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PRICE STABILITY AND INFLATION TARGETING IN COMMODITY ECONOMIES: MACROECONOMICS VERSUS A POLITICAL ECONOMY?

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Abstract In this study, the author argues that maintaining price stability in commodity economies is influenced by their resource rent distribution, and that economic stability is extremely sensitive to the nature of a political regime. The commodity factor alone is shown not to be an impediment to maintaining price stability and implementing inflation targeting. An empirical analysis based on data from 68 resource-rich countries provides evidence that the link between the timing of the implementation of inflation targeting and resource wealth variables is not skewed towards resource-poor countries. This study finds that among democracies, inflation targeters demonstrate the best price stability parameters, the most flexible exchange rates, more independent central banks, and more diversified economies, while among autocracies, the best parameters are seen in countries that have sovereign wealth funds

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1. INTRODUCTION

The ability of resource-rich countries to maintain price stability is very often viewed in the context of their overall macroeconomic vulnerability. This is related to a long tradition of viewing global commodity price fluctuations as something of a challenge. The financial integration of such countries further complicates the matter, adding the problem of macrofinancial stability to the issue of price shocks. Pro-cyclical capital flows, and the private sector's tendency to accumulate the debt in times of favorable commodity market conditions, make the vulnerability profile of commodity economies more complex. These countries currently perceive the development of macroprudential instruments and counter-cyclical fiscal policy institutions as a benchmark of macroeconomic management. Similar innovations are being implemented amid a lack of fundamental differences in price stability maintenance capabilities between commodity exporters and other countries. The marginal case of Venezuela is rather an exception to the rule. At the same time, the fact that the inflation problem is receding into the background does not imply that resource wealth comes as a kind of anti-inflation bonus. On the contrary, resource rent and its ability to distort the operation of economic policy institutions may prove to be a driver of the formation of a political regime under which maintaining price stability is either simplified as coalition bargaining costs minimization, or made more complex as political actors compete to capture rent. This implies that price stability in such countries can be viewed not only from a macroeconomic perspective but also from the standpoint of the political economy.

The worldwide spread of inflation targeting – specifically the growing number of inflation-targeting nations qualifying as commodity exporters – raises the question of how well-matched conditions of resource wealth are to this method of maintaining price stability. On the one hand, the introduction of inflation targeting requires macroeconomic policy institutions to have matured to a certain level – one that naturally corresponds to the overall quality of the institutions. On the other hand, these countries' structural irregularities point to the possibility that maintaining price stability within them may run counter to meeting other objectives necessitated by the commodity factor. By way of example, the prevention of the Dutch disease requires a narrower exchange-rate fluctuation range, while the prudent averting of negative "balance sheet effects" may call for additional exchange-rate flexibility. Reserves hoarding requires liquidity sterilization, potentially resulting in the higher interest rates, in turn inviting pro-cyclical capital inflows. Along with this, commodity prices may fluctuate within a range that can turn a typical trade-offs that in nature is another class of macroeconomic objectives.

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Introducing inflation targeting in Ukraine has revived discussion about resource wealth's compatibility with price stability. This debate mainly appeals to our country's historical experience, and appears to be removed from the global context of the analysis of monetary regimes' performance. Simultaneously, estimates of the comparative efficiency of inflation targeting in terms of resource wealth also lack conclusiveness.

The paper puts forward the hypothesis that the natural resource factor, which is reflected in the export's structure, must not be perceived as (a better bias for) a price stability maintenance capability. The same goes for inflation targeters with a large share of non-commercial exports. The special nature of this monetary regime involves anchoring inflationary expectations and responding to anticipated inflation, ultimately incorporating a strong counter-cyclical component into macroeconomic policy. As a result, the basic monetary techniques for achieving price stability do not differ in countries that vary in their natural resource endowments, while the economic cyclicality induced by commodity price fluctuations is balanced out by central banks' actions.

This leads to the question of whether inflation targeters and non-targeters differ among themselves in terms of their price stability maintenance capabilities. This leads to a hypothesis that resource-endowed countries may or may not be successful in maintaining price stability, depending on how resource wealth determines the nature of their political regimes. This parameter is also an important driver of an economy's financial depth and complexity – structural characteristics that, in theory, should facilitate maintaining price stability through better adaptability to shocks. The same applies to the level of central bank independence, which is normally associated with price stability.

Political regimes also play an important role from the perspective of the introduction of counter-cyclical fiscal buffers. Where fiscal policy does not create reliable prerequisites for macroeconomic stability, central banks' capability to offset the pro-cyclicality of commodity prices is a result of institutional quality – to a much greater extent than the way in which institutional quality generates a counter-cyclical bias in fiscal policy. Put differently, price stability and its inflation-targeting-based maintenance is associated mainly with democratic political regimes that enable financial development, thereby positively impacting the accessibility of flexible-exchange-rate setting with a counter-cyclical objective.

This paper is structured as follows. The next section presents a review of the literature. Section 3 is concerned with a political-economy analysis of the link between resource rent and price stability. Section 4 contains an empirical assessment of the chronology of the introduction of inflation targeting. The next section discusses a grouping of resource-rich countries and gives a relevant analysis of identified patterns. The conclusions section summarizes the outcome of the research.

2. PRICE STABILITY AND RESOURCE WEALTH: A LITERATURE OVERVIEW

The baseline approach to the monetary problems of commodity economies is grounded in a theoretical analysis of links between global price shocks, foreign exchange inflows, and the choice of an optimal trajectory for inflation and exchange rate behavior. Against this background, this macroanalysis focuses on how domestic inflation impacts the real exchange rate and how the latter affects the deterioration of the economy's structure (as in cases of Dutch disease) (Corden, 1982; Corden and Neary, 1982). Within this framework, the issue of price stability is viewed in the context of the link between exchange rate behavior and the structural outcome when it appreciate. It is evident that price stability must play an important role in maintaining macroeconomic equilibrium in commodity economies. Otherwise, removing the conflict between the domestic inflation path and exchange rate would not have required large-scale counter-cyclical foreign exchange interventions. The key role of foreign exchange reserves in maintaining macrofinancial stability in resource-endowed countries manifests itself in their tendency towards setting fixed exchange rates, that empirically evident from Aliyev (2012), Aliyev (2013), and Aliyev (2014) suggests. Wills and van der Ploeg (2014) reach similar conclusions.

In subsequent research, the theoretical conceptualization of ways to achieve price stability underwent changes. A number of authors emphasize the political-economic factors involved in macroeconomic stability. In other words, a lack of stability is a result of political instability over the fight for rent (Auty, 2001a; Auty, 2001b). Coupled with fiscal policy, populism can add to problems related to controlling inflation. On the other hand, a politically stable autocracy makes possible an accumulation of fiscal buffers through the removal of coalition bargaining on budget parameters (Koziuk, 2016a; Koziuk 2016b).

In contrast to the political-economic approach, the macroeconomic perspective on the problem is less reliant on the role of rent-seeking in economic policy distortions. Price stability is to a greater extent viewed through the prism of central banks' reactions to the exchange rate and its role in open economies (Ball, 1998). However, the "fear-of-floating" debate recognizes the importance of export structure, alongside dollarization, strong spillover effects, etc. As a result, the tendency to maintain limited exchange rate fluctuations, and a strong response by interest rates to exchange rate developments, are seen as the mark of an optimal choice (Mohanty and Klau, 2004; Mishkin and Schmidt-Hebbel, 2007; Schmidt-Hebbel and Carrasco, 2016; Airaudo et al., 2016, etc.).

However, because of several local waves of commodity price changes, the said problems are exacerbated as emerging markets grow more prone to fluctuations in global prices, as seen from the perspective of consumption structure. Put another way, the performance of inflation targeting in the light of commodity price volatility has come to be viewed in the context of optimal responses to supply shocks. In other words, resource wealth is indirectly identified with the special case of acute vulnerability to shocks in the prices of non-core inflation. While conventional monetary theory says that central banks can ignore transitive supply shocks, in emerging markets they cannot. A response to a supply shock – especially a shock to the supply of an agricultural commodity – may be optimal where core inflation is sensitive to movements in the most volatile components of the CPI. This is precisely the angle from which De Gregorio (2012) looks at inflation-targeting risks. Agenor and Pereira da Silva (2013), in turn, point out that, than exported commodities are also to consume domestically, terms-of-trade shocks are closer to supply-side shocks, and so the problem boils down to an optimal response to the gap between the most volatile prices and core inflation, rather than to the structure of exports. In effect, it means that resource wealth is not an impediment to maintaining price stability, including through inflation targeting. The only question is the extent to which the macroeconomic policy authorities are prepared to take the appropriate actions.

Viewed from another perspective, commodity economies have a set of distinguishing features that must be taken into account, as outlined in IMF (2012) and IMF (2015), for instance. First, commodity economies are extremely responsive to global-centric shocks. In these economies, most macroeconomic aggregates (such as consumption and investment) include an unambiguous pro-cyclical component. Second, the role of fiscal buffers in neutralizing the pro-cyclical effects of commodity price volatility has to be more distinct. Monetary policy may turn out to be more restricted in terms of the choice between price stability, exchange rate stability, and financial stability. Additionally, the higher the degree of commodity economies' integration into global finances, the more responsive they will be to capital flow shocks. Third, although commodity price volatility has little effect on the trend of potential GDP, its cyclical component's response to these fluctuations is twice as strong as that of other countries. This effect is more pronounced for energy exporters. In other words, the parameters in the Neo-Keynesian inflation equation will change in such a way that the fluctuations in the monetary policy instrument variable in the reaction function may be more significant. Accordingly, importance is assigned to the components of the economy and economic policy that help reduce the significance of the impact of GDP's cyclical component on overall inflation. However, IMF (2012), Heenan et al. (2006) and Roger (2010) point out that inflation targeting is precisely the method that a number of commodity-rich economies try to use to decrease macroeconomic volatility.

Frankel et al. (2008) and Frankel (2010), in turn, find that inflation targeting in the resource-wealth case is not as counter-cyclical as expected. Maintaining price stability amid a positive commodity shock, they argue, requires a substantial strengthening of the exchange rate, just as a shock to commodity import prices requires comparable upward pressure on the exchange rate from higher interest rates. Furthermore, the authors point out that inflation targeting generates adverse pro-cyclical effects: monetary restrictions accompany a negative terms-of-trade shock, not vice versa. That being said, in the case of the simultaneous export and intermediate consumption of a country's core commodity, the domestic situation does not look so one-sided and is essentially reduced to the conventional problem of an optimal response to non-core inflation (Agenor and Pereira da Silva, 2013).

Aghion et al. (2009) show that the financial development level directly determines a flexible exchange rate's ability to offset terms-of-trade shocks. Insufficiently deep financial systems, when combined with sharp exchange rate fluctuations, have a negative effect on labor productivity growth. This problem pertains to all countries with average and low incomes, but commodity-rich countries constitute a special case. In those countries, financial development can continuously remain depressed for institutional reasons (competition for rent capture, the insufficient protection of property rights, volatile and high inflation) and because the resource extraction sector can operate without the financial depth of the national financial system, thanks to a strong capacity to borrow from abroad in foreign currency (Kurronen, 2012; Koziuk, 2016a). That is to say, counter-cyclical response options under the price stability policy may be limited by the financial development factor. However, a structural change under which a transition to inflation targeting takes place produces better institutional quality. This improvement in quality is what unlocks financial development potential. It is not by chance that those resource-endowed nations that have the lowest hard-currency reserves tend to combine flexible exchange rates with high financial development indexes and are, for the most part, inflation targeters (Koziuk, 2016b). An empirical analysis of the response function for New Zealand, Australia, Canada, and the UK indirectly confirms this in the case of developed countries. The first two of them show a more pronounced response to exchange rate fluctuations, while the other two do not (Lubik and Schorfheide, 2007).

Nevertheless, exchange rate fluctuation responses remain a source of debate among the authors of such theoretical and empirical studies. If a weakening of the real exchange rate produces an increase in future inflation, a response to it is justified. But Aizenman et al. (2008) argue that, for a number of emerging markets, reverse causality appears to be true: higher inflation causes future exchange rate weakening. In another study, the same authors introduce resource wealth as a criterion to analyze central bank behavior in 16 emerging markets in 1989–2006 (Aizenman et al., 2011). The authors write that inflation targeters and non-targeters do not significantly differ in terms of growth rates, but that inflation is lower for the former; having a large share of commodity exports is associated with somewhat higher inflation, but at the same time, central banks show a stronger response to it; central banks also display a more pronounced response to exchange rates in commodity-exporting countries. Aizenman et al. (2011) explain this by saying that commodity exporters are more susceptible to terms-of-trade shocks, while central banks' sensitivity to exchange rate movements relates not so much to attempts to indirectly ensure control over inflation, as to efforts to lower GDP volatility. Equally noteworthy is that the authors find a link between the share of commodities in exports and a stronger central bank response to inflation. This may mean that monetary authorities in resource-rich countries approach inflation as a challenge to macroeconomic stability, rather than considering themselves to be doomed to elevated inflation.

3. COMMODITY ECONOMIES AND PRICE STABILITY: THE POLITICAL ECONOMY OF RENT AND ECONOMIC POLICY IMPLICATIONS

The criticism that commodity countries cannot ensure low and stable inflation derives in fact mainly from their vulnerability to a wide range of commodity price fluctuations. Basic logic suggests that a strong positive shock to commodity prices will draw an exchange rate response that may hinder the development of non-extraction sectors. At the same time, a plunge in commodity prices will require a monetary policy easing that will quickly transform the devaluation into high inflation. By the same logic, the absence of an exchange rate response can also mean the existence of inflationary pressure. Commodity price growth, should it happen, activates the income effect, while a drop in commodity prices triggers attempts to revitalize aggregate demand, exerting pressure on the central bank to create economic stimuli.

However, this approach is somewhat simplistic. It is immediately obvious that this reasoning leaves out institutions. A positive commodity price shock easily transforms into a boost to inflation if authorities or the central bank take no anti-inflation action. Increases in investment or rises in wages reflect to the same extent how the existing political regime approaches resource rent. Efforts to quickly convert rent into social welfare or redistribute it in favor of predatory elites is a key element of the mechanics of inflation acceleration during a commodity boom. The reason that the lack of counter-cyclical policy stems from a predatory attitude to rent is that understanding the temporal constraints of a positive price shock (even a rather persistent one) must rely on experience, which is common knowledge. Put differently, a price volatility cycle is not an issue of asymmetric information between macroeconomic policy authorities and other authorities. The same situation applies when commodity prices go into free fall. Adapting to new equilibrium conditions requires adjusting consumption and investment. It may also be necessary to adjust them simultaneously by cutting real wages and increasing investment. Those changes to the economy run into political and economic constraints that can be described as follows.

If under the existing political regime there is a certain status quo regarding rent access, the economy may perturb this status as it adjusts to the new equilibrium conditions. As a result, those experiencing a drop in welfare may forge an alternative alliance to help vested interests shift to other parties the burden of adjusting to the new equilibrium conditions. In either case, elevated inflation in a resource-rich country may signal a struggle over rent and indicate the unsustainability of the political regime, due to it lacking the resources to monopolize access to rent and transform price stability into a benefit with which to buy citizens' loyalty. In addition, if price stability is removed from the equation, the nature of rent access and the relevant sustainability of the political regime will affect the redistribution of the benefits/the burden of adjusting to the new equilibrium conditions. Given sufficient guarantees that such a redistribution has an acceptable form, political agents will not be interested in using pro-inflation policies to seize rent. By contrast, when those guarantees are scarce, pro-inflation policies may again be considered to be among the tools available for the redistribution of commodity price volatility losses/benefits.

Table C1 (in Appendix C) categorizes the potential monetary manifestations of commodity price fluctuations, grouped by political regime. It is assumed that the nature of rent distribution is not the only determiner of the modality of the democracy vs. autocracy comparison. In either case, competition for rent and how this competition affects institutional quality lead to different macroeconomic outcomes. For that reason, this comparison needs to be widened. There can be weak democracies, in which agents compete for rent access while social populism serves as one of the tools for such competition, and strong democracies, in which commodity rent is (at least to an extent) isolated from the current economic process and distributed according to a certain social optimum. Autocracies can be expropriatory, whereby rent access monopolization means control over other socio-economic and political processes amid intensified pressure on political and economic rivals, and prudent, in which rent monopolization is a method to avoid the wasting of rent, with its partial conversion into social welfare in exchange for loyalty.

From a strictly macroeconomic perspective, the link between commodity price fluctuations and domestic inflation reduces to the issue of there being an optimal response to a terms-of-trade shock. A positive shock will have expansionist effects, a negative one – restrictive effects. If price stability is in and of itself a policy objective, then in either case the response to various effects is a matter of available policy space or an acceptable trade-off between alternatives. The scale of commodity wealth and the corresponding scale of the economy's vulnerability to commodity price fluctuations will matter for the set of policy-mix instruments, rather than for inflation per se. This implies that, once price stability becomes a policy objective, the magnitude of commodity wealth begins to drive the search for an optimal combination of macroeconomic tools that would support such stability without causing additional macroeconomic fluctuations. That being said, even within this formulation, maintaining price stability may not be an exclusively technical issue, given the nature of the shocks, the varying impact of commodity prices on potential GDP, the sensitivity of inflation and the economy's cyclical position, the central bank's preferences, etc. In other words, the problem of commodity wealth may boil down to the typical dilemma of an inflation targeter: what should the response to a supply shock be?

Taking into account, however, that price shocks in resource-rich countries have the attributes of both supply shocks and demand shocks, the case becomes more complex (De Gregorio, 2012). For instance, an energy exporter and an agricultural products exporter with the same CPI structure may find themselves in different conditions in terms of consumer price behavior, especially if these exporters are countries with average or low incomes. Another problem is to identify the time at which not responding to a positive commodity shock ceases to be optimal strategy, as a result of a supply shock turning into a demand shock.

In this context, inflation targeting may bring in a number of positive aspects, as it involves the anchoring of inflation expectations, which should help decrease the sensitivity of the consumer price response to inflation drivers, activate counter-cyclical exchange rate behavior, restrain the central bank's politically motivated discretion, etc. Despite these positive aspects, criticism of inflation targeting (Frankel et al., 2008; Frankel, 2010) stems from the idea that stabilizing inflation and maintaining it within a target zone are actions opposite to offsetting a terms-of-trade shock. The important role of the exchange rate in shaping the trajectory of potential GDP is also seen as an impediment to inflation targeting, which is based on the principle of a floating exchange rate. However, the operation of this monetary regime on forward-looking principles does not make it identical to other monetary regimes, which adds stabilizing elements to the economy. On a grand scale, these should not ensue from the structure of exports even if the latter imposes additional constraints on optimal exchange-rate behavior. Continual signaling to economic agents that, should they intensify the shifting of costs to the consumer, they will face demand-side constraints through interest rates, is critical to forming a common denominator between supply and demand shocks in a resource-rich country. In that interpretation, terms-of-trade shocks converge with the most volatile components of the CPI. The amplitude of the latter, which is determined by the scale of resource wealth, drives a more complex policy-mix toolkit precisely in order to avoid provoking the central bank into sporadically degrading the trade-off between variation in inflation and variation in GDP growth when a resource shock is persistent. It is in this context that the link between resource wealth and the monetary regime choice has to be considered.

4. RESOURCE WEALTH AND THE TIMING OF INFLATION TARGETING IMPLEMENTATION: AN EMPIRICAL PERSPECTIVE

The importance of political and economic factors in ensuring price stability in a resource-rent economy and its vulnerability to terms-of-trade shocks raises the issue of substantiating the hypothesis about the role of a country's structural characteristics in its transition to inflation targeting. For instance, Ismailov et al. (2016) and Schmidt-Hebbel and Carrasco (2016) argue that, for the most part, safeguards against an accelerated transition to inflation targeting become relevant under the conditions of a substantial public debt (the risk of the preservation of fiscal dominance), high and volatile inflation (the risk of lack central bank credibility, potentially increasing disinflation costs), dollarization (the risk of exchange rate fluctuations having substantial impacts on the balance sheet, etc.), and the central bank's technical unpreparedness (the risk of the operational level of policy and macro-forecasting methodology). The export structure factor is not mentioned, making it all the more interesting whether this factor is a prerequisite for either a speedy transition to inflation targeting (given this factor's potential counter-cyclicality) or a delayed one (considering its potentially negative effect on the ability to maintain stable prices).

Graphical models reveal the nature of the link between resource wealth indicators (all three of the World Bank's World Development Indicators) and the chronology of nations' transition to inflation targeting (according to Central Banks News data) (see Figures 1–3).

As can be seen from Figures 1–3, there is no indication that inflation targeting is mainly introduced by countries that have no resource wealth. It is noteworthy, however, that it is possible to see certain ambiguous patterns in the link between resource wealth and the timing of the transition to inflation targeting.

First, all three figures show a rather clear-cut distinction between countries with high and low resource-wealth levels.

Second, the distribution between countries with greater resource wealth and those with lesser resource wealth is skewed towards the latter. The skew is most pronounced in Figure 3 (total resource rent as a percentage of GDP) and least pronounced in Figure 2, which features non-manufactured exports as an indicator. The pattern in Figure 2 is especially important, as it implies that the structure of exports is not a safeguard against an accelerated transition to inflation targeting. It is also important because this indicator demonstrates that this monetary regime is instituted by countries that rely on agricultural products for a significant share of exports. Given the composition of the CPI, the vulnerability to fluctuations in agricultural product prices in middle-income countries does not appear to be a significant flag against inflation targeting. That is, even if reaching a target is under serious threat as a result of agricultural product exporters viewing a drop in the crop harvest as the equivalent of a negative supply shock, it is not an impediment to transitioning to this monetary regime. It is safe to assume that the key is the way in which the central bank transforms the operational framework and conducts a systemic expectation-anchoring policy. Also important is the transformation of institutions in order to improve the allocation of resources.

Third, in the case of there being substantial resource wealth, a delayed transition to inflation targeting is more likely. This is best illustrated in Figure 3. In the other two cases, however, countries are relatively evenly spread out in time with regard to the link between resource wealth and the time this monetary regime is implemented. The difference in the nature of indicators used in plotting Figures 1–2 and 3 is intended precisely to demonstrate that inflation targeting will likely be the preferred monetary regime where, along with the extraction sector, there are other sectors that raise economic complexity. This may also mean that the presence of a more diversified economy, even one with a pronounced resource sector, will require greater price stability – which is only natural given the higher level of the intensity of economic transactions and, hence, the greater significance of the nominal anchor of price stability.

Fourth, the introduction of inflation targeting occurs later in time in countries outside the developed cohort, as developed countries have large resource endowments and were the first to introduce the regime (New Zealand, Canada, Australia, Norway). At the same time, Chile, Mexico, Brazil, Columbia, Peru, etc. exemplify that a rapid transition to this price stability regime is feasible in medium-income countries. On the one hand, the delayed transition to inflation targeting should be viewed in light of the fact that countries vary in how they mature towards the need to use instruments that ensure price stability in this monetary regime. For some, this may be the result of resource wealth being converted into the increased welfare of households, spurring financial development, which in turn fuels the growing role of capital flows in ensuring macroeconomic stability. Others may take the path of structural change, and minimize their dependence on extraction and other sectors.

5. EMPIRICAL MEASURES OF THE LINK BETWEEN PRICE STABILITY AND THE STRUCTURAL CHARACTERISTICS OF RESOURCE-RICH COUNTRIES

Some of the recent radical price turnarounds in world commodity markets allow for the empirical testing of how inflation conditions differ across inflation-targeting countries and countries that operate another monetary regimes. In addition, it is important to take into account the links between the price stability parameters and structural characteristics of the countries in the above two groups. The same applies to analyzing the problem of the dependence of the two groups' structural characteristics on the scale of their resource wealth.

To empirically test those links, a sample of 68 countries was compiled. The IMF has identified 52 countries as resource-rich (IMF, 2015). However, the IMF's criterion for identifying such countries is rather strict (under the criterion, commodities should make up 35% of exports in 1962–2014, while net commodity exports should represent no less than 5% of gross foreign trade over the same period). In addition, this sample would not have resulted in a correct identification of the role that inflation targeting plays in ensuring price stability in resource-rich countries. For the purposes of this study, 16 countries with large commodity export volumes were added to the sample. These were the Dominican Republic, Tonga, Cape Verde, Fiji, Uganda, Iraq, Armenia, Ukraine, Mexico, South Africa, Australia, Canada, New Zea-

Figure 1. Percentage of commodity exports and the year of inflation targeting implementation

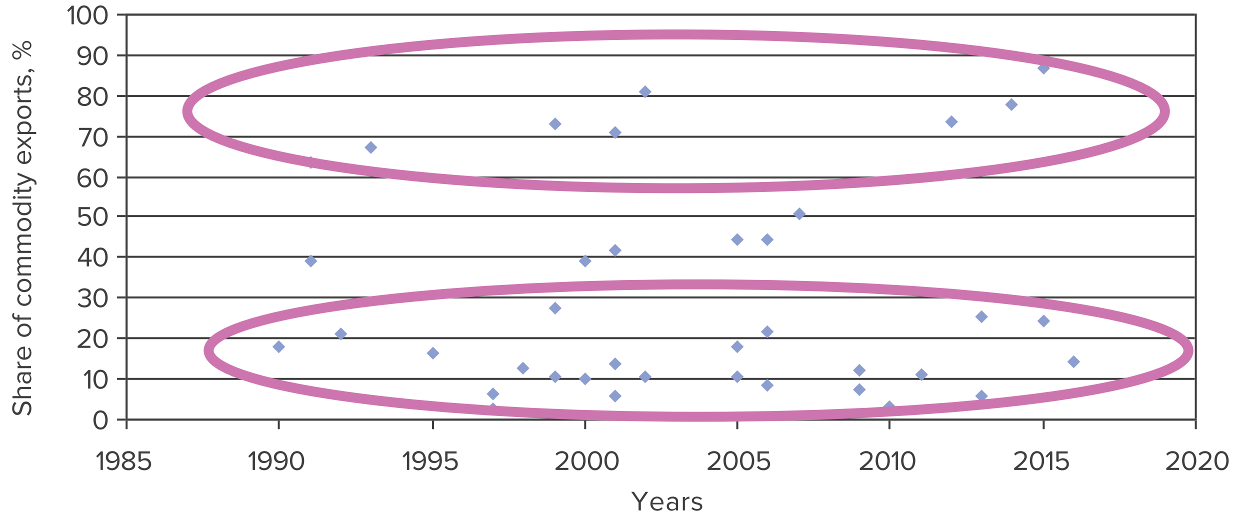


Figure 2. Percentage of nonindustrial exports and the year of inflation targeting implementation

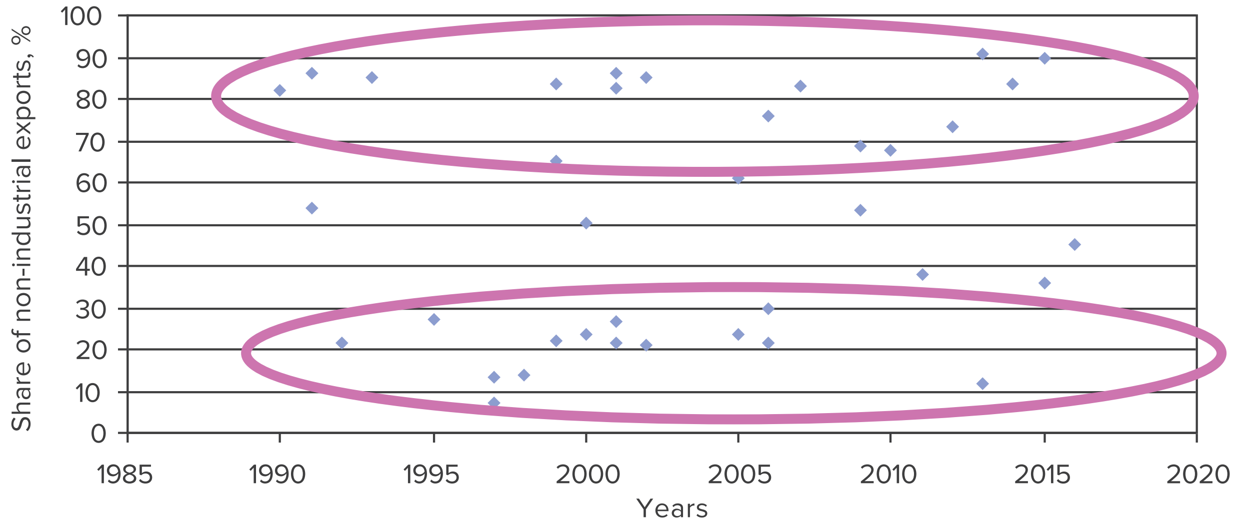
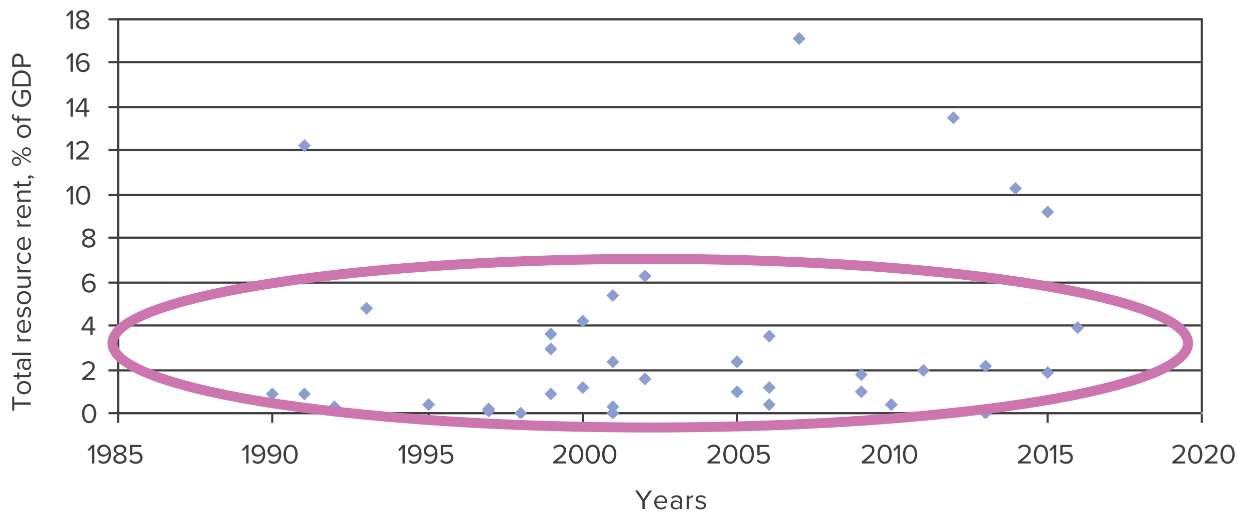


Figure 3. Resource rent and the year of inflation targeting implementation



land, Iceland, and Norway. The analysis covered the 1999–2017 period. Reinhart et al. (2017) argue that the 1999–2016 period chronologically captures the last full cycle of commodity prices. What makes this period stand out is that during it, resource-rich countries became less prone to the destabilizing effects of capital flows, thereby demonstrating the use of counter-cyclical policy instruments.

Price stability is analyzed using two indicators: average inflation and standard deviation of inflation for the selected period (IMF data). Non-manufactured exports was chosen as a resource wealth variable (World Bank's World Development Indicators) to account for the contribution of agricultural products to the structure of a country's foreign trade and, hence, to indirectly consider the issue of links between food prices, the significant share of food consumption in medium- and low-income countries, and the sensitivity of core inflation to shocks to the most volatile components of the CPI.

The following indicators describe the countries' structural characteristics:

- the financial depth index, which was developed by Svirydzenka (2016). This measure shows how an economy prone to terms-of-trade shocks can manage without pro-inflation stimuli from the central bank, as the financial sector absorbs some of the shocks. In addition, a lack of financial progress is viewed as a structural attribute of commodity economies that constrains their ability to maintain macroeconomic stability;

- the economic complexity index, which is calculated by MIT (https://atlas.media.mit.edu/en/rankings/country/eci). The average value of this index for 1999–2016 was used. It is assumed that the more the extraction sector dominates, the greater the extent to which it limits the development potential of alternative sectors, as the "resource curse" and "Dutch disease" approaches predict. By the same logic, the less diversified an economy is (the lower the index's value), the more inflationary are the consequences of a commodity price cycle;

- GMT – the central bank independence index. According to the literature, the level of central bank independence has an impact on maintaining price stability. But it is more important that the status of monetary authorities actually determines the country's choice of the institutional design of its macroeconomic policy. This design must determine how the costs and benefits of adapting to external shocks, which in turn determine the specific monetary measure of the resource rent, should be distributed. While resource-rich countries gravitate to low levels of monetary authority independence (Koziuk, 2016), this index could prove to be an important watershed divide between the groups of countries;

- the Democracy Index. This is an indicator of the political regime. It determines the nature of resource rent distribution and the quality of economic policy institutions. The link between them is not always traceable. Strong autocracies may institute fiscal buffers, as they draw no populist opposition over rent wasting, while weak democracies may find themselves incapable of implementing effective macroeconomic policy, both due to continual competition for rent and because of populism. Along with this, the way rent is spent may be dictated by competition for electoral advantage, leading to an outcome in which rent reinforces competitive populism. Predicting the nature of the link between this variable and price stability is going to be complicated.

Appendix A contains a graphical representation of established links. As shown, the split of the sample into inflation-targeting countries and countries with other monetary regimes is significant. In nearly every case, we see differences in the links' density or elasticity coefficient, and sometimes the links have opposite directions. Under otherwise equal conditions, the two groups differ in how the structural characteristics interact with inflation. The same applies to the link between the measure of resource wealth and the other measures used. A more concrete analysis identifies a number of other points.

First, both average inflation and variation in inflation are strongly related to the financial depth index in both groups of countries. This indicates that the development of financial markets and the availability of financing play an important role in reducing the need for monetary activism when responding to shocks. This could also mean that the inflow of foreign currency (resulting from either a positive trade shock or an inflow of capital in response to the growth in commodity prices) is more pro-inflationary where financial markets have lesser depth. However, inflation targeters manifest a better relationship between price stability parameters and financial depth (Figures A1–A4). At the same time, they display a more pronounced reverse relationship. This could be viewed as a consequence of their being at the higher level of economic development and the heterogeneity of countries under the financial development criterion, whereby financial depth is already important in the general institutional structure of the economy, but stops short of being able to offset pro-inflationary shocks.

Second, the nature of the link between price stability parameters and the economic complexity index is also evidence of the often-mentioned pro-inflation risks posed by responses to shocks in a poorly differentiated economy (Figures A5–A8). While the link's direction is the same here as in the case of financial depth, the link's density is much lower. In other words, the lack of differentiation of the economy is not an inflationary factor in itself, as the lack of financial depth can reduce the economy's ability to adapt to shocks, resulting in a deterioration of price stability. As with the previous case, inflation-targeting countries demonstrate a better elasticity coefficient in the link between the chosen parameters. Put differently, apart from their higher level of economic complexity, not having such a level is unlikely strongly pro-inflationary factor.

Third, the link between central bank status and price stability parameters is multidirectional in the context of the two groups of countries. For inflation targeters, a weak relationship is also theoretically predictable. For the other group, the relationship is direct (Figures A9–A12). This is because the members of the first group operate in a more conventional institutional format and deal with a traditional set of political and economic problems. Simultaneously, those in the other group show a different manifestation of institutional inflation buffers, which may or may not be associated with central bank independence. All in all, countries with stronger central bank independence may be substantially more vulnerable to political and economic pressure, while countries with weaker central bank independence may have other macroeconomic stability institutions, such as sovereign wealth funds.

Fourth, the resource wealth variable does not convincingly correlate with price stability parameters in either of the groups of countries. However, some differences are visible.

Table 1. Mean values of variables by country group

	Democracy Index	Mean inflation for 1999–2017, %	Standard deviation of inflation for 1999–2017	Nonindustrial exports, %	Exchange rate regime variable*	GMT index	Financial depth index	Economic complexity index
All 68 countries	5.02	8.89	10.10	68.86	1.52	0.55	0.28	-0.67
Democracies, 40 countries	6.51	8.90	11.06	62.30	2.15	0.59	0.33	-0.41
Democracies, apart from Venezuela, 39 countries	6.54	6.39	4.72	62.69	2.15	0.59	0.33	-0.41
Autocracies, 28 countries	2.90	8.88	8.73	76.80	0.61	0.48	0.21	-1.03
Democracies with no or little inflation-targeting (IT) experience (up to 7 years), 25 countries	5.90	11.29	16.19	65.20	1.44	0.58	0.22	-0.63
Democracies with extensive IT experience, 15 countries	7.52	4.91	2.51	60.15	3.33	0.62	0.51	-0.04
Democracies with extensive IT experience that are not developed countries, 10 countries	6.60	5.99	3.01	58.63	3.10	0.61	0.40	-0.15
Autocracies with sovereign wealth funds, 14 countries	3.00	4.54	4.07	80.10	0.57	0.50	0.30	-0.73
Autocracies with no sovereign wealth funds, 14 countries	2.80	13.21	13.38	73.5	0.64	0.45	0.12	-1.33
All countries with sovereign wealth funds, 17 countries	3.93	4.40	3.74	78.95	0.94	0.52	0.34	-0.61

Note 1. IT – inflation targeting.

Note 2. Kazakhstan and Russia, which have quantitative inflation targets but are classified as autocracies under the Democracy Index, were not combined into a separate group.

Note 3. * A variable that quantifies the exchange rate regime. This variable has a 0–4 range. The 0 value is assigned to countries that have the following exchange rate regimes under the classifier: no separate legal tender, currency board, conventional peg, stabilized arrangements. A value of 1 is assigned to a crawling peg, crawl-like arrangements, pegged exchange rate within horizontal bands, a value of 2 to other managed arrangement, a value of 3 to floating, and a value of 4 to free floating.

Note 4. Only three countries that are classified as democracies under the Democracy Index have sovereign wealth funds (Norway, Chile, Trinidad and Tobago), and so they were not combined into a separate group.

For countries with central banks engaged in inflation targeting, the resource wealth variable's average value hardly ever correlates with non-manufactured exports, which are, however, reversely correlated with the variation in inflation. Along with this, other countries show a more clear-cut reverse relationship between the resource wealth variable and inflation, but a direct relationship between the resource wealth variable and the variation in inflation (Figures B1–B4). These differences are probably best explained by differences in fiscal policy restrictions.

As the data above show, when coupled with the set of characteristics of the countries under analysis, export structure does not stand out in terms of its contribution to central banks' ability to ensure stable prices. Despite certain differences in the nature of the links between price stability parameters and structural change in favor of inflation targeters, the overall structure of exports must not be viewed as an insurmountable barrier on the way to price stability in resource-rich countries.

The obvious heterogeneity of commodity economies follows from the analysis conducted above. They differ in terms of monetary regime. In addition, as mentioned before, the political regime factor and the resource wealth level are viewed as an important determiners for potential policy-mix options and their institutional format in these political and economic conditions. To pinpoint the results of the earlier analysis, 68 of the sample countries were grouped under the general criterion of political regime (democracy vs. autocracy) and under subordinate criteria that identify macroeconomic policy regimes. The subordinate criteria were whether the countries were inflation targeters and whether the structure of their macroeconomic regimes included sovereign wealth funds (the results of the above analysis were based on a simple grouping on the principle of targeter vs. non-targeter). Indirectly, this approach enables the empirical verification of monetary effects in the context of the theoretical division of political regimes in commodity economies, as shown in Table C1 (see in Appendix C). The findings are presented in Table 1.

The grouping results presented in Table 1 allow the data shown in Appendix A to be refined, but confirm the theoretical assumptions outlined in Table C1 (see in Appendix C). Several key generalizations can be made. Democracies and autocracies differ in terms of inflation conditions, structural characteristics, and macroeconomic policy regimes. In the democracy group (40 countries), price stability parameters appear marginally worse than those in the autocracy group (28 countries). Removing Venezuela from the 40-country sample, however, changes the picture. The 39-country democracy group returns better results than the 28-country autocracy group. At the same time, compared to the autocracies, the group of countries with democratic regimes demonstrates the following pattern: they have smaller resource wealth, but prefer more flexible exchange rates, more independent central banks and have higher levels of financial development and more diversified economies (which fully matches the results of prior research (Koziuk, 2016a; Koziuk, 2016b). This outcome may be unambiguously interpreted as supporting the idea that a lower level of resource wealth decreases the likelihood of rent access monopolization, which in turn is generally a certain stimulus for the development of institutions that guarantee economic diversification and provide a boost to the financial system. Along with this, price stability is helped by a more independent central bank, while adjustment to shocks occurs via the exchange rate channel (at least in part, taking into account the greater flexibility of exchange rate regimes). At the same time, this does not mean that the political regime as a determinant of financial depth and economic diversification is the only factor that matters for price stability. The macroeconomic policy regime is fundamentally important, as evidenced by the analytical groupings. Simultaneously, the qualitative characteristics of each of the political regimes are no less important in explaining which macroeconomic policy regime a country will prefer. And this is the fundamental reason for the differences seen among resource-rich countries.

First, countries with democratic regimes (barring Venezuela) are inferior to autocracies with sovereign wealth funds in terms of price stability and financial depth, but have higher levels of central bank independence, more flexible exchange rates, and more diversified economies. This is evidence of the fundamental importance of fiscal policy in maintaining price stability in countries with substantial resource wealth. But this does not rule out that the monetary policy regime is less significant.

Second, democratic countries that are differentiated under the criterion of the implementation/length of their inflation targeting regime differ in the same way as do autocracies with and without sovereign wealth funds. The 15-country group of democracies with long-term expertise in inflation targeting shows better results in the price stability domain compared to the 25-country group of democracies that either have little experience in targeting inflation or use an alternative monetary regime. The same applies to the group of countries that target inflation but are not classified as developed (10 countries). They are inferior to the aforementioned group of 15 countries, but substantially superior to the 25-country group by every measure. In other words, the monetary policy regime matters. Under any conditions, long-term inflation targeting in resource-rich countries unambiguously correlates with a more independent central bank, more flexible exchange rates, a deeper financial system, a more diversified economy, and a higher level of democracy. As for autocracies, breaking them down in terms of whether or not they have a sovereign wealth fund is rather illustrative. The 14-country group that has such a fund is, by every indicator, far ahead of the 14-country group that does not and, by the financial depth index, even ahead of the group of democracies with little or no inflation targeting experience. This has a straightforward interpretation. Countries that institute fiscal buffers attempt to counter the destructive cycles of commodity prices though converting resource wealth into social welfare (at least in part). They have also managed to achieve a certain reduction in pressure in terms of rent wasting, and are not explicitly expropriatory autocracies. This is evidenced by substantial differences in their financial depth and economic diversification.

Third, both the competitive populism inherent in weak democracies and the expropriatory voluntarism typical of primitive autocracies have similarly negative impacts on price stability and depress economic diversification and financial development. While weak democracies typically have more central bank independence greater exchange rate flexibility than primitive autocracies, the two groups are equally vulnerable to pro-inflationary political and economic risks, most likely regardless of their level of resource wealth. Rather, resource wealth acts to amplify such risks. The former group demonstrates lower average inflation rates for the selected period, but a higher variation in inflation. This may indicate the existence of a political business cycle factor, and its greater significance in democracies as opposed to autocracies. At the same time, a weak democracy is most likely less damaging to economic and financial development than an expropriatory autocracy, as seen from differences in the financial depth and economic complexity indexes.

Fourth, under the inflation criterion, inflation-targeting democracies are not too far behind the more advanced autocracies with sovereign wealth funds, which are able to sacrifice rights and freedoms (specifically, the three democracies with sovereign wealth funds (Norway, Chile, Trinidad and Tobago) improve the inflation outcome of the countries with sovereign wealth funds as a whole, compared to the autocracies alone, which have fiscal buffers at their disposal). Rights and freedoms are fundamentally important for economic diversification and financial development, even when they fall short of guaranteeing complete immunity to pro-inflation populism.

From the standpoint of this paper's focus, the data in Table 1C (see in Appendix C) reinforce the notion that resource wealth is not an impediment to ensuring price stability, and that inflation targeting may be an effective instrumental manifestation of this.

6. CONCLUSIONS

From a theoretical perspective, commodity economies are viewed as being especially vulnerable to terms-of-trade shocks, which are subsequently added to by capital flow shocks. The conventional approach is to mainly analyze the maintenance of price stability in those economies from the perspective of acceptable exchange rate fluctuations, or in terms of a combination of inflexible exchange rates with the accumulation of reserves and/or with the establishment of sovereign wealth funds. The implementation of inflation targeting in many countries has altered the notion of this monetary regime's potential to be used to meet the pro-cyclical challenges that arise from commodity price volatility. For the most advanced inflation targeters, resource wealth and the terms-of-trade shocks that are associated with it are becoming the subject of a growing body of research into the optimal response to supply shocks, thus depriving the resource factor of its status as a special case that complicates the issue of ensuring price stability. However, it is possible that this factor may substantially complicate macroeconomic management. By contrast, in the context of Ukraine's transition to inflation targeting, it is the resource structure of exports that is viewed as a challenge to the central bank's ability to meet inflation targets.

The basic theoretical objection outlined in this paper is that maintaining price stability depends heavily on the distribution of resource rent within a political regime. In and of itself, the resource factor does not pose a challenge to price stability, but rather serves as the driver of a political struggle to capture rent. As a result, price stability is either perturbed as politics shifts towards populism (weak democracies), or maintained as a certain optimal choice (strong democracies), or ensured as reward for citizens' loyalty (prudent autocracies that limit rent wasting), or disrupted as a consequence of a predatory elite's actions (expropriatory autocracies).

The experience of other countries, as analyzed in this paper, shows that the availability of ample natural resources is not an impediment to ensuring price stability, including through conducting an inflation-targeting policy.

A comparison of the chronologies of countries' transitions to inflation targeting and the indicators of their resource wealth does not in general indicate that countries that adhere to this monetary regime have uniquely low levels of commodity dependence. In much the same way, there is no clear evidence that the subsequent transition to inflation targeting requires resource wealth.

Inflation targeters and non-targeters differ in terms of the nature of the link between price stability parameters and structural indicators. Along with this, the role of export structure does not stand out as a defining one, when compared to financial depth, economic complexity, and central bank independence. At the same time, inflation targeters have a much better trade-off between links, according to the majority of the analyzed variables.

The country grouping confirms that commodity economies are heterogeneous, so for the purposes of this study, political regime was chosen as the basic separation criterion (democracy vs. autocracy), while the presence/length of inflation-targeting experience (for democracies) and the existence of sovereign wealth funds (for autocracies) were selected as the functional criterion. Inter-group comparisons unambiguously indicate that the monetary regime for the former and the fiscal regime for the latter are the fundamental determinants of price stability. At the same time, democracies show higher levels of central bank independence, more flexible exchange rates, more diversified economies, and more developed financial systems. The exchange rate regime is an important aspect of the choice between available options. In the first case, its flexibility is linked to its shock-absorbing role and correlates with a deeper financial system. In the other case, counter-cyclical fiscal buffers eliminate the pressure that the terms of trade exert on the exchange rate regime. As a result, it may be less flexible.

The above generalizations imply that resource wealth per se does not represent a challenge to price stability or a factor that impedes the implementation of inflation targeting. The main factor at play here is the presence of a political regime within which price stability is not compromised during the struggle for rent. Because of this, the instrumental maintenance of such stability can be effectively implemented through a monetary regime of inflation targeting and/or a fiscal regime of countercyclical buffers.

Projecting this paper's conclusions onto the domestic situation exposes the critical importance of developing relevant institutions for ensuring price stability in Ukraine, given that it is a commodity-oriented economy. These institutions include, first and foremost, an independent central bank that is oriented towards meeting the objectives of price and financial stability. They also include fiscal regulations and medium-term budget planning to minimize the impact of the government's discretionary decisions on macroeconomic development.

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APPENDIX A

Figure A1. Inflation and financial depth in inflation-targeting countries

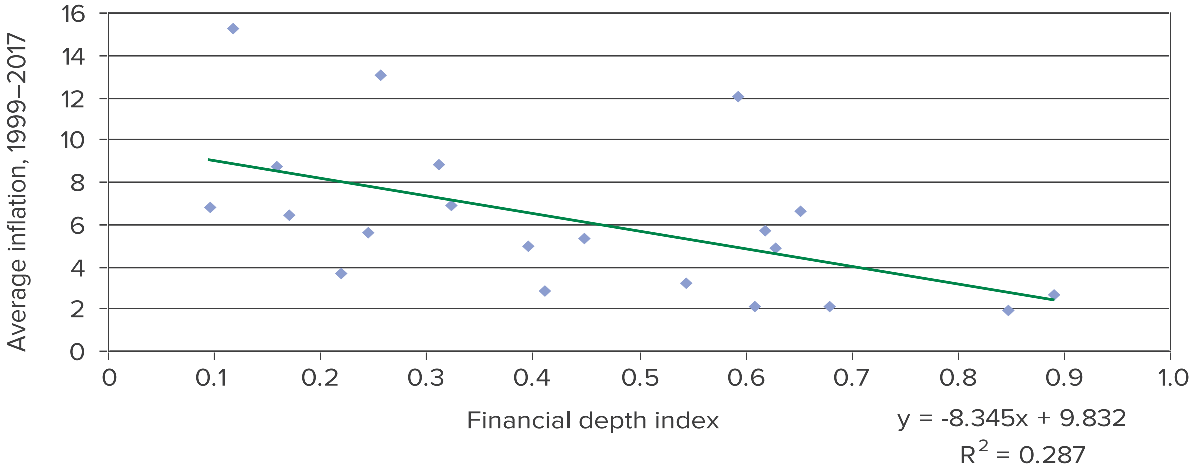


Figure A2. Inflation and financial depth in countries that do not target inflation

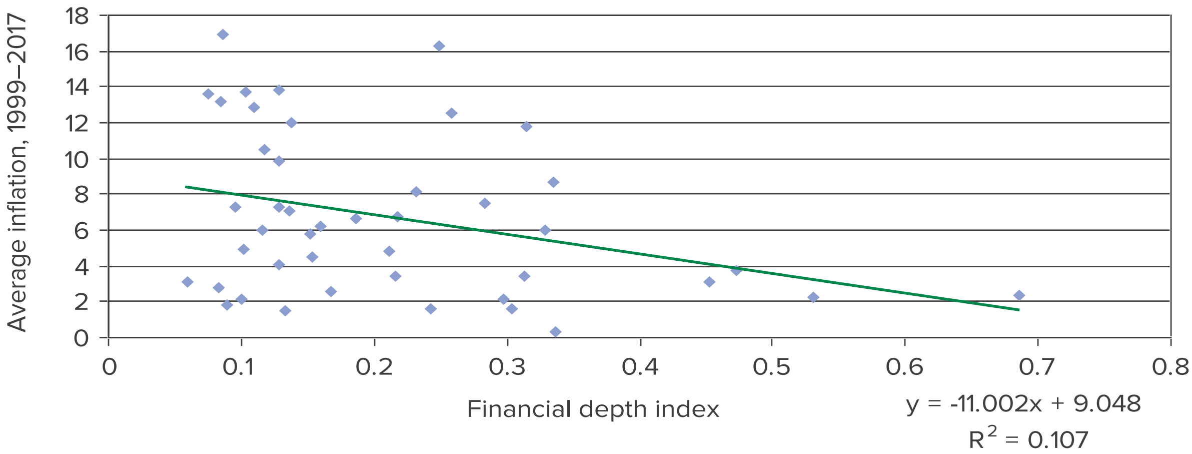


Figure A3. Financial depth and variation in inflation in countries that target inflation

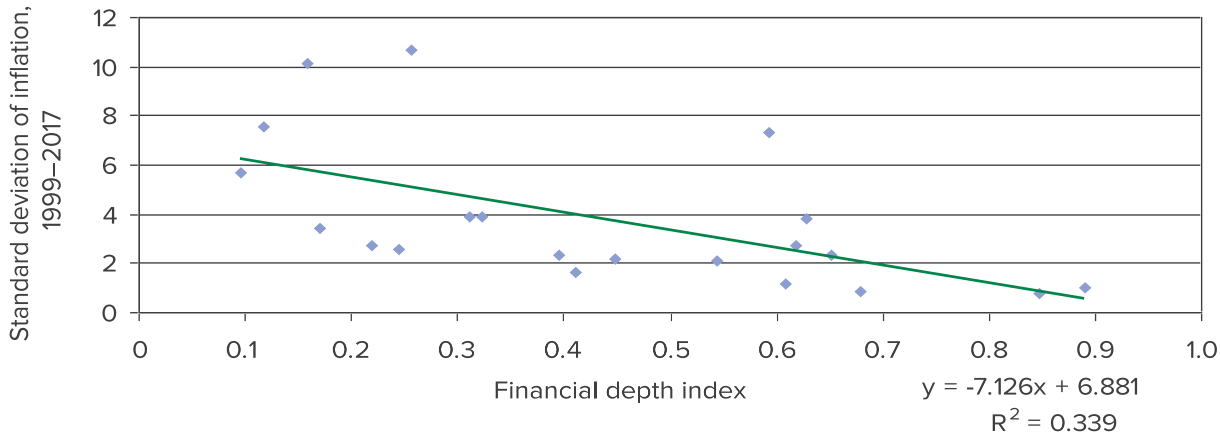


Figure A4. Variation in inflation and financial depth in countries that do not target inflation

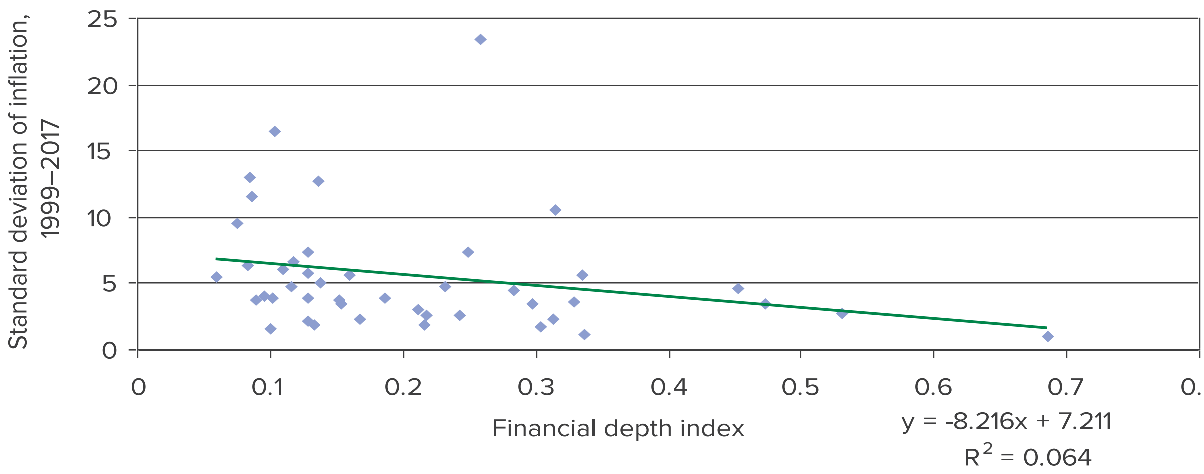


Figure A5. Inflation and economic complexity in inflation-targeting countries

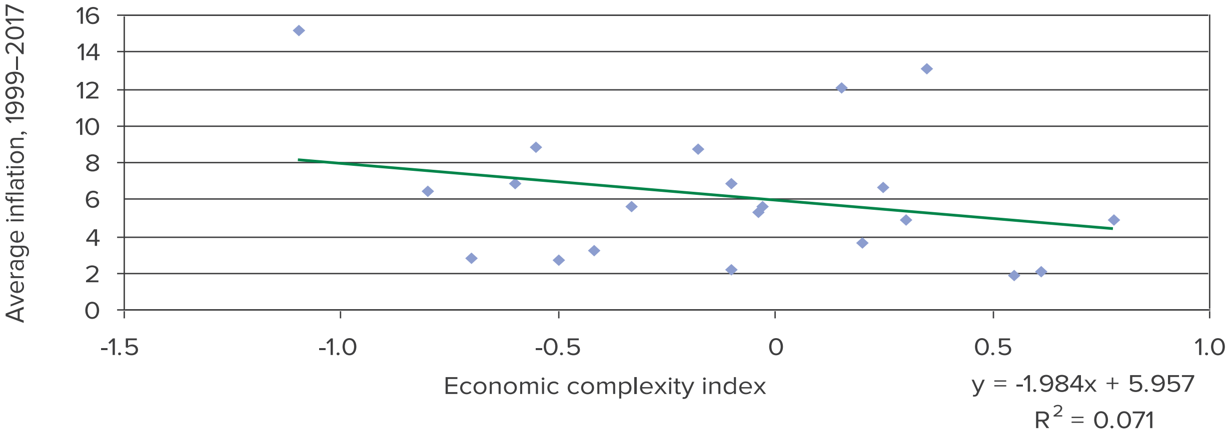


Figure A6. Inflation and economic complexity in countries that do not target inflation

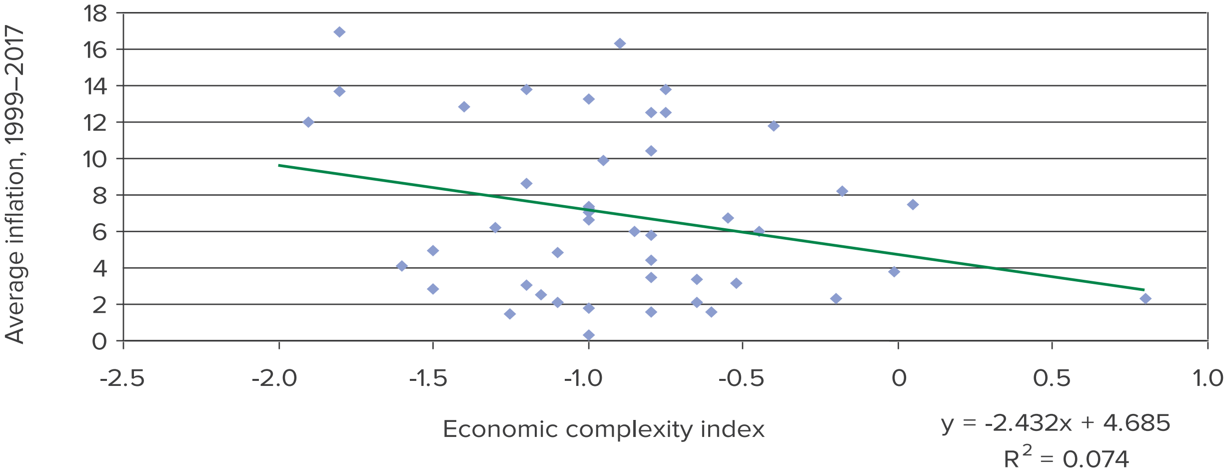


Figure A7. Variation in inflation and economic complexity in inflation-targeting countries

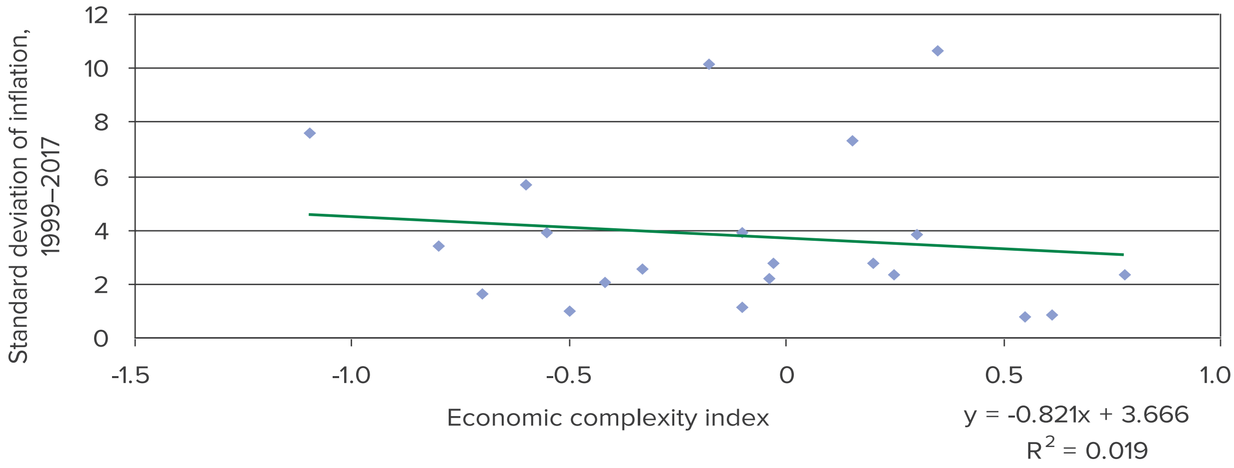


Figure A8. Variation in inflation and economic complexity in countries that do not target inflation

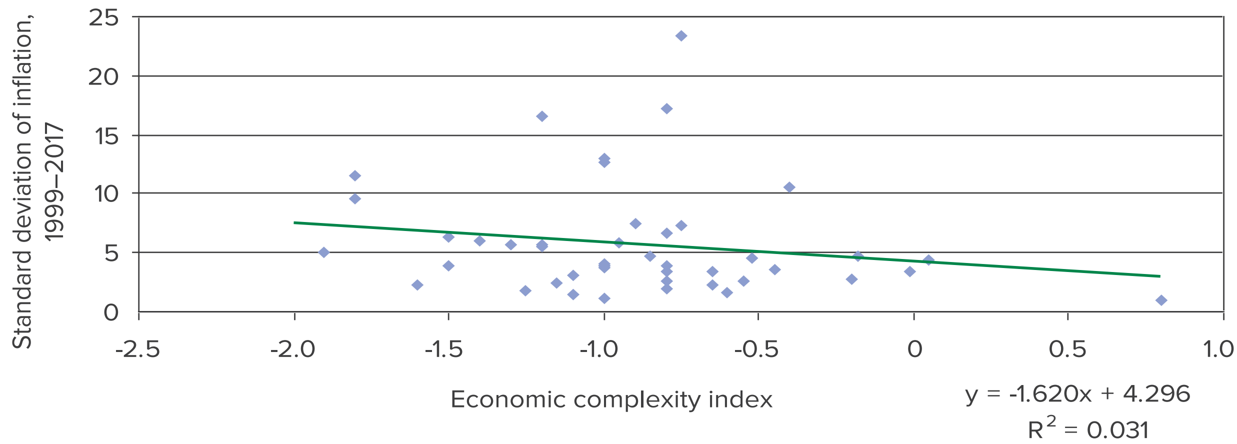


Figure A9. Inflation and central bank independence in inflation-targeting countries

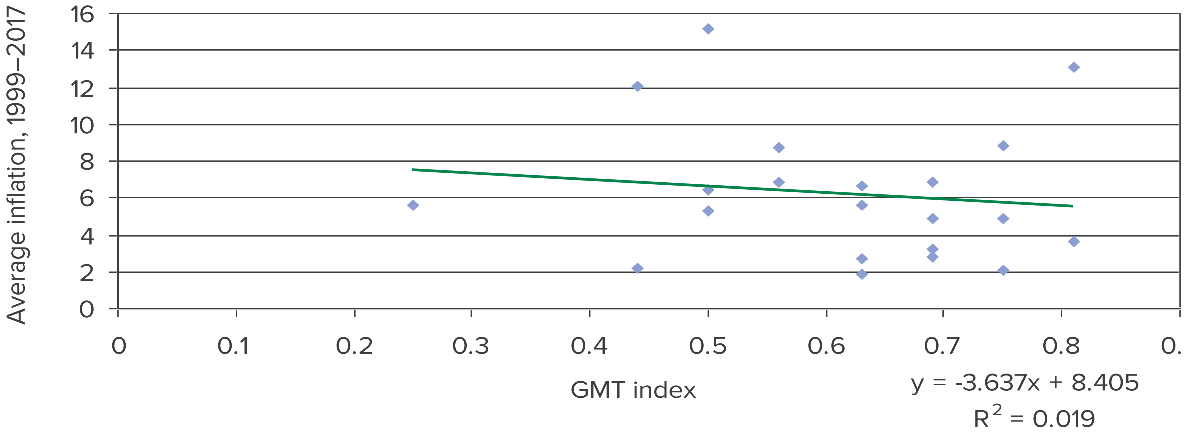


Figure A10. Inflation and central bank independence in countries that do not target inflation

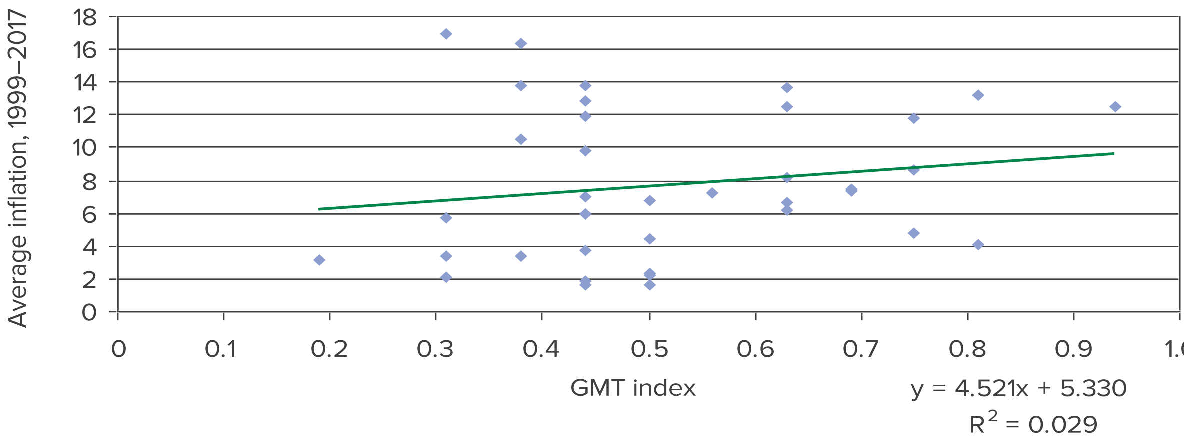


Figure A11. Variation in inflation and central bank independence in inflation-targeting countries

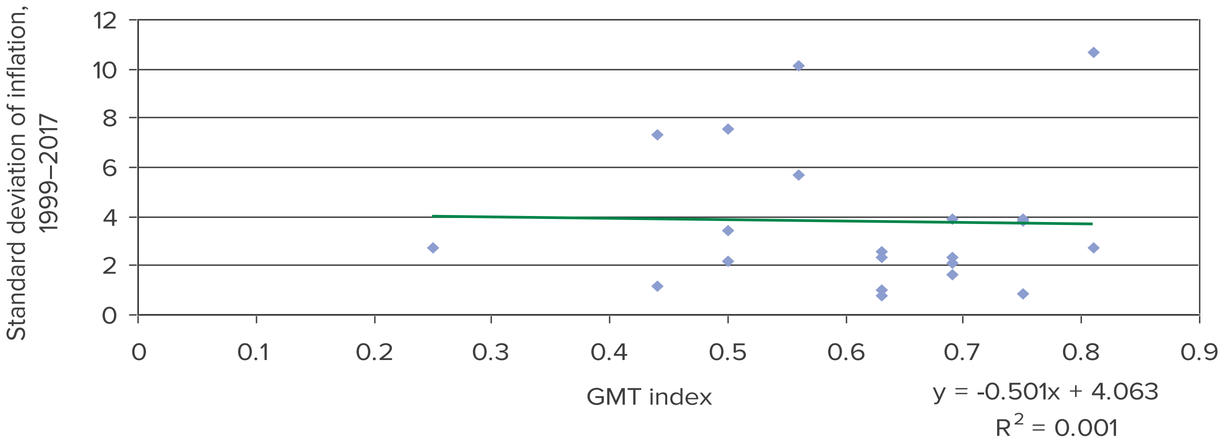
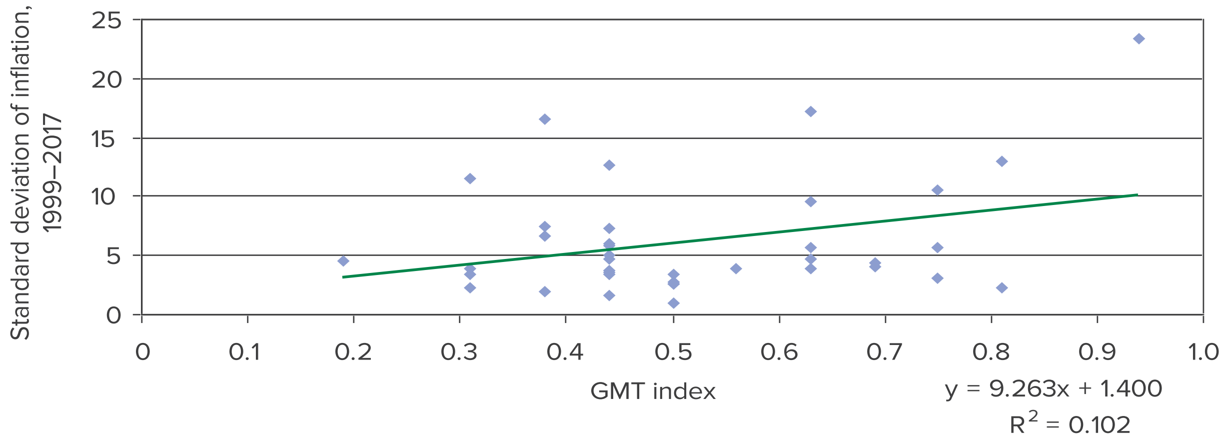


Figure A12. Variation in inflation and central bank independence in countries that do not target inflation



APPENDIX B

Figure B1. Inflation and resource wealth in inflation-targeting countries

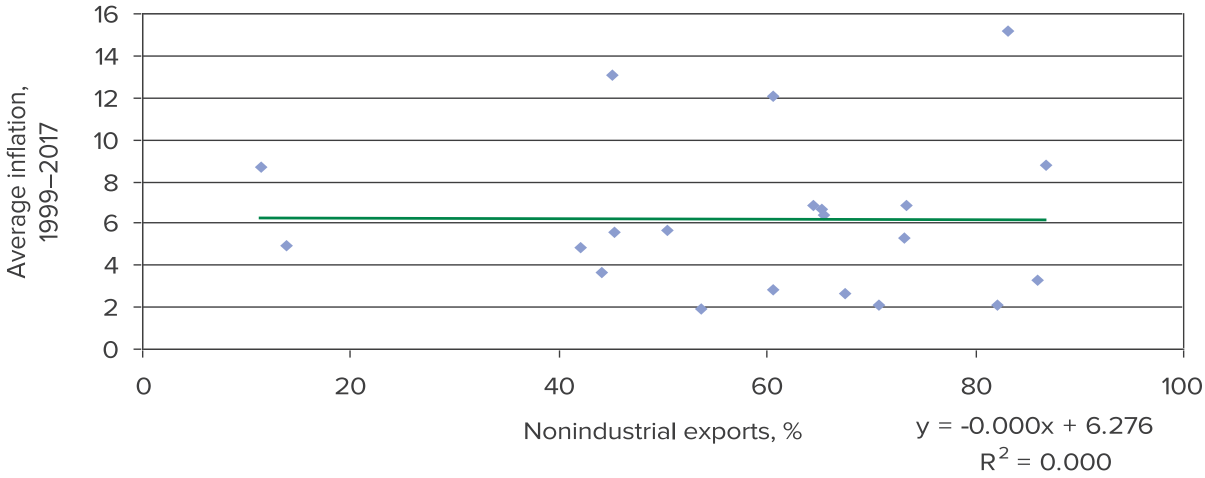


Figure B2. Resource wealth and inflation in countries that do not target inflation (excluding Venezuela and Angola)

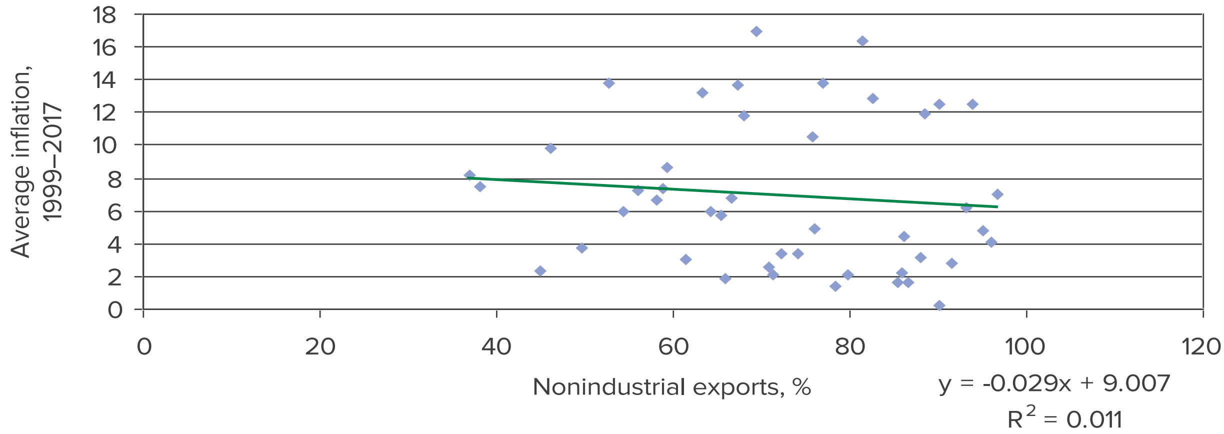


Figure B3. Resource wealth and variation in inflation in countries that target inflation, 1999–2017

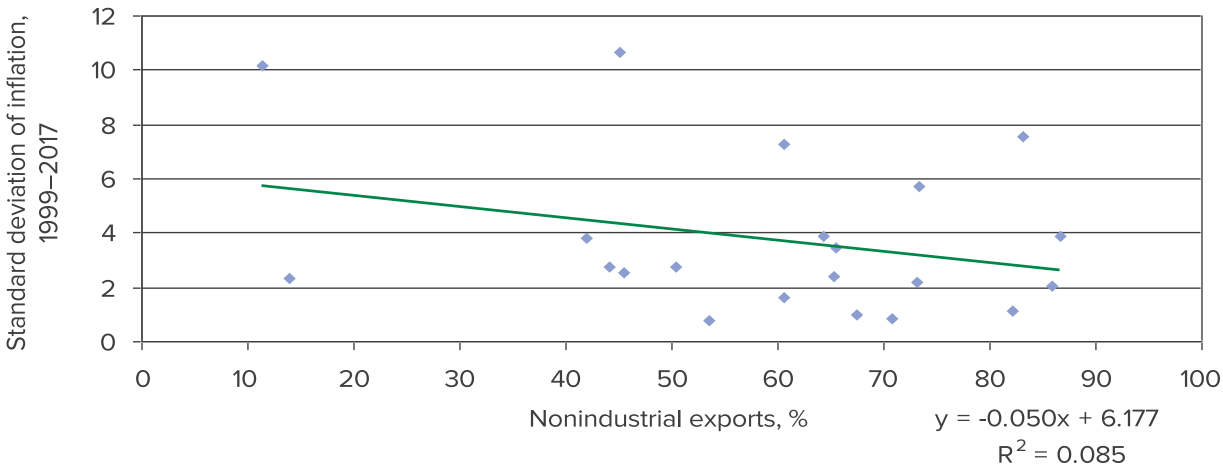
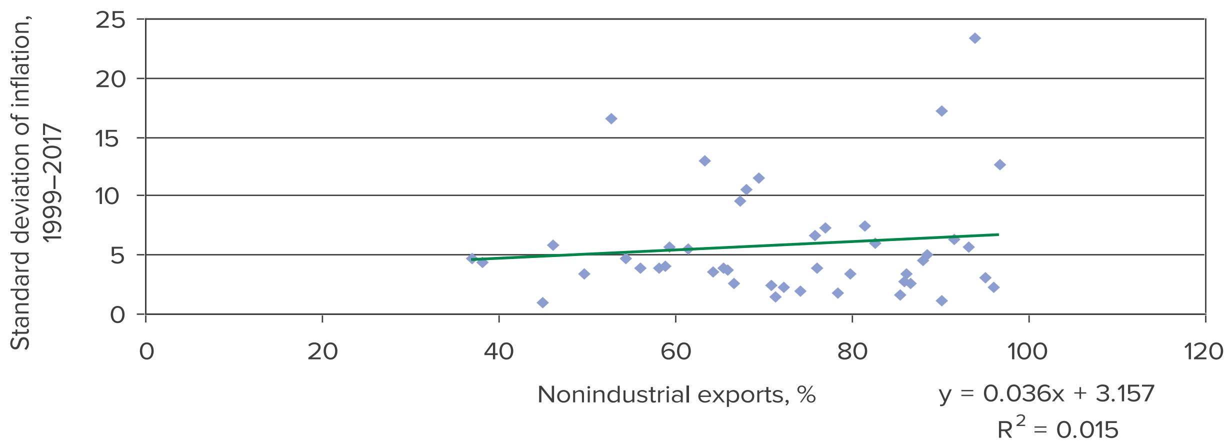


Figure B4. Resource wealth and variation in inflation in countries that do not target inflation (excluding Venezuela and Angola)



APPENDIX C

Table C1. Monetary effects of the commodity cycle by political regime

	Democracies		Autocracies	
	Weak	**Strong**	**Expropriatory**	**Prudent**
Examples	Ukraine, Latin America before the 2000s, Venezuela	Norway, New Zealand, Australia	Angola, Sudan, Syria, Iran	UAE, Saudi Arabia
General description	Competition for rent access. Establishment of such control is unsustainable. Social populism feeds on temporarily captured rent and is a way of sustaining such control	Political institutions are formed that reduce the impact of rent on the existing political process, while rent is distributed according to a certain social optimum	Captured rent is seen as a source of personal wealth and political domination to remove rivals	The political regime helps neutralize the risk of rent wasting and eliminate negotiation costs. Monopolized rent is distributed to support a certain social welfare level to buy loyalty
A propensity to seek an optimal policy mix to neutralize impacts of commodity price volatility	Weak or nonexistent. Discretion constraints by each competitor will be seen as a potential narrowing down of options when taking power	The formation is complete or underway. The policy mix reduces the vulnerability of social welfare to the negative macrofinancial outcomes of the commodity cycle	None. Discretion constraints are incompatible with the very principle of rent conversion into personal wealth	The formation is complete or underway. The policy mix allows for savings that lower the vulnerability to shocks and thereby ensure social welfare to an extent
The political factor of macro-instability	Strong	Weak	Potentially strong	Weak or meager
Monetary effects at the stage of a boom in commodity prices	Inflation acceleration resulting from an extended nominal base of social populism. Overestimation of the real value of the exchange rate and external liabilities	Inflation acceleration is possible. But a combination of policy-mix tools holds back the pro-cyclical effects of commodity price growth	More rapid inflation and growth of external debt, due to a newly apparent possibility to expand the expropriation base	Inflation can accelerate. But a combination of policy-mix tools holds back the pro-cyclical effects of commodity price growth. However, control over budget talks expands options to support the current account surplus
The major line of pressure on the central bank (at the commodity price growth stage)	A tendency towards the blocking of counter-cyclical decisions	Not deemed acceptable	A tendency towards the stimulation of pro-cyclicity	Counter-cyclical decisions are doled out in the context of the application of external asset accumulation instruments
Monetary effects at the stage of a drop in commodity prices	Inflation acceleration as exchange rate falls, and fiscal dominance, which is intensified after the economy is weaned off the “commodity drug”	A certain slowdown is possible due to recession, but a decrease in the exchange rate may raise inflationary pressure somewhat in the case of there being strong spillover effects	More rapid inflation and devaluation on the back of a weakening economy and its inability to adjust to shocks	A balance between inflation, devaluation, loss of external assets, and fiscal expansion to preserve a certain political and social status quo during adjustments to shocks

Table C1. Monetary effects of the commodity cycle by political regime (continuation)

	Democracies		Autocracies	
	Weak	**Strong**	**Expropriatory**	**Prudent**
The major line of pressure on the central bank (at the commodity price deflation stage)	A tendency towards supporting economic stimulus measures. Pro-cyclical manifestation of social populism	Not deemed acceptable	A tendency towards economic stimulus to restore the former scale of expropriation	Stimuli are doled out in the context of optimizing the trajectory of external assets reduction
Consequences for inflation	Rapid and unstable	Slow, with low volatility	Rapid and unstable	Slow, with low volatility
The set of policy-mix options	From fixed exchange rate to a technically independent central bank. Discretionary fiscal policy	Price stability (inflation targeting), flexible exchange rates, fiscal regulations (+ fiscal buffers)	Transitional exchange rate regimes, low central bank independence, discretionary fiscal policy	Price stability is achieved through limited exchange rate fluctuations, counter-cyclical fiscal buffers, and external asset accumulation