.0000)	-0.0789*** (0.0000)	-0.0652 (0.1174)
Inflation	-0.5454 (0.1510)	0.0617 (0.7101)	0.0823 (0.3998)	0.0350 (0.7174)	-0.2277*** (0.0000)	-0.2086 (0.8741)	-0.1040 (0.2700)	0.0628 (0.1427)	0.1066 (0.1212)	0.04175 (0.8018)	-0.2482*** (0.0000)	-0.2323 (0.8554)
GFCF (Investment)	-0.5280* (0.085)	0.2786** (0.04989)	-0.0268 (0.9284)	0.1952 (0.4156)	-0.1677*** (0.0000)	-0.0914 (0.6776)	-0.4607** (0.0257)	0.3404*** (0.0020)	-0.0237 (0.8665)	0.1756 (0.6664)	0.0713*** (0.0000)	-0.0155 (0.7010)
Current account bal	0.0231 (0.8594)	-0.1130 (0.4636)	-0.0252 (0.9612)	-0.0243 (0.9861)	-0.0597*** (0.0000)	0.0579 (0.8916)	0.2873*** (0.0000)	-0.1170*** (0.0000)	-0.0276 (0.8689)	0.0535 (0.6615)	-0.1013*** (0.0000)	-0.0603*** (0.0000)
Fiscal balance	0.1263 (0.3508)	0.0309 (0.1343)	-0.0241 (0.8742)	0.0178 (0.9168)	-0.0265*** (0.0000)	-0.0399** (0.0148)	0.3144 (0.9105)	0.0962 (0.8038)	-0.0249 (0.7725)	-0.0286 (0.9348)	0.2084*** (0.0000)	0.0323* (0.0676)
Gross Domestic Savings	0.3341*** (0.0017)	0.2224 (0.5236)	-0.1435 (0.7787)	-0.0226 (0.8865)	0.1310*** (0.0000)	0.3756*** (0.0000)	0.5355 (0.7933)	0.1126*** (0.0000)	-0.1419 (0.1222)	0.0234 (0.4611)	0.1960*** (0.0000)	0.3369*** (0.0000)
Foreign Direct Invest.	0.1440 (0.5533)	0.0325 (0.9887)	-0.0112 (0.9995)	0.0613 (0.9784)	-0.1069*** (0.0000)	-0.1964*** (0.0000)	-0.0987 (0.9668)	0.0198 (0.9832)	-0.0166 (0.9988)	0.0533 (0.9928)	-0.1069*** (0.0000)	-0.0752*** (0.0001)
Trade Openness Index	0.4796*** (0.0000)	0.1840 (0.1280)	0.0816 (0.7278)	-0.1201 (0.3545)	0.2225*** (0.0000)	0.4077*** (0.0000)	0.0296 (0.0000)	0.2285*** (0.0000)	0.1180*** (0.0000)	0.1035*** (0.0075)	0.0735*** (0.0000)	-0.0654*** (0.0000)
Govt effectiveness index	0.0296*** (0.0097)	-0.1185** (0.0203)	0.0716** (0.0222)	0.0456 (0.8587)	0.2028*** (0.0000)	0.3217*** (0.0004)	-0.01955*** (0.0000)	-0.0355 (0.6449)	-0.0662*** (0.0007)	0.05978*** (0.5982)	-0.0552*** (0.0000)	-0.1475*** (0.0000)
Fin. dev. Index	-0.5679*** (0.0000)	0.2200 (0.3053)	0.0815 (0.7438)	0.0064 (0.9841)	-0.1671*** (0.0000)	0.1439 (0.9223)	-0.0220*** (0.0000)	-0.1043*** (0.0000)	0.0587 (0.1314)	0.0375 (0.6563)	-0.3845*** (0.0000)	0.0678*** (0.9222)
GDP PPP	-0.0017*** (0.0017)	0.0040*** (0.000)	-0.0069*** (0.0000)	0.0018 (0.4910)	0.0008*** (0.000)	-0.0010 (0.000)	-0.0001*** (0.0070)	-0.0008*** (0.0000)	0.0022*** (0.0000)	-0.0020*** (0.0000)	0.0003*** (0.0000)	0.0010*** (0.0000)
Lab. part.rate		0.0102 (0.9750)		-0.0173 (0.8517)		-0.0258 (0.9952)		-0.1080*** (0.000)		0.0888*** (0.0000)		-0.2550*** (0.0000)
Employment industry		0.1086 (0.8460)		0.0717 (0.9667)		-0.0651 (0.9798)		0.1894*** (0.000)		0.1136 (0.8652)		-0.1974*** (0.0000)
Internet Population		-0.3576*** (0.0001)		0.0227 (0.8517)		-0.0366 (0.9172)		0.1672*** (0.0000)		-0.0248 (0.9442)		-0.1941*** (0.0000)
Threshold value(c)	4.6**	4.4	3.7***	3.1	2.8***	1.62	4.6**	4.4	3.7***	3.1	2.8***	1.62
Number of observations	198	198	162	162	180	180	198	198	162	162	180	180

Where *, ** and *** indicates statistical significance at 10%, 5% and 1% level respectively. Above estimates are based on two-step optimal GMM estimator with HAC standard errors. P-values are reported in parenthesis. Instruments consists of two 2 lags of all regressors

It can be observed that, with all three sub-samples, only the first model (with the core macro controls) appears to have a statistically significant threshold value.. Therefore, we will concentrate on the interpretation of these models since the threshold values for the other model specifications are not statistically significant. With values of 4.6% (Latin America) and 3.7% (Africa), these regime switching inflation indicators are considerably higher than for the mixed 'Other' sub-sample (2.8%) or the full sample discussed in the main model of table 3.

However, for the inflation coefficient, the effect is not statistically significant, neither for the Latin American sub-sample nor for the African group of countries. For the miscellaneous group, the inflation coefficients are statistically significant and negative in both regimes, while the effect is slightly more pronounced in the high inflation regime. This partially supports the findings from the main model discussed above, that the negative inflation effect becomes stronger particularly in the high inflation regime. However, it should be noted that these samples, of 198 (LA), 162 (AF) and 180 (mixed group) observations respectively, are rather small compared to the full model setting of 31 countries and over 550 observations - and the estimation technique is rather demanding and sensitive to the number of regressors included, so small sample results might be interpreted with caution. With a view to the other literature contributions mentioned in section 2, such insignificant results are not unusual.

Regarding the other control variables for Latin America presented in Model I(a), Savings, Trade openness and government effectiveness index all have a positive effect on growth in the low inflation regime, whilst the Financial Development Status and the GDP-PPP tend to have a negative statistically significant effect⁷, which are consistent with the high inflation regime shown in Model I (b). In a high inflation regime, trade loses its statistical significance, whilst the current account balance exerts a positive effect on growth.

For the Africa sub-sample (Model I(a)), only a positive significant effect of the government effectiveness indicator and a negative GDP PPP effect can be found in the low inflation regime. Interestingly, for the high inflation situation in Africa (Model I(b)), these coefficients both switch signs, but additionally, a positive trade openness effect on economic growth can be found. For the mixed sub-sample, all core coefficients turn out

⁷The gross fixed capital formation ratio is only significant at the 10% level.

to be statistically significant and support the findings from the main model above.

4 Conclusion

This paper empirically studies the relationship between economic growth and inflation for a panel of 31 selected emerging market economies for the period 2000 to 2019. We use different econometric estimators to study the causal effects of inflation on economic growth. We start from a static linear specification and extend to a dynamic (GMM) specification to capture the inertia effects of GDP growth. Furthermore, we relax the linearity assumption by resorting to a regime-switching (dynamic GMM) approach to discriminate between high and low inflation situations.

We find a statistically significant negative relationship between inflation and economic growth from our linear specifications (both static and dynamic model estimations), and the results appear to be robust across all specifications. The nonlinear specification indicates a threshold value of about 2 % (and slightly higher with 2.7% for the simple model specification) which segregates the two inflation regimes. Our results support the argument that it is reasonable to distinguish between different inflation regimes, as we find a positive impact of inflation on economic growth once inflation is below the threshold and above the threshold, and we found that inflation exerts a negative effect on growth. This new insight was not visible with the common linear panel approaches, which consider a homogeneous reaction coefficient of economic growth to changes in inflation. Our robustness checks support the main findings; once the coefficient is significant, the effect is more pronounced in the high inflation regime.

Thus, we claim that inflation is not harmful to economic growth per se, but it needs to be considered in which inflation regime/situation the economy is situated. This also has implications for policy recommendations. With this approach, we particularly strengthen the data-driven perspective, which should be taken into account, meaning whether the economy is situated in a high- or low-inflation state, besides only the country-wise focus. Based on our findings for this group of countries, tolerating inflation above 2% could have negative consequences for the economy as far as growth is concerned.

It should be noted that our study is not without limitations. The estimators used for the study (panel FE, GMM and threshold GMM models) do not account for cross-

sectional dependence in the panel, which, if present, could affect the computation of the standard errors and hence render inference invalid. We argue that since the countries are heterogeneous and not from the same region, spatial cross-sectional dependence (due to spatial proximity) would likely not be an issue. Nevertheless, other forms of cross-sectional dependence emanating from common factor dependence, such as countries responding to global shocks similarly, could affect residual correlation and should at least be investigated.

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Appendix

This appendix presents the pre-estimations and accompanying suitability tests as well as additional results and outcomes of the robustness checks.

Table 5: Hausmann Test

	<i>Inflation proxy: cpi</i>			<i>Inflation proxy: deflator</i>		
<i>Variables</i>	F-stats.	P-value	Df	F-stats	P-value	Df
<i>Values</i>	43.46	0.000	13	20.61	0.081	13
<i>Num Obs</i>	558			558		

Table 6: Testing for individual and time effects - Full sample (Inflation CPI)

<i>Variables</i>	<i>TW effects versus no effects</i>				<i>TW effects versus individual effects</i>				<i>TW effects versus time effects</i>			
	Test-stats.	P-value	Df1	Df2	Test-stats	P-value	Df1	Df2	Test-stats	P-value	Df1	Df2
<i>Values</i>	6.99	0.000	47	497	7.97	0.000	17	497	5.41	0.000	30	497
<i>Num Obs</i>	558				558				558			

F-Test for Individual and or Time Effects. The null hypothesis indicates the absence of significant effect (for individual, time or both effects)

Table 7: Testing for individual and time effects - Full sample (Inflation deflator)

<i>Variables</i>	<i>TW effect versus no effects</i>				<i>TW effect versus individual effects only</i>				<i>TW effect versus time effects only</i>			
	Test-stats.	P-value	Df1	Df2	Test-stats	P-value	Df1	Df2	Test-stats	P-value	Df1	Df2
<i>Values</i>	6.53	0.000	47	497	8.25	0.000	17	497	4.84	0.000	30	497
<i>Num Obs</i>	558				558				558			

F-Test for Individual and or Time Effects. The null hypothesis indicates the absence of significant effect (for individual, time or both effects)

Table 8: Panel poolability test - Full sample

Variables	<i>Fixed effects (a) and Pvc</i>				<i>Fixed effects(b) and Pvc</i>			
	F-stats.	P-value	Df1	Df2	F-stats	P-value	Df1	Df2
Values	0.54	0.999	433	62	1.10	0.259	373	124
Num Obs	558				558			

Chow test for poolability of panel data. Fixed effect within model and pooled panel model are compared to Panel Variable Coefficient Model (pvc). Null hypothesis states model stability and hence comparability of mdels. Alternative hypothesis implies model instability.

Figure 2: Correlation Matrix

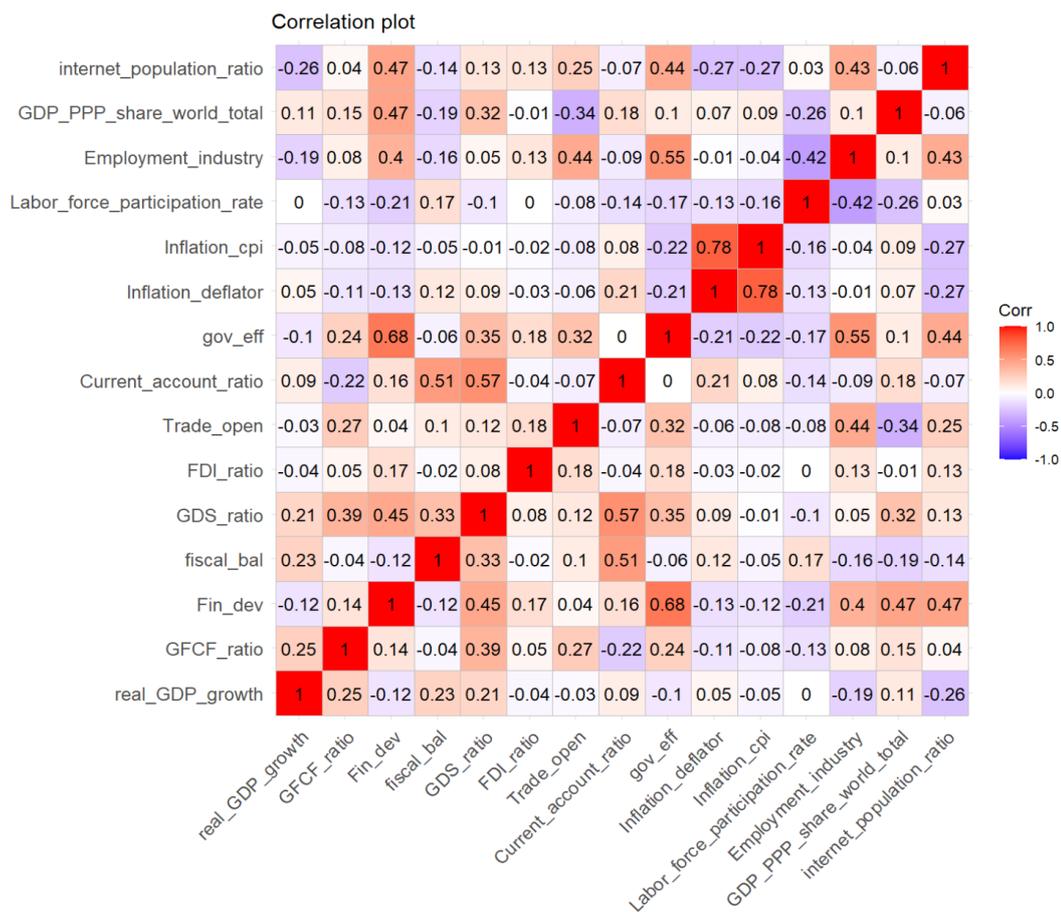


Figure 3: Summary Statistics

	skim_variable <chr>	n_missing <int>	complete_rate <dbl>	mean <dbl>	sd <dbl>	p0 <dbl>	p25 <dbl>	p50 <dbl>	p75 <dbl>	p100 <dbl>	hist <chr>
1	real_GDP_growth	0	1	3.9136613	3.045225	-15.100000	2.50650000	3.9760000	5.5232500	14.60400	
2	GFCF_ratio	0	1	22.1568166	5.182540	12.4460094	18.67508656	21.0583434	24.5500300	40.63242	
3	Fin_dev	0	1	29.7282036	13.811040	6.7783318	18.54832098	28.5611391	40.3822511	66.28937	
4	fiscal_bal	0	1	-2.5663280	4.289265	-15.8380000	-4.54625000	-2.7560000	-1.1115000	29.80200	
5	GDS_ratio	0	1	19.1674635	10.130369	-7.0121627	13.80637160	19.2481556	24.2521400	55.41616	
6	FDI_ratio	0	1	0.8842763	5.054154	-42.2802616	0.05099535	0.3550214	0.9445104	60.01182	
7	Trade_open	0	1	72.6365590	29.359313	20.7225189	53.23125571	68.3810264	86.5030706	168.34072	
8	Current_account_ratio	0	1	-2.1779319	5.604334	-15.7680000	-5.17350000	-2.6815000	-0.3482500	27.41900	
9	gov_eff	0	1	-15.9671853	52.053949	-121.3150382	-58.24494958	-17.6529482	20.5868270	118.67384	
10	Inflation_deflator	0	1	5.5390244	5.545145	-16.9085342	2.27795852	4.3312775	7.1114457	45.16631	
11	Inflation_cpi	0	1	4.9213692	4.836902	-3.1090000	2.14100000	3.8775000	6.3322500	51.46100	
12	Labor_force_participation_rate	0	1	64.7080108	7.456610	47.8700000	61.03500000	64.6700000	69.4500000	82.82000	
13	Employment_industry	0	1	21.3392473	6.562658	6.0100002	18.01000023	21.4899998	25.2300000	34.14000	
14	GDP_PPP_share_world_total	0	1	0.6324857	1.131715	0.0240000	0.06600000	0.2205000	0.6787500	7.03800	
15	internet_population_ratio	0	1	32.1906387	23.537903	0.2270456	10.11863325	28.9015073	51.1640687	95.72474	

Figure 4: Country level summary statistics (mean)

Country	GDP growth	Inflation CPI	Inflation deflator
<chr>	<dbl>	<dbl>	<dbl>
Albania	4.249	2.402	2.598
Botswana	3.701	6.784	6.125
Brazil	2.419	6.357	7.515
Cameroon	4.010	2.201	1.846
Chile	3.703	3.199	4.573
Colombia	3.804	5.000	6.355
Costa Rica	4.032	7.028	7.541
Croatia	2.124	2.113	2.508
Dominican Republic	4.971	8.408	8.783
Egypt	4.432	9.937	10.618
El Salvador	1.995	2.377	2.426
Guatemala	3.454	5.531	4.107
Honduras	4.089	6.445	5.680
Hungary	2.657	4.312	4.581
India	6.936	6.247	5.492
Kenya	4.240	7.249	8.434
Mali	4.864	1.800	3.241
Mexico	2.074	4.588	5.377
Morocco	4.128	1.521	1.172
Nigeria	6.072	12.067	11.765
North Macedonia	2.884	2.057	2.981
Panama	5.902	2.391	2.923
Paraguay	3.345	6.223	7.926
Peru	4.766	2.699	2.934
Philippines	5.472	3.974	3.579
Poland	3.788	2.548	2.406
Romania	4.070	9.583	12.034
Saudi Arabia	3.494	1.772	5.270
South Africa	2.662	5.619	6.618
Tunisia	3.133	4.069	4.587
Ukraine	2.609	12.865	16.382