

Oil Price Volatility and Latin American Growth

Working paper

April 2024

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Abstract

Understanding the intricate relationship between oil price volatility and economic growth is essential for policymakers and investors seeking to develop effective policies to promote sustainable development and reduce vulnerabilities in the Latin American region. Our aim of this research paper was to analyze this relationship by accounting for the unique characteristics of the region, including both oil-producing countries and net oil importers, and comparing it with other regions worldwide. Our results revealed that the surge in oil prices following the pandemic has directly impacted the economic growth of Latin America. However, the economic growth of advanced economies has a more significant influence on Latin America's growth compared to that of other regions. Furthermore, we examined the potential implications of oil price volatility for inflation levels within countries, and we analyze the relationship between oil prices and the profitability of oil-producing firms based on microeconomic data, which elucidates the overall impact of oil price volatility on the region's economic growth.

JEL Codes: F43, Q02, Q11, N16.

Keywords: Economic Growth, Commodities Market, Oil Prices, Latin America.

¹ We thank Cristian Huertas and Juan Camilo Sánchez for research assistance.

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In Memoriam

We pay tribute to our esteemed colleague, Philip Turner, who has left an irreplaceable void in the scientific community with his untimely passing. Philip played a significant role in this work by contributing his expertise, insights, and unwavering dedication.

Philip's academic life was marked by his intellectual brilliance and passion for research. He approached scientific inquiry with a profound curiosity and a commitment to excellence that inspired us all. Philip was a close collaborator with FLAR and was a highly inquiring researcher about specific topics in our region. In recent years, Philip contributed to multiple activities at FLAR, including blogs, webinars, and research papers.

In addition to his scholarly achievements, Philip was a cherished friend and colleague known for his kindness and generosity. His absence will be deeply felt, and his legacy will continue to influence and inspire us.

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1. Introduction⁵

Oil prices are a critical determinant of economic growth, both globally and regionally. Changes in oil prices can affect the price level, inflation rate, exchange rates, and output of an economy, among other variables. Oil price volatility can significantly impact economic growth, as it creates uncertainty and reduces investment and consumption.

In Latin America, oil price volatility has been a constant concern for many countries, as the region comprises both significant oil producers and net oil importers. Countries such as Venezuela, Brazil, Mexico, Colombia, and Ecuador are heavily dependent on oil production to generate revenue and support their domestic economies. In contrast, countries such as Argentina, Chile, and Costa Rica are net oil importers, and lower oil prices can support their economic growth by reducing their imports. The impact of oil price volatility on economic growth in Latin America can also depend on a country's level of economic development, energy policies, governance structures, and technological capabilities.

Moreover, the relationship between oil prices and economic growth can have different effects in the short and long run, and the impact of oil prices on economic growth can depend on both the levels and the volatility of oil prices. Understanding the dynamics of this relationship is critical for policymakers and investors who seek to develop effective policies to promote economic growth, reduce vulnerabilities, and promote sustainable development in the region.

Against this background, we aimed to examine the relationship between oil price volatility and economic growth in Latin America, considering the particularities of the region. We analyzed the impact of oil prices on economic growth in selected Latin American countries, including oil-producing countries and net oil importers, as well as the region as a whole, for comparison with other regions worldwide.

According to our analysis, the increase in oil prices after the pandemic directly impacted gross domestic product (GDP) growth in Latin America. Nevertheless, our research has also revealed that the economic growth of advanced economies has a more significant influence on Latin America's growth than on that of other regions. Indeed, the economic growth of advanced economies is the most significant determinant of the growth of Latin American countries when we analyze them separately. The last finding is particularly pronounced in countries that are net oil exporters in the region. These results are consistent with previous research studies conducted on the subject, such as Österholm, P., and Zettelmeyer, J. (2008).

⁵ The opinions in this paper are those of the authors and do not reflect those of FLAR or its Board of Directors.

The relationship between oil prices and economic growth can be complex and depends on various factors, such as the level of oil dependence, the elasticity of demand for oil, and the ability of countries to adapt to changes in oil prices. Additionally, the impact of oil prices on economic growth can vary across countries and regions depending on their level of oil production and consumption, Hamilton, J. D. (2003), Jiménez-Rodríguez, R., and Sánchez, M. (2005), Bergmann, P. (2019).

The relationship between these two variables is not necessarily symmetric. When oil prices increase, the negative impact on the economic growth of net importer countries tends to be greater than the positive impact when oil prices decrease. This is because the costs of production and consumption tend to be more sensitive to increases in oil prices than decreases, Lee, K., Ni, S., and Ratti, R. A. (1995).

The impact of changes in oil prices on economic growth depends on several factors, including the direction and magnitude of the change in oil prices, the level of oil dependence, and the elasticity of demand for oil. Moreover, the relationship is bidirectional, with changes in economic growth affecting oil prices and changes in oil prices affecting economic growth, Lee, K., Ni, S., and Ratti, R. A. (1995), Jiménez-Rodríguez, R., and Sánchez, M. (2005), Mendoza, O., and Vera, D. (2010), Al-Yousef, N. (2018), Raheem, I. D., and Olabisi, N. O. (2019), Charfeddine, L., Klein, T., and Walther, T. (2020), Kisswani, K. M. (2021), Adeosun, O. A., Tabash, M. I., and Anagreh, S. (2022), Sha, Z. (2022).

This relationship can vary depending on whether a country is a net oil importer or exporter. Net oil-exporting countries tend to benefit from higher oil prices, as this leads to increased export revenues, which can boost their economic growth. Conversely, net oil-importing countries tend to be negatively affected by higher oil prices, as this increases the cost of importing oil, which can reduce consumer spending and business profits, leading to slower economic growth. Jiménez-Rodríguez, R., and Sánchez, M. (2005), Berument, M. H., Ceylan, N. B., and Dogan, N. (2010), Taghizadeh-Hesary, F., Yoshino, N., Mohammadi Hossein Abadi, M., and Farboudmanesh, R. (2016), Bergmann, P. (2019), Souza, R. D. S., and de Mattos, L. B. (2022), Pekarčíková, K., Vaněk, M., and Sousedíková, R. (2022).

However, the relationship is not always straightforward, as some net oil-importing countries may have a significant oil industry that benefits from higher prices, while some net oil-exporting countries may have inefficient governance structures that prevent them from benefiting fully from high oil prices.

Therefore, the impact of oil prices on economic growth depends on several factors, including a country's level of oil dependence, its position as a net oil importer or exporter, the efficiency of its oil industry, its level of economic development, and its governance structures, among others.

Additionally, this relationship can have different effects in the short and long run. In the short run, oil price changes can significantly impact economic growth, as they affect the cost of production and consumption. However, in the long run, the impact of oil prices on economic growth can be more complex. For instance, higher oil prices may encourage investment in alternative energy sources, leading to a shift from oil dependence and reducing the impact of oil price fluctuations on economic growth. Similarly, lower oil prices may reduce incentives for alternative energy investment, leading to a delay in the transition from oil dependence. Mendoza, O., and Vera, D. (2010), AZIZ, M. I. A., and Dahalan, J. (2015), Al-Yousef, N. (2018), Raheem, I. D., and Olabisi, N. O. (2019).

Moreover, in the long run, changes in oil prices can affect the balance of payments, inflation expectations, and investment decisions, which can significantly impact economic growth. Therefore, while oil price changes can immediately impact economic growth, the long-term effects can depend on several factors, including a country's level of economic development, energy policies, technological capabilities, and governance structures.

Not only do oil price levels affect economic growth, but volatilities in oil prices can create uncertainties for businesses and consumers, making it more difficult to plan and make investment decisions. For instance, sudden increases in oil prices can lead to higher inflation, lower consumer spending, and slower economic growth, while sudden decreases in oil prices can have opposite effects on these variables. This volatility can create instability and uncertainty, making it difficult for businesses and consumers to make long-term plans and investments. Rafiq, S., and Salim, R. (2014), Raheem, I. D., and Olabisi, N. O. (2019).

Oil prices have experienced large fluctuations over the past three years and remain high. Brent crude oil price reached a low of under \$68 per barrel at the end of 2019 but then plummeted when the COVID-19 pandemic hit. War-related tensions, however, pushed oil prices back up and, by late 2021, had risen well above pre-pandemic levels. Since mid-2022, oil prices have fallen sharply.

To gain a deeper understanding of this topic, we used the International Monetary Fund (IMF) database, which covers 196 countries and spans from 1980 to 2021. This resulted in approximately 7,000 global observations, with 1,300 of those being in Latin America. We employed these data points and additional control variables to construct large panel datasets. This enabled us to create several subsamples of countries to compare the relationship between oil prices and economic growth in Latin America with that in other regions.

Furthermore, after delving more deeply into the impact of oil prices on economic growth, we analyzed other potential implications of oil price volatility for inflation levels within countries. Additionally, utilizing microdata

from oil companies globally, we examined the relationship between oil prices and the profitability of oil-producing firms, which are often viewed as significant contributors to economic growth in certain economies.

2. GDP growth and oil prices in Latin America

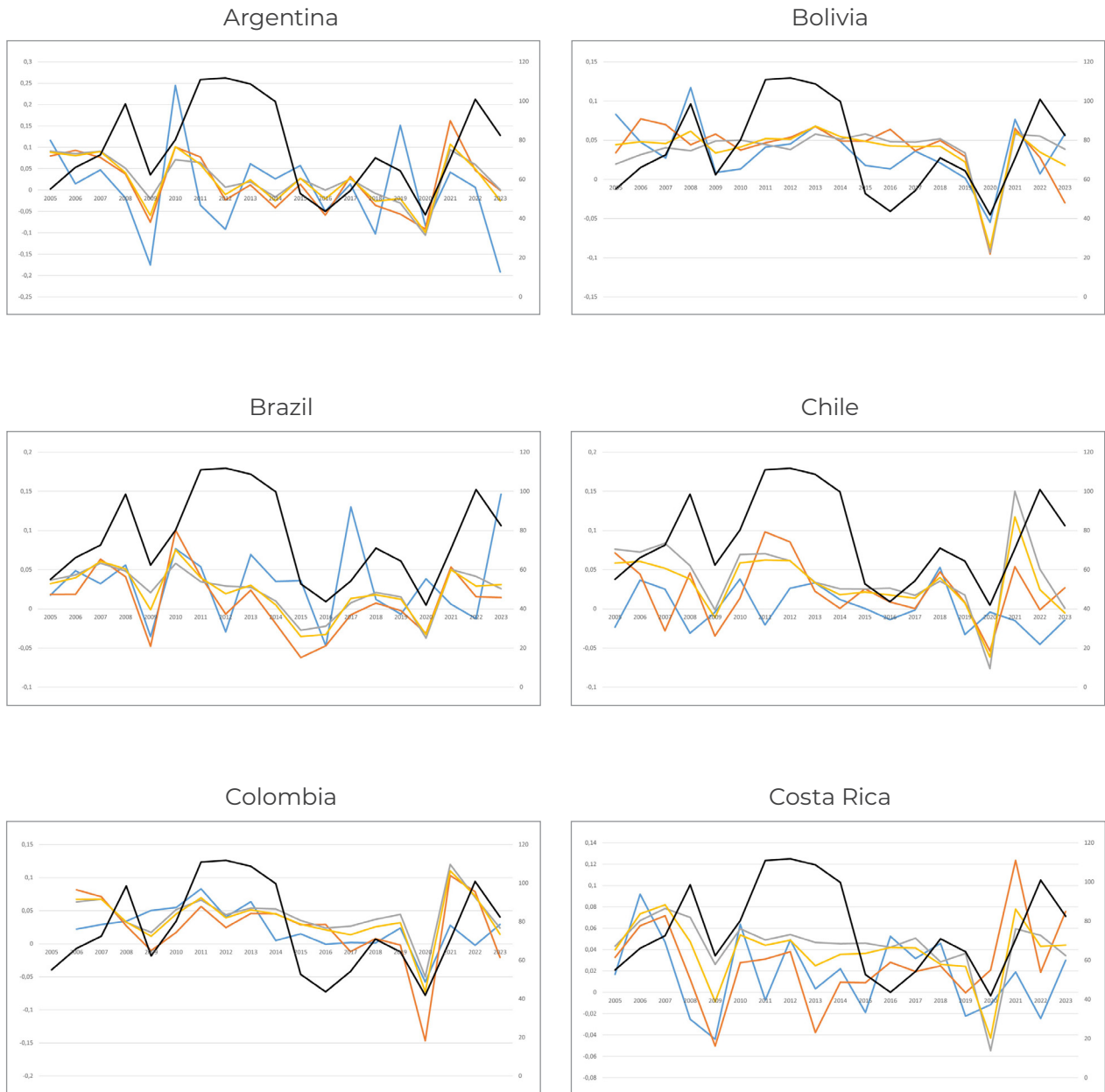
Latin America is widely recognized for its production and export of commodities. A fundamental question that has long been asked is the extent to which fluctuations in commodity prices impact the region's gross domestic product (GDP). The answer to this question is contingent on several factors, including the size of the commodity sector, the trade balance of commodities, and the level of production and export diversification. Consequently, each Latin American country exhibits a unique relationship between commodity prices and GDP.

To examine the relationship between oil prices and the business cycle in FLAR+3⁶ countries, **Figure 1** displays the GDP growth of these countries by added sectors. Despite the significance of oil production in the region, it does not constitute a substantial portion of the GDP in many countries. As a result, the impact of oil price fluctuations on production in these countries is not always significant. However, the figure shows that some commodity-producing countries, including Colombia, Ecuador, Bolivia, and Chile (although copper is Chile's primary commodity, and the correlation coefficient between oil and copper prices is 0.85), exhibit a direct relationship between their GDP and the oil price cycle. In contrast, countries such as Brazil and Mexico, which boast the largest oil companies in the region, do not show any clear relationship between economic growth and oil prices due to their vast and diversified economies.

Nonproducing oil countries, such as Costa Rica, Uruguay, and Paraguay, do not reveal a distinct pattern. However, the countercyclical relationship is evident in some years, predominantly within the secondary sector. This observation aligns with the factors mentioned above, as GDP depends on many variables beyond just oil prices.

⁶ FLAR+3 countries are the FLAR member countries (Bolivia, Colombia, Costa Rica, Ecuador, Paraguay, Peru, Uruguay, and Venezuela) plus the four greatest nonmember countries (Argentina, Brazil, and Mexico), representing 95% of Latin America GDP. Throughout this article, we use "FLAR+4" and "Latin America" interchangeably.

Figure 1. GDP Growth by Country Added Sector and Oil Prices (USD per barrel)





Source: IMF and countries' national accounts.

The findings above suggested that the impact of oil prices in the Latin American region could have another channel propagation through countries' external accounts, specifically through terms of trade. Other possible channels are the fiscal accounts of countries that are affected by state ownership of several commodity companies and the subsidization of gasoline prices.

The external sector appears to be closely linked to the commodity price cycle, which portrays the relationships among the most important countries in Latin America. However, importantly, the relationship between commodity prices and countries' external accounts is highly particular and contingent on various factors. Although one might assume that high commodity prices would enhance the external accounts of commodity producers, a negative effect exists due to the income effect and the appreciation of the exchange rate, which increases imports and negatively impacts external accounts.

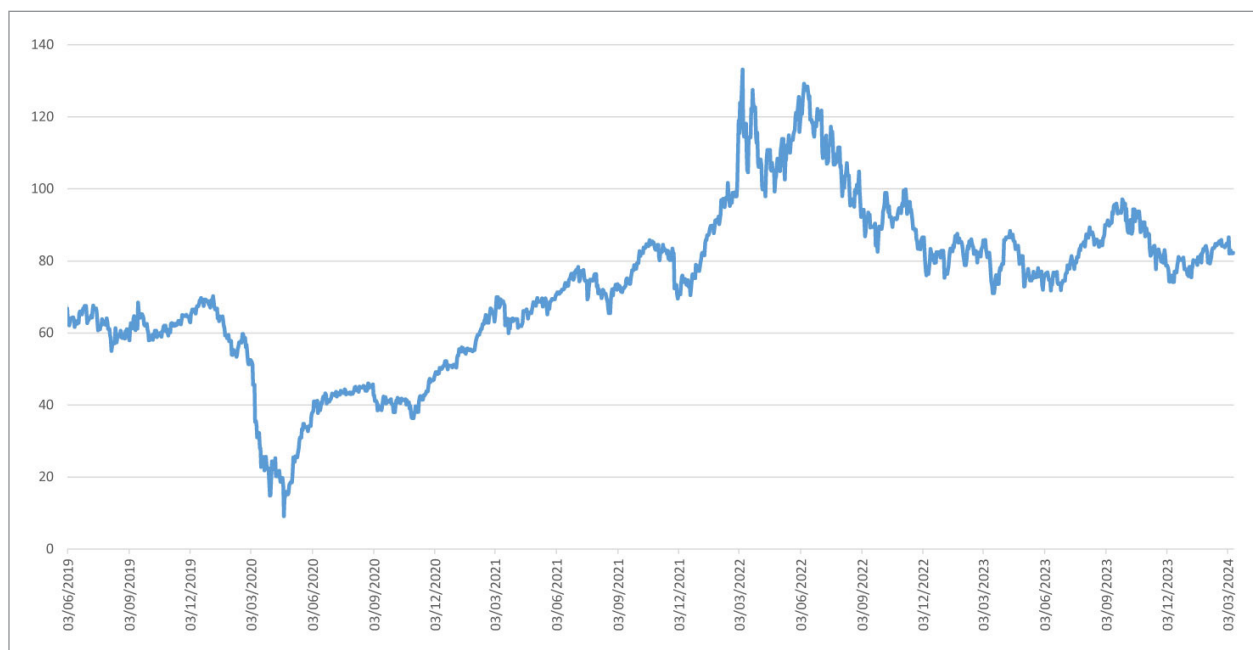
The impact of oil prices on economic growth constitutes a more direct channel than the first one on the external sector. The effects of oil price fluctuations on Latin American countries are crucial, especially considering that the region is widely recognized as a significant exporter of various commodities, including oil. Therefore, it is imperative to understand the implications of oil price changes for regional economic growth.

3. Data

We relied on the International Monetary Fund (IMF) database as the primary data source, which includes data from 196 countries spanning from 1980 to 2021. The dataset comprises approximately 7,000 worldwide observations, including approximately 1,300 observations in Latin America. We analyzed multiple macroeconomic variables, including GDP, GDP growth, consumer price index, commodity price index, current account, trade balance, terms of trade, and exchange rate. In addition to this dataset, we utilized S&P Capital IQ and Bloomberg as additional sources to supplement the data on commodity prices and financial indicators of commodity-producing firms. These diverse sources of data were then employed to create a comprehensive panel database to examine the relationship between oil prices and GDP growth in various subsamples of countries. Moreover, we aimed to compare the relationship between oil prices and economic growth in Latin America with that in other regions.

Oil prices have experienced significant fluctuations in the past three years and continue to remain high (Figure 2). The Brent price reached its lowest at just under \$68 per barrel at the end of 2019, but it plummeted when the COVID-19 pandemic hit. War-related tensions, however, pushed oil prices back up, and by late 2021, they had risen well above prepandemic levels. Since mid-2022, oil prices have sharply declined.

Figure 2. Brent Spot Price

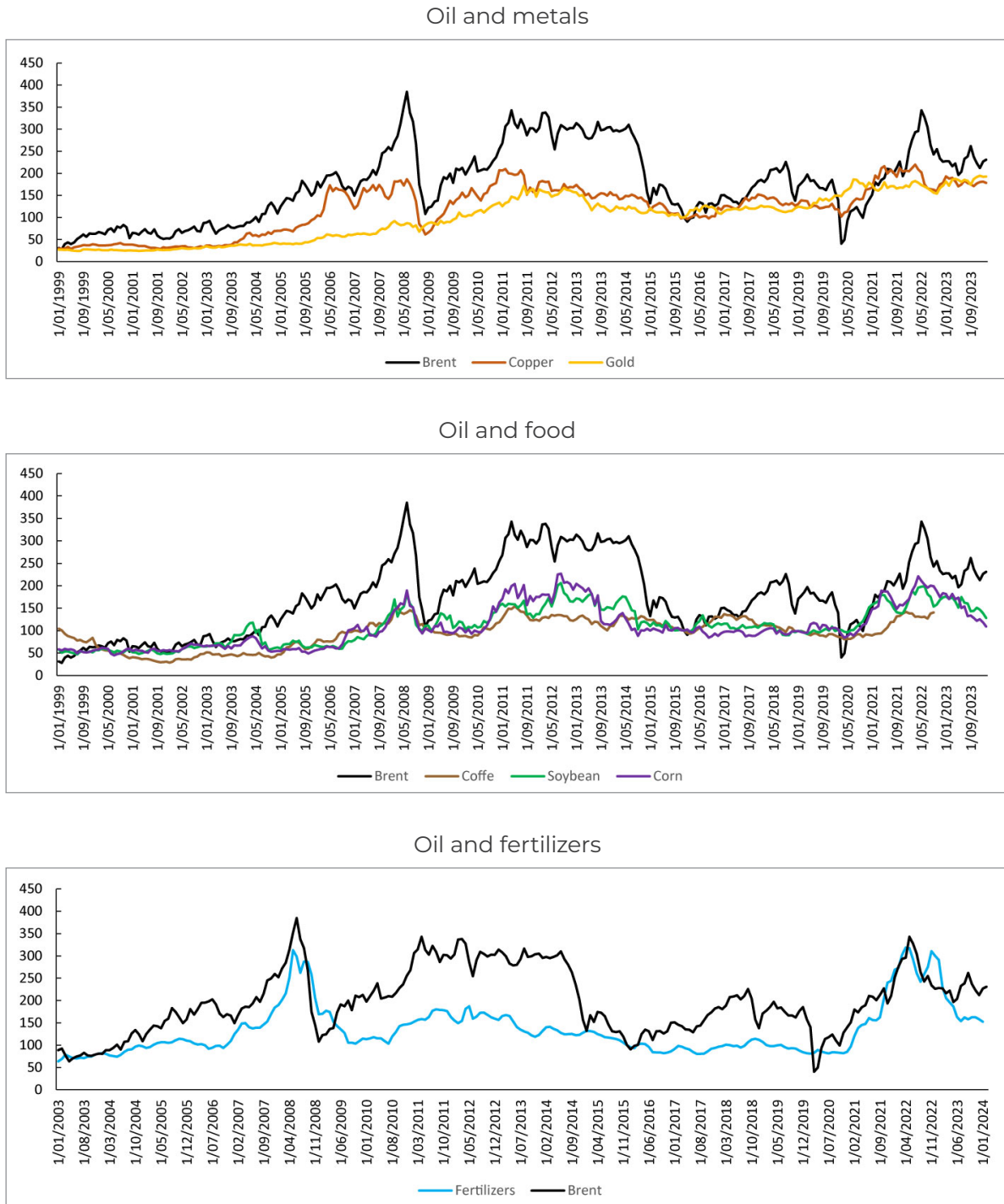


Source: EIA.

Oil is crucial as a primary commodity produced in the region; however, other essential commodities, such as copper, gold, and soybean, are also important. We analyzed the interrelationship between oil prices and other commodities generated in the region to examine potential correlations.

Figure 3 provides a depiction of the evolution of commodity prices and their association with oil prices (Brent reference). All commodity prices exhibited clear comovements with oil prices. To provide a more detailed understanding of the correlation among commodity prices, **Table 1** presents a correlation matrix. According to the data presented in the table, most of the commodities display a positive correlation greater than 0.7, except a few instances, such as the correlation between gold and fertilizers or between fertilizers and copper. The latter could be attributed to the limited length of the fertilizer price series.

Figure 3. Commodity Prices and Their Relation to Oil Prices



Source: S&P Capital IQ.

Table 1. Commodity Price Correlation Matrix

Commodity price	Brent	Copper	Fertilizers	Corn	Soybean	Coffee	Gold
Brent	1.00						
Copper	0.84	1.00					
Fertilizers	0.69	0.55	1.00				
Corn	0.81	0.80	0.70	1.00			
Soybean	0.82	0.81	0.63	0.93	1.00		
Coffee	0.77	0.82	0.61	0.76	0.78	1.00	
Gold	0.65	0.82	0.31	0.80	0.82	0.75	1.00

Source: Own calculations.

To conduct a comprehensive examination of commodity price correlation, a rolling correlation of daily prices was handled yearly. The findings were highly heterogeneous. Specifically, the correlation between metal commodities and oil prices showed a marked increase during some stress periods, while the correlation between food commodities and oil prices decreased during the same periods. Notably, copper demonstrated a significant correlation across the considered time frame. Furthermore, the correlation between gold and copper appeared greater during select stressful years, although this association was not consistently observed. As a distinctive commodity, gold serves as a store of value, a pivotal characteristic during periods of financial turmoil. Moreover, the correlations between the three food commodities (soybean, corn, and coffee) increased during times of crisis; however, their associations fluctuated in different directions over the remaining years without a discernible pattern.

4. Results

We followed the approach of Pesaran et al. (1999) to estimate a dynamic panel data model where y_{it} is the dependent variable, \mathbf{X}_{it} is the vector of explanatory variables (regressors), u_i represents the fixed effects and ε_{it} is the error term.

$$y_{it} = \sum_{j=0}^q \delta'_{ij} \mathbf{X}_{i,t-j} + u_i + \varepsilon_{it} \quad (1)$$

In this section, we present the first set of regressions that analyzed the relationship between GDP growth and explanatory variables, such as the economic growth of advanced economies and oil price growth. The dependent variable considered was GDP growth, while the explanatory variables were represented by the economic growth of advanced economies, proxied by the GDP growth of economies that belonged to the G7 group and the growth of oil prices. The regressors were identified with two lags to study the persistence of their effects over time.

The presented data in **Table 2** display the estimation for GDP growth and oil prices for all countries included in the sample. Notably, the contemporary GDP growth of advanced economies exhibited a strong association with the GDP growth of individual sets of economies. Furthermore, the growth of oil prices directly impacted the GDP growth of the fourth group of countries in the sample, which comprised the world, advanced, emerging, and Latam economies. However, this effect was smaller than that of G7 growth.

Table 2. GDP Growth and Oil Prices (Dependent variable: GDPgrowth)

VARIABLES	(1)	(2)	(3)	(4)
	World	Advanced	Emerging	Latam
G7Growth	0.775*** (0.0575)	1.112*** (0.0958)	0.703*** (0.0684)	1.048*** (0.172)
G7Growth (-1)	-0.0639 (0.0435)	0.0844 (0.0737)	-0.0925* (0.0525)	-0.0806 (0.0809)
G7Growth (-2)	-0.0585 (0.0569)	0.0901* (0.0454)	-0.0935 (0.0720)	-0.204* (0.107)
Oilpricegrowth	0.0148*** (0.00283)	0.0113*** (0.00327)	0.0155*** (0.00354)	0.0168*** (0.00424)
Oilpricegrowth(-1)	0.0190*** (0.00362)	0.00392 (0.00358)	0.0234*** (0.00452)	0.0233*** (0.00672)
Oilpricegrowth(-2)	0.0192*** (0.00297)	0.00757** (0.00368)	0.0230*** (0.00368)	0.0177*** (0.00509)
Constant	1.732*** (0.197)	0.0374 (0.251)	2.123*** (0.241)	0.793 (0.574)
Observations	7,152	1,461	5,463	1,316

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In some instances, the lags of G7 GDP growth demonstrated significance; however, their signs were unexpected. On the other hand, the lags of oil price growth exhibited a high level of persistence in their impact, even up to three periods after the initial occurrence. Although the effect of this variable was small in magnitude, it appeared to be similar in many cases to the contemporary impact of the variable on GDP.

The impact of G7 growth on the advanced and Latam economies was comparatively greater. This outcome could be attributed to the synchronization of the economic cycle that occurs in many instances among advanced economies, which is expected to influence the first group of countries. Additionally, the results emphasized the significance of the demand effect of developed economies on the Latam countries, which was more influential than the impact of commodity prices.

The comparative analysis of emerging market countries vis-à-vis Latam countries presents an intriguing subset for exploration. **Table 3** provides estimates of GDP growth and oil price growth for oil exporters (specifications 1, 2, and 3) and nonoil exporters (specifications 4, 5, and 6) within the category of emerging economies. Notably, the GDP growth of advanced economies continued to substantially influence the GDP growth of these countries. Specifically, the contemporaneous effect of the variable had the most significant and positive impact on increasing the GDP of these countries. However, emerging economies that do not export oil exhibited a significant negative impact in the first or second lag of the variable.

The impact of oil price growth had several noteworthy outcomes. For emerging oil exporters, the growth of oil prices positively influenced the GDP growth of these nations, with a lasting effect observed for up to three periods. Furthermore, this impact persisted robustly, even when considering the effect of G7 GDP growth. Conversely, emerging economies that do not export oil exhibited a contemporary effect of oil prices on GDP growth that was both positive and significant when oil prices were considered in isolation. This effect may reflect an indirect impact of GDP growth on oil prices. However, when G7 GDP growth and oil prices were considered, this effect was not consistent and appeared to yield some counterintuitive results.

Table 4 displays the findings derived from the partitioning of Latin American countries into oil exporters (specifications 1, 2, and 3) and nonoil exporters (specifications 4, 5, and 6), which were subjected to estimations. Notably, the foremost factor influencing the economic growth of the aforementioned countries was the current GDP growth of advanced economies. Additionally, the analysis revealed that the growth of oil prices significantly impacted the economic growth of the region, with a persistent effect observed over three distinct periods.

Table 3. GDP Growth and Oil Prices in EMEs (Dependent variable: GDPgrowth)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EMEs oil exporters			EMEs nonoil exporters		
G7Growth	0.637*** (0.112)		0.699*** (0.130)	0.704*** (0.0772)		0.747*** (0.0834)
G7Growth (-1)	-0.0842 (0.0933)		-0.131 (0.136)	-0.0433 (0.0474)		-0.0932* (0.0518)
G7Growth (-2)	-0.131 (0.152)		-0.132 (0.197)	-0.108** (0.0417)		-0.0952* (0.0521)
Oilpricegrowth		0.0473*** (0.00758)	0.0262*** (0.00790)		0.0299*** (0.00349)	0.00903** (0.00350)
Oilpricegrowth(-1)		0.0198*** (0.00701)	0.0325*** (0.0108)		0.00436 (0.00283)	0.0171*** (0.00311)
Oilpricegrowth(-2)		0.0255*** (0.00870)	0.0382*** (0.00917)		0.000497 (0.00380)	0.0143*** (0.00339)
Constant	2.568*** (0.422)	2.974*** (0.0952)	2.063*** (0.477)	2.323*** (0.217)	3.292*** (0.0379)	2.115*** (0.233)
Observations	1,616	1,586	1,586	3,548	3,475	3,475

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The analysis indicated that the increase in oil prices had a positive and statistically significant association with oil-exporting and non-oil-exporting nations in Latin America. This observation could be attributed to the high degree of correlation between the prices of various commodities exported from the region and the price of oil. Latin America is widely renowned for its significant role as a commodity exporter, with a considerable proportion of non-oil-exporting countries also exporting commodities such as copper or soybeans that are strongly linked to fluctuations in oil prices.

However, it was evident that the growth of oil prices had a more profound and enduring impact on the economic growth of oil-exporting countries in the Latin American region. Conversely, the impact of oil prices on nonoil exporting countries was significant only in its contemporary effect when oil prices were analyzed in isolation from other growth-related variables. This contemporaneous effect may be attributed to the influence of global economic growth on oil prices. In contrast, when growth variables were accounted for, the contemporary effect of oil prices was found to be less pronounced, but its impact became more persistent over time.

Table 4. GDP Growth and Oil Prices in Latin America (Dependent variable: GDPgrowth)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	EMEs oil exporters			EMEs nonoil exporters		
G7Growth	0.816**		0.866*	1.192***		1.212***
	(0.312)		(0.402)	(0.154)		(0.160)
G7Growth (-1)	-0.0366		-0.158	-0.0448		-0.0632
	(0.142)		(0.149)	(0.118)		(0.100)
G7Growth (-2)	-0.475		-0.410	-0.139**		-0.108
	(0.290)		(0.297)	(0.0530)		(0.0635)
Oilpricegrowth		0.0455***	0.0187**		0.0453***	0.0158***
		(0.00602)	(0.00798)		(0.00563)	(0.00535)
Oilpricegrowth(-1)		0.0251	0.0377**		-0.00293	0.0163**
		(0.0139)	(0.0156)		(0.00657)	(0.00652)
Oilpricegrowth(-2)		-0.000605	0.0223***		-0.00832	0.0166**
		(0.00516)	(0.00561)		(0.00925)	(0.00740)
Constant	1.832	2.235***	1.551	0.705	2.690***	0.415
	(1.235)	(0.0941)	(1.382)	(0.549)	(0.0729)	(0.540)
Observations	451	440	440	856	836	836

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The subsequent regressions add other commodities (primary commodity index, IMF) to estimate similar regressions for four Latin American countries (**Table 5**), three advanced countries that export oil (**Table 6**), and three advanced countries that import oil (**Table 7**). Across all sets of countries, the GDP growth of advanced economies emerged as the most crucial variable determining economic growth, except for Brazil. In Brazil, the increase in nonoil commodity prices favorably impacted economic growth, while the same was observed in Chile and Germany. Conversely, nonoil commodity price growth detrimentally affected Canada's GDP growth. Surprisingly, under these specifications, oil price growth significantly impacted only Canada's economic growth.

The outcomes for Brazil underscore the significance of its market size and nonoil commodity production. This nation produces and exports a substantial number of commodities, including mineral metals, soybeans, corn, and sugar. The situation in Chile is analogous, with copper and metal minerals comprising the primary export lines. Nonetheless, in the latter case, the growth of advanced economies' GDP continued to be the most crucial factor determining economic growth. For Mexico and Colombia, advanced economic growth appeared to be the sole determinant in the present specification.

Table 5. Latam Countries (Dependent variable: GDPgrowth)

	(1)	(2)	(3)	(4)
VARIABLES	Brazil	Mexico	Colombia	Chile
G7Growth	0.315 (0.303)	1.461*** (0.187)	0.897* (0.516)	1.215*** (0.309)
Oilpricegrowth	0.0191 (0.0185)	-0.00670 (0.0151)	-0.0186 (0.0331)	-0.0138 (0.0226)
Primpricegrowth	0.113*** (0.0391)	-0.00945 (0.0350)	0.135 (0.0830)	0.0973* (0.0552)
Constant	1.214* (0.668)	-0.472 (0.373)	1.433 (1.215)	1.478* (0.763)
Observations	30	30	30	30

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6. Advanced Oil Exporter Countries (Dependent variable: GDPgrowth)

	(1)	(2)	(3)
VARIABLES	Canada	Norway	Denmark
G7Growth	0.948*** (0.0971)	0.755*** (0.119)	0.965*** (0.175)
Oilpricegrowth	0.0154* (0.00860)	-0.00949 (0.0108)	-0.00849 (0.0108)
Primpricegrowth	-0.0258* (0.0148)	0.000490 (0.0261)	0.0239 (0.0252)
Constant	0.592*** (0.165)	0.899*** (0.219)	-0.0187 (0.385)
Observations	30	30	30

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7. Advanced Oil Importer Countries (Dependent variable: GDPgrowth)

	(1)	(2)	(3)
VARIABLES	France	Germany	United Kingdom
G7Growth	1.107*** (0.193)	0.869*** (0.132)	1.563*** (0.236)
Oilpricegrowth	0.0105 (0.00704)	-0.0138 (0.00856)	-0.000373 (0.0105)
Primpricegrowth	-0.0100 (0.0186)	0.0606** (0.0239)	-0.0263 (0.0254)
Constant	-0.611 (0.452)	-0.497 (0.333)	-0.876 (0.540)
Observations	30	30	30

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Despite the significant role of the commodities sector in Latin America, particularly in countries with high production concentrations on oil or other commodities, the results may be surprising. It appeared that the growth of oil prices had a secondary effect that mirrored the increased demand from advanced economies during periods of growth. As a result of these boom cycles, countries that produce commodities reap the benefits of higher demand and higher prices.

In addition, the findings aligned with those of oil-exporting advanced economies, where the growth of developed nations are crucial in their economic progress. The outcomes for Latin America were consistent with those of previous research. Notably, Österholm, P., and Zettelmeyer, J. (2008) propose that "Conditional forecasts for various external scenarios indicate that Latin American growth can withstand moderate drops in commodity prices and external growth, but is vulnerable to more severe shocks, particularly a simultaneous external slowdown and tightening of global financial conditions."

5. Oil price growth, inflation, and exchange rates

The analysis of the repercussions of oil price growth on GDP growth has sparked interest in exploring other dimensions in which oil price volatility may impact Latin American countries. Specifically, it is crucial to assess the effect of oil price growth on the inflation rate of these nations. In this regard, we aimed to identify the relationship between commodity price growth and inflation, considering the interaction with other macroeconomic variables such as the exchange rate, GDP growth, and economic growth of advanced economies.

Drawing on longitudinal data from 1992 and accounting for inflation persistence, our results revealed that the growth in exchange rates exerted a statistically significant direct impact on inflation rates in the same four Latin American countries examined at the end of the previous section (**Table 8**). As commodity exporters, the price and quantity effects of commodity exports were some of the determinants of exchange rate evolution. The transmission mechanism of this effect was through the cost of imported goods and services, which directly influenced the consumer price index (CPI). A reduction in the inflow of foreign currencies (due to less quantity or lower price of commodity exports) could cause a rise in exchange rates, implying a surge in import costs and leading to an upward push on the overall price level, thereby contributing to inflation.

Moreover, the price growth of specific commodities is critical in these economies. In Mexico's case, surges in oil prices substantially impact inflation levels. This can be attributed to the 'cost-push' mechanism, where an increase in oil prices, a vital input in production and transportation, leads to a rise in goods and service costs.

In contrast, for Brazil and Chile, inflation rates were influenced by nonoil commodity price growth, highlighting the importance of these commodities in their domestic production processes and consumption baskets.

In Colombia, inflation was directly influenced by GDP growth. This suggested a demand inflation mechanism at play, where increased economic activity leads to greater demand for goods and services, resulting in upward pressure on prices. Furthermore, the persistence of inflation, which was indicative of adaptive expectations and potential price and wage rigidities, significantly influences the inflation trajectories of Mexico, Colombia, and Chile.

Table 8. Oil Price Growth and Inflation for Latam (Dependent variable: Inflation)

VARIABLES	(1)	(2)	(3)	(4)
	Brazil	Mexico	Colombia	Chile
Inflation (-1)	0.0543 (0.0534)	0.718*** (0.0845)	0.836*** (0.0634)	0.668*** (0.0880)
G7Growth	4.537 (4.656)	0.403 (0.389)	-0.100 (0.413)	-0.0520 (0.380)
Oilpricegrowth	-0.293 (0.274)	0.0729** (0.0275)	-0.0174 (0.0286)	0.0298 (0.0244)
Primpricegrowth	1.745* (0.890)	0.00740 (0.0468)	0.0529 (0.0435)	0.0961** (0.0405)
XRgrowth	1.092*** (0.0811)	0.292*** (0.0300)	0.0869* (0.0473)	0.232*** (0.0803)
GDPgrowth	-0.461 (2.946)	-0.335 (0.229)	0.387* (0.219)	0.177 (0.184)
Constant	-16.12* (8.557)	-0.768 (0.676)	-0.930 (0.708)	-0.630 (0.682)
Observations	30	30	30	30

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

To establish a comparative framework with advanced economies, we conducted the same estimation exercise for oil exporters and importers. Our analysis revealed that, in contrast to Latin American nations, the exchange rate channel was not significantly important in dictating inflation levels for advanced economies categorized as net oil exporters (**Table 9**). However, Norway was the only exception to this general trend.

Our findings suggested that oil prices are significant in determining inflation in Canada and Denmark, indicating the prevalence of cost-push inflation due to these economies' reliance on oil as a major input in their production processes. Interestingly, our results showed that past inflation emerged as a crucial determinant of present inflation only in Denmark.

Overall, these findings provided significant insights into inflation dynamics and macroeconomic policy considerations for advanced economies, particularly those that heavily rely on oil for their economic growth.

Table 9. Oil Price Growth and Inflation for Advanced Oil Exporters
(Dependent variable: Inflation)

	(1)	(2)	(3)
VARIABLES	Canada	Norway	Denmark
Inflation (-1)	0.555 (0.358)	0.0477 (0.278)	0.939*** (0.332)
G7Growth	0.0963 (0.164)	0.123 (0.164)	-0.496 (0.375)
Oilpricegrowth	0.0333** (0.0153)	0.0175 (0.0127)	0.0303* (0.0150)
Primpricegrowth	0.0306 (0.0347)	0.00362 (0.0176)	0.0212 (0.0171)
XRgrowth	0.103 (0.0881)	0.0597* (0.0321)	0.0660 (0.0428)
GDPgrowth	-0.0749 (0.199)	-0.200 (0.163)	0.478 (0.341)
Constant	0.499 (0.777)	2.061** (0.742)	-0.0513 (0.544)
Observations	30	30	30

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

For advanced net oil-importing nations (**Table 10**), it was observed that past inflation robustly forecasted current inflation rates. The influence of oil prices was significant only in the case of France, while nonoil commodity prices had substantial implications for inflation in the United Kingdom. Nevertheless, the exchange rate channel did not manifest a notable effect on inflation within this group of nations, possibly due to the mitigating effect of the diversification of imports, their ability to pass on increased costs to their export markets, or their ability to reduce dependency on imported commodities.

Table 10. Oil Price Growth and Inflation for Advanced Oil Importers
(Dependent variable: Inflation)

VARIABLES	(1) France	(2) England	(3) United Kingdom
Inflation (-1)	0.569*	1.393*	0.657***
	(0.297)	(0.673)	(0.183)
G7Growth	0.0361	0.0746	-0.549
	(0.334)	(0.186)	(0.419)
Oilpricegrowth	0.0301*	0.0215	0.0234
	(0.0145)	(0.0178)	(0.0153)
Primpricegrowth	0.0129	0.0380	0.0431**
	(0.0179)	(0.0466)	(0.0186)
XRgrowth	0.0366	0.0646	0.0520
	(0.0436)	(0.0505)	(0.0476)
GDPgrowth	-0.0673	0.0941	0.338
	(0.233)	(0.147)	(0.244)
Constant	0.473	-0.977	0.774
	(0.562)	(1.215)	(0.513)
Observations	23	23	30

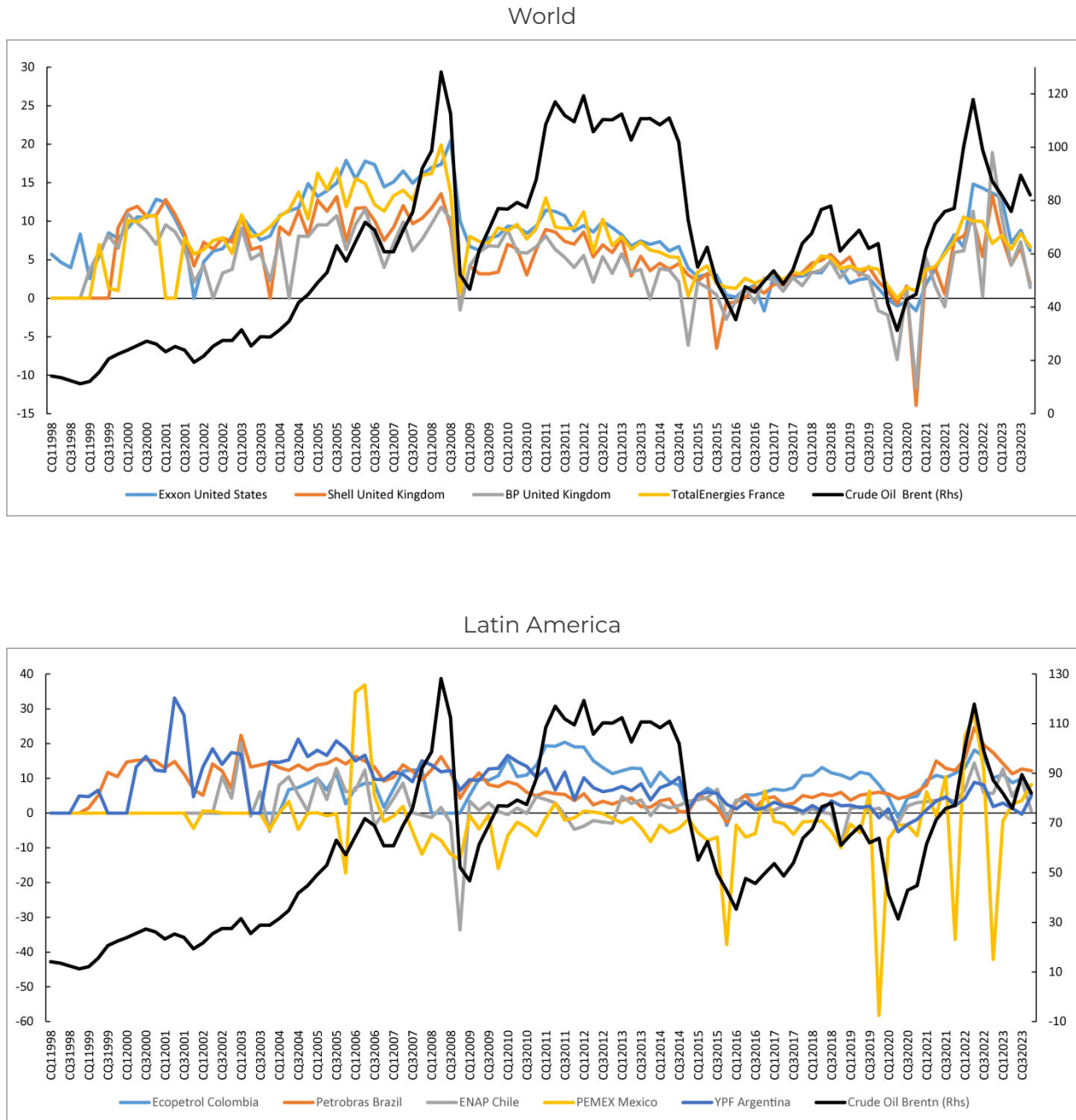
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

6. Oil-producing firms

In this section, we delve into a microeconomic channel that establishes a connection between oil prices and the profitability of oil-producing firms, which are considered drivers of economic growth in some economies. To illustrate this connection, **Figure 4** shows the correlation between the quarterly profits of larger oil corporations globally and in Latin America and oil prices over the past two decades. The top graph in the figure delineates the trajectory of major international oil corporations. The profit margins of these leading entities exhibited synchronicity with global oil prices. This correlation could be observed in the escalating profits aligned with surges in world oil prices before the global financial crisis, during the 2010-2014 boom, and in the months of 2021. Correspondingly, the decrease in profits during the global financial crisis, the commodities crisis in 2014-2015, and the COVID-19 pandemic mirrored the downturn in oil prices. These findings underscore the interdependence of oil prices and the profitability of oil-producing firms, which can have significant implications for economic growth and stability in oil-dependent economies.

The bottom graph shows the profit trajectories of leading oil corporations in Latin America. The evolution of profits in this region exhibited greater stability than that of their global counterparts, albeit certain firms such as Ecopetrol presented a similar pattern. Petrobras, the region's largest company, demonstrated remarkable consistency in its profit margins, even amidst drastic fluctuations in oil prices. However, the increase in earnings in recent quarters significantly correlated with oil prices. The region's second-largest company, Pemex, delineated an atypical trend that did not correspond with oil prices, with numerous periods reflecting negative profits. This could be attributed to the fact that Pemex is state-owned, in contrast to Ecopetrol or Petrobras, both of which exhibit a mixed capital structure. Such differentiation in capital structure could engender disparities in the financial outcomes of purely state-owned corporations and mixed-capital companies, the latter being more subject to market regulation.

Figure 4. Profits (ROA), Major Oil Companies (%), and Oil Prices (US\$ per barrel. RhS)

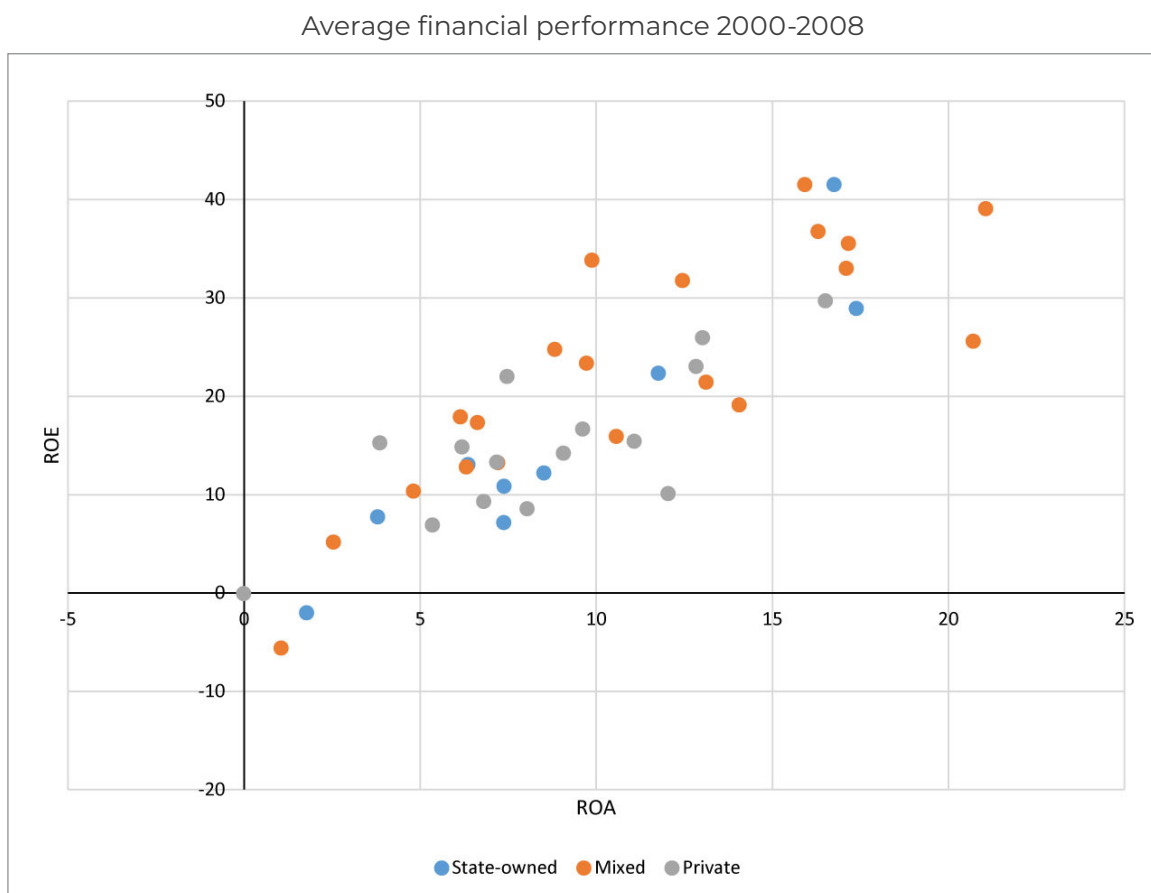


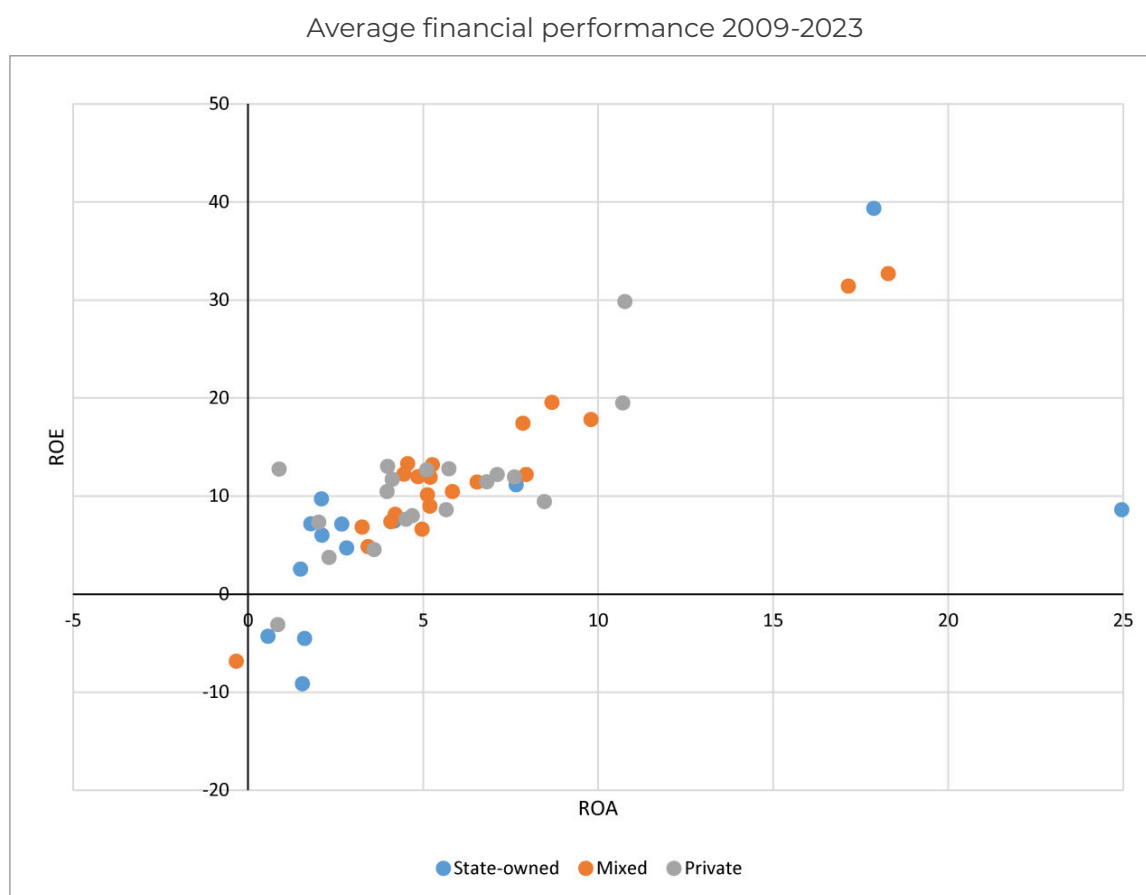
Source: S&P Capital IQ.

According to certain economic literature, state-owned oil companies tend to exhibit lower financial performance on average than their private international counterparts. Al-Mana et al. (2020) have specifically demonstrated that, in a group of the fifty largest oil companies worldwide, state-owned oil firms, known as National Oil Companies (NOCs), on average, exhibit lower financial performance than international oil companies do.

To confirm this finding for developing economies, we compiled data on the major oil-producing firms in emerging economies (as displayed in **Figure 5**). Prior to the global financial crisis (top graph), we were unable to discern any patterns between state-owned, mixed, and private oil-producing firms. However, following the global financial crisis (bottom graph), state-owned companies seemed to congregate in a small area near the origin, indicating a lower average financial performance for this type of firm.

Figure 5. Financial Performance of Oil-producing Companies (EMEs)





Source: S&P Capital IQ.

A more comprehensive understanding of the profit behavior of firms can be attained by estimating the relationship between profits and oil prices, particularly for oil-producing companies. Positive results are typically observed among firms in advanced economies and among Latin American firms.

Subsequent tabulated data (**Table 11**) present the results for oil-producing companies in two distinct cohorts: Advanced economies (top 5 firms) and Latin American economies (top 5 firms). Oil prices appeared to directly influence returns on assets (ROAs) for advanced economies and Latin American firms. However, the magnitude of the effect was almost double in the former than in the latter. All oil-producing entities in Latin America were either state owned or possessed a mixed ownership structure, a distinctive characteristic that may be the impetus behind this outcome. This was plausible because ownership structure could impact managerial and financial practices, as well as the utilization of financial instruments that enable firms to hedge against oil price volatility, a common practice in privately owned companies.

Table 11. ROA of Oil-producing Companies (Dependent variable: ROA)

VARIABLES	(1) Advanced	(2) Latam	(3) Latam
Oilpricegrowth	0.0990*** (0.0165)	0.0580* (0.0298)	0.0362 (0.0321)
G7Growth	-0.353 (0.324)	0.00564 (0.403)	-0.351 (0.560)
Latam growth			0.464 (0.372)
Constant	7.146*** (0.643)	4.477*** (0.796)	4.184*** (0.742)
Observations	115	112	112

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

State-owned oil firms often prioritize objectives beyond profitability, such as domestic supply or employment support. They have access to government resources that provide some protection against short-term oil price volatility, but they face increased pressure to allocate profits to social expenditure. Privately held oil corporations prioritize profitability and shareholder returns, causing them to be more directly impacted by changes in oil prices. Despite similar challenges, their response strategies may differ significantly due to these differences in organizational structure.

The results, instead of providing a final conclusion, serve as a driving force for further exploration of the phenomenon that underlies the apparent distinction between state-owned oil firms and private ones. Upon a preliminary examination of the microdata, numerous questions arise: What are the primary financial objectives of each type of firm? What is their strategy for hedging against volatile prices? To what extent do financial best practices impact profitability? Is corporate governance a crucial determinant of profitability? These and other pertinent inquiries warrant further investigation for future research.

7. Conclusions

Oil prices are an essential determinant of economic growth, both globally and regionally. Fluctuations in oil prices can impact various economic variables, including the price level, inflation rate, exchange rate, and output of an economy. The volatility of oil prices can have significant implications for economic growth, as it introduces uncertainty and reduces investment and consumption. In Latin America, oil price volatility has been an ongoing concern for many countries, given that the region comprises both significant oil producers and net oil importers.

In this paper, we examined the relationship between oil price volatility and economic growth in Latin America, accounting for the specificities of the region. We analyzed the impact of oil prices on economic growth in selected Latin American countries, including oil-producing countries and net oil importers, as well as the region, and compared it with other regions worldwide.

Our analysis revealed that the increase in oil prices after the pandemic directly impacted the GDP growth of Latin America. However, our research has also revealed that the economic growth of advanced economies more significantly influences Latin America's growth than on that of other regions. In fact, the economic growth of advanced economies is the most significant determinant of the growth of Latin American countries when analyzed separately.

Furthermore, we analyzed other potential implications of oil price volatility for inflation levels within countries through the exchange rate channel. The findings showed that growth in exchange rates exerts a statistically significant direct impact on inflation rates. Additionally, we utilized microdata from oil companies worldwide to examine the relationship between oil prices and the profitability of oil-producing firms, which are often viewed as significant contributors to economic growth in certain economies. The results indicated that oil prices appear to directly influence returns on assets (ROA) but at different magnitudes depending on the ownership structure of the firm (private or state owned), which motivates further exploration of this topic using microdata from firms in the region.

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