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Quantifying the Economic Impact of Rising Oil Prices: An Empirical Analysis

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Abstract
Rising oil prices consistently capture the attention of various segments of society, including economists, journalists, and individual citizens. Despite the widespread concern, the existing literature lacks precise methods for quantifying the output losses associated with higher oil prices. This paper introduces a straightforward new metric designed to calculate the real gross domestic product losses that occur when oil prices increase above their trend levels. The proposed metric offers a fresh perspective by directly linking changes in oil prices to real gross domestic product outcomes. Upon applying this metric, the study uncovers that the output losses due to rising oil prices are often minimal. Surprisingly, the analysis frequently shows that real gross domestic product actually increases above its potential when oil prices rise. This counterintuitive finding challenges the conventional wisdom that higher oil prices are inherently detrimental to economic performance. Several factors can explain why higher oil prices might not always harm the economy. One possible explanation is that rising oil prices can stimulate economic activity in oil-producing regions and sectors. Increased revenues from higher oil prices can lead to greater investment in energy infrastructure, exploration, and production activities. This, in turn, can create jobs and spur economic growth in these areas, offsetting the negative impacts in oil-importing regions. Additionally, the response of economies to higher oil prices can vary depending on their energy efficiency and the adaptability of their industries. Economies that have invested in energy-efficient technologies or that can quickly switch to alternative energy sources may be better equipped to handle rising oil prices without significant adverse effects. In such cases, the overall impact on real gross domestic product might be mitigated or even positive. Furthermore, the relationship between oil prices and economic growth is complex and influenced by numerous factors, including monetary policy, fiscal responses, and global economic conditions. For instance, central banks might adjust interest rates to counteract the inflationary pressures of higher oil prices, thereby stabilizing economic growth. Similarly, government policies aimed at supporting affected industries or consumers can help cushion the impact of rising oil prices. The findings of this study have important implications for policymakers and stakeholders. Understanding that the impact of rising oil prices on real gross domestic product is not always negative allows for more nuanced and informed decision-making. Policymakers should consider the broader economic context and the specific characteristics of their economies when responding to oil price fluctuations. For instance, in oil-exporting countries, rising oil prices can be a boon, leading to increased revenues and economic growth. In such cases, policies might focus on managing the windfall revenues effectively to ensure long-term economic stability. On the other hand, oil-importing countries might need to emphasize energy diversification, efficiency improvements, and the development of alternative energy sources to mitigate the impact of higher oil prices.

Keywords: Oil Prices, Economic Impact, Gross Domestic Product, Energy Efficiency
JEL Codes: E31, Q43, Q41

1. INTRODUCTION

The widespread coverage of rising oil prices in leading mainstream newspapers reflects the global concern over their far-reaching implications. Headlines across various publications underscore the potential threats posed by elevated oil prices to economic stability and recovery. For example, articles such as "Congress looks for a culprit for rising oil prices" (New York Times, 2008), "Oil prices may threaten global economic recovery, says energy agency" (The Guardian, 2011), and "Oil prices: crude awakening" (The Economist, 2010) highlight the urgent need to address the challenges arising from surging oil prices. The concerns raised by rising oil prices resonate with diverse economic stakeholders, including consumers, businesses, and policymakers, all of whom grapple with the implications of such increases. To effectively address these concerns, it becomes crucial to accurately quantify the impact of rising oil prices on various sectors of the economy. Only through a comprehensive understanding of these effects can informed decisions be made to mitigate their adverse consequences and ensure economic resilience in the face of fluctuating oil prices.

This paper aims to tackle this challenge by introducing a novel metric designed to quantify the economic losses in real GDP attributed to higher oil prices. To achieve this, we draw upon the methodology utilized in the sacrifice ratio literature, which traditionally measures the output losses resulting from efforts to reduce inflation. However, what sets our approach apart is its focus on capturing the episodic nature of oil-associated output losses. Indeed, while existing methodologies

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may offer valuable insights into the relationship between oil prices and economic output, they often overlook the dynamic nature of this relationship over time. Our technique acknowledges the variability in the impact of oil price hikes across different historical periods. By doing so, we aim to provide a more comprehensive understanding of how economic output responds to fluctuations in oil prices, taking into account changing circumstances, technological advancements, and other contextual factors. This nuanced approach allows for a deeper analysis of the complex dynamics between oil prices and economic performance, ultimately enhancing our ability to formulate informed policy responses and strategic interventions.

The economic landscape during the 1960s and 1970s was vastly different from that of the 2000s, characterized by varying levels of oil intensity and technological sophistication. During the earlier periods, economies were more heavily reliant on oil as a primary energy source, and the shocks experienced then may have had different implications for economic output compared to more recent times. In contrast, the 2000s saw significant advancements in technology and a greater diversification of energy sources, which could have altered the way economies responded to oil price shocks. By considering these contextual differences, our methodology allows for a more nuanced assessment of the impact of oil price fluctuations across different historical periods, enabling policymakers to tailor their responses accordingly. By incorporating these temporal variations into our analysis, our method offers a more comprehensive and nuanced perspective on how oil prices affect economic output. This allows for a deeper understanding of the complex dynamics at play and provides valuable insights for policymakers and stakeholders seeking to navigate the challenges posed by oil price fluctuations. Ultimately, our approach enhances the ability to formulate effective strategies to mitigate the adverse effects of oil price shocks and promote economic stability and resilience.Rather than considering the impact of oil prices on economic output as a constant or uniform phenomenon, our approach focuses specifically on periods when oil prices are on the rise. This allows us to capture the unique dynamics and effects associated with such episodes of increasing oil prices. By isolating these periods and analyzing their impact on output losses, we can provide a more targeted and accurate assessment of the economic consequences of rising oil prices. our research challenges the prevailing belief that rising oil prices invariably lead to declines in real GDP. Instead, our analysis suggests a more nuanced relationship between oil price hikes and economic output. Contrary to expectations, we find that periods of increasing oil prices are often accompanied by economic booms, with countries experiencing higher levels of real GDP relative to potential GDP. This unexpected positive correlation underscores the complex and multifaceted nature of the relationship between oil prices and economic performance, highlighting the need for a more sophisticated understanding of these dynamics. our novel metric challenges the prevailing notion that oil price increases inevitably lead to negative economic consequences. Instead, it suggests a more nuanced relationship, wherein rising oil prices may sometimes align with periods of economic expansion and prosperity. This finding underscores the complexity of the relationship between oil prices and economic performance, highlighting the need for a more nuanced understanding of the factors at play. By providing a fresh perspective on this issue, our metric offers valuable insights that can inform policy decisions and economic forecasting efforts.

2. LITERATURE REVIEW

The relationship between oil prices and economic activity has been a subject of extensive research, with much of the literature suggesting that oil price shocks have a negative impact on economic activity. Hamilton (1983) argues that oil price hikes often coincide with U.S. recessions in the post-war period, a trend observed in other countries as well. For instance, Papapetrou (2001) provides evidence of higher oil prices leading to output deterioration in Greece, while Cuñado and de Gracia (2003) find similar effects in European economies. More recent studies, like Zhao et al. (2014), demonstrate the adverse impact of oil supply shocks on China's long-term output levels. Interestingly, some authors, such as Jiménez-Rodríguez and Sánchez (2005), present evidence suggesting that the relationship between oil prices and output is nonlinear, indicating that the impact of oil price changes on economic activity may vary depending on the magnitude and direction of the shocks. Hamilton's seminal work in 1983 highlighted the historical association between oil price increases and U.S. recessions, suggesting a straightforward negative relationship. Subsequent studies, such as those by Papapetrou (2001) and Cuñado and de Gracia (2003), expanded this analysis to other economies, revealing similar patterns of output deterioration in response to higher oil prices. However, more nuanced perspectives have emerged in recent years. Zhao et al. (2014) investigated the effects of oil supply shocks on China's long-term output, illustrating the differential impact of various types of oil shocks on economic performance. Similarly, Jiménez-Rodríguez and Sánchez (2005) introduced the idea of nonlinearity, suggesting that the relationship between oil prices and output may not always follow a simple linear pattern.

Dhawan, Jeske, and Silos (2010) contribute to the discourse by presenting a perspective that diverges from the prevailing view regarding the impact of oil price increases on output. Building upon the findings of Kim and Loungani (1992), they suggest that oil prices may not exert significant influence on output fluctuations. This alternative viewpoint challenges the conventional wisdom that oil price rises invariably lead to adverse effects on economic activity. By questioning the conventional narrative, Dhawan, Jeske, and Silos (2010) prompt a reevaluation of the factors driving output fluctuations, highlighting the need for a more nuanced understanding of the complex interplay between oil prices and economic performance. Their research underscores the importance of considering alternative hypotheses and methodologies in exploring the relationship between oil prices and output dynamics. The study by Rasmussen and Roitman (2011) adds another dimension to the discourse on the impact of oil prices on GDP by suggesting that the effect may be relatively modest. This finding further complicates the understanding of the relationship between oil prices and economic output, highlighting the need for careful consideration of various factors and contexts.

Indeed, as noted by Bernanke (2004), the impact of oil price shocks can vary depending on the prevailing economic conditions. Factors such as the nature of the shock itself—whether it is driven by changes in demand or supply—can significantly influence its effects on economic performance. Kilian (2008) and Kilian (2006) delve deeper into this issue, arguing that different types of oil shocks can lead to distinct outcomes for economic activity. By distinguishing between demand and supply shocks, these studies underscore the importance of nuanced analysis in understanding the complex dynamics of oil price fluctuations and their implications for GDP. The proposed approach in this paper recognizes the multifaceted nature of oil price shocks and their diverse impacts on economic output. By acknowledging that oil price fluctuations can be driven by various factors and can interact differently with other economic circumstances, the study aims to offer a comprehensive understanding of the relationship between oil prices and GDP.

In proposing an episodic method for quantifying GDP losses linked to increasing oil prices, the paper seeks to address the limitations of existing approaches and provide a more nuanced assessment of the economic effects of oil price hikes. This novel methodology is designed to capture the dynamic nature of oil-associated output losses, accounting for temporal variations and contextual factors that may influence the relationship between oil prices and GDP. By adopting this innovative approach, the study aims to offer valuable insights into the complex dynamics of oil price shocks and their implications for economic activity. Through rigorous analysis and empirical investigation, the paper endeavors to contribute to the existing body of literature on the subject, ultimately enhancing our understanding of the economic consequences of accelerating oil prices.

3. OIL-ASSOCIATED OUTPUT LOSSES

The measurement of oil prices in this study utilizes the West Texas Intermediate (WTI) dollar price of a barrel of crude oil. To identify episodes of rising oil prices, the methodology employed draws from the literature on the sacrifice ratio, with specific inspiration from Ball (1994). Initially, a series for trend oil prices is computed by applying a centered nine-quarter moving average to quarterly WTI crude oil prices. This smoothing technique helps to filter out short-term fluctuations and highlight longer-term trends in oil prices. Subsequently, oil price "peaks" and "troughs" are identified within the data series. A peak is characterized by a quarter where the oil price is higher than the previous four quarters and the subsequent four quarters. Conversely, a trough is identified when the oil price is lower than the preceding four quarters and the following four quarters. Once peaks and troughs are identified, a rising oil price episode is defined as the period from a trough to a peak. In this manner, the study identifies and analyzes six distinct episodes of rising oil prices spanning the years 1960 to 2015. This approach allows for the systematic examination of the impact of oil price increases on economic output over specific time periods, facilitating a more detailed understanding of the relationship between oil prices and GDP.

4. OUTPUT LOSSES DURING OIL PRICE HIKES

Following the identification of oil price rise episodes, the next step involves calculating the amount of lost output during each episode. This process uses real GDP data from the OECD, expressed in billions of U.S. dollars. The approach compares actual output to potential output from the trough to the peak of each oil price rise episode. Potential output is estimated using the Hodrick-Prescott (HP) filter, applied to the real GDP data spanning from 1960 to 2015. The HP filter is a commonly used tool for extracting the smooth long-term trend component of a time series, separating it from short-term fluctuations. This allows for a more accurate representation of potential output, which reflects the economy's capacity to produce goods and services under normal conditions without triggering inflationary pressures. To quantify the impact of rising oil prices, the study calculates the differences between the level of actual observed real GDP and potential real GDP for each quarter during the identified episodes of rising oil prices. These differences are summed to obtain the total output loss or gain for each episode. For the 25 OECD countries included in the sample, and across all six identified episodes, the mean difference between actual real GDP and potential real GDP is found to be $14.1 billion, while the median difference is $0.2 billion. These findings suggest that, on average, these countries have experienced higher than usual output during periods of accelerating crude oil prices. This result challenges the conventional wisdom that rising oil prices necessarily lead to economic downturns, indicating that, in many cases, economies may actually experience periods of expansion and higher output in response to increasing oil prices.

Next, we express the sum of the differences between actual output and potential output (output gaps) as a percentage of the mean level of GDP for each country during each identified episode. This allows for a standardized comparison across different countries and time periods, taking into account the size of each economy. The analysis reveals significant variation across countries. For instance, during the episode from the first quarter of 1987 to the third quarter of 1991, Finland's cumulative output gaps amounted to 38 percent of its mean real GDP for that period. This indicates a substantial period of economic expansion relative to potential output, likely driven by favorable economic conditions despite rising oil prices. In contrast, Greece experienced a considerable negative impact during the episode from 2009 to 2013. During this period, the sum of its output gaps constituted a loss equivalent to 34 percent of its GDP. This period coincides with the global financial crisis and subsequent European debt crisis, which severely affected Greece's economy. Additionally, the analysis shows substantial variation across different time periods. This temporal variation underscores the importance of considering the specific economic context and conditions prevailing during each episode of rising oil prices. Economic factors such as technological advancements, changes in oil intensity, and the nature of the oil price shock (demand-driven or supply-driven) can significantly influence the impact of rising oil prices on economic output.

For instance, during the oil price increases of 1965-1981 and 1987-1991, the vast majority of countries saw output rising far above potential. Specifically, 72 percent of the sample countries experienced positive output gains during the 1965-

1981 period, and 84 percent saw gains during the 1987-1991 period. On the other hand, during the episode from 2009 to 2013, nearly all countries suffered significant output losses, with Turkey being the only exception. This stark contrast underscores the importance of recognizing the episodic nature of oil price hikes and their varying impact on the gap between real GDP and potential GDP. To obtain a clearer picture of the overall relationship between climbing crude oil prices and output changes, we calculate the mean of all countries' summed output losses (or gains) expressed as a percentage of GDP. This analysis yields an average gain of real GDP over potential GDP amounting to 1.03 percent of GDP during periods of accelerating oil prices. When considering the median, the figure increases to 1.24 percent, indicating that the typical country experienced a GDP gain slightly higher than the average. Moreover, when examining the median of the median ratios of output losses/gains to GDP, the results are 0.20 percent and -0.24 percent, respectively, suggesting that the distribution of these effects varies widely among different countries. These findings challenge the conventional wisdom that rising oil prices are invariably detrimental to economic performance. Instead, they reveal that periods of increasing oil prices have historically been associated with economic expansions in many cases. This highlights the need for a more nuanced understanding of the relationship between oil prices and economic output, taking into account the episodic and context-dependent nature of this relationship. By adopting an episodic approach to quantifying oil-associated output losses, we can better capture the diverse impacts of oil price hikes on different economies over time. These numbers are quite telling, indicating that the common fears of higher oil prices negatively impacting economic performance are not supported by the real GDP data. On average, net output losses are minimal, and there is a tendency for output to improve during episodes of accelerating crude oil prices. This observation runs contrary to the public perception of oil prices being universally harmful. While it is true that higher fuel prices can adversely affect certain sectors or individuals more than others, at the aggregate, economy-wide level, our fears seem to be exaggerated. By employing an episodic approach to quantify oil-associated output losses, we find that there are actually gains, not losses, during periods of rising oil prices.

To ensure the robustness of these findings, we conducted a check using annual oil production data from the Energy Information Administration (EIA). We averaged oil production data from 1980 to 2019 and identified five countries in our sample that rank among the top twenty oil-producing nations globally: Canada, Mexico, Norway, the UK, and the United States. We then recalculated the averages excluding these major oil-producing countries, as reported in squared parentheses at the bottom of Table 1. This exclusion, targeting countries that are likely to benefit directly from higher oil prices, made little-to-no difference to our results. This further supports the conclusion that the positive correlation between rising oil prices and economic output is not solely driven by the inclusion of oil-rich nations in the sample.

Table-1. Output Losses During Oil Price Rise Episodes

	1965Q3-1981Q1	1987Q1-1991Q3	1994Q3-1996Q4	1998Q2-2000Q3	2001Q4-2010Q3	2011Q4-2019Q3
Trough Trend Oil Price ($/Barrel)	2.922	17.058	17.616	16.430	26.674	69.206
Peak Trend Oil Price ($/Barrel)	36.385	22.894	21.019	27.865	84.432	96.894
Total Trend Oil Price Rise over Episode($/Barrel)	33.463	5.836	3.403	11.436	57.758	27.688

Table 1 presents data on output losses during various episodes of oil price rises spanning from 1965 to 2022. For the period from the third quarter of 1965 to the first quarter of 1981, the trough trend oil price was $2.922 per barrel, while the peak trend oil price reached $36.385 per barrel, resulting in a total trend oil price rise of $33.463 per barrel over this episode. During the period from the first quarter of 1987 to the third quarter of 1991, the trough trend oil price was $17.058 per barrel, and the peak trend oil price rose to $22.894 per barrel. This episode experienced a total trend oil price rise of $5.836 per barrel. From the third quarter of 1994 to the fourth quarter of 1996, the trough trend oil price was $17.616 per barrel, with the peak trend oil price at $21.019 per barrel. The total trend oil price rise for this episode was $3.403 per barrel. The period from the second quarter of 1998 to the third quarter of 2000 saw a trough trend oil price of $16.430 per barrel and a peak trend oil price of $27.865 per barrel. The total trend oil price rise during this episode was $11.436 per barrel. Between the fourth quarter of 2001 and the third quarter of 2010, the trough trend oil price stood at $26.674 per barrel, rising to a peak trend oil price of $84.432 per barrel. This period experienced a significant total trend oil price rise of $57.758 per barrel. Finally, for the period from the fourth quarter of 2011 to the third quarter of 2022, the trough trend oil price was $69.206 per barrel, with the peak trend oil price reaching $96.894 per barrel. The total trend oil price rise over this episode was $27.688 per barrel. Overall, the table illustrates the variability and magnitude of oil price increases across different periods, highlighting significant fluctuations in oil prices and their potential impact on output losses.

Table 2: Output Losses as a Percentage of Oil Price Rise Episodes' Mean Level of Real GDP

	1965Q3-1981Q1	1987Q1-1991Q3	1994Q3-1996Q4	1998Q2-2000Q3	2001Q4-2010Q3	2011Q4-2019Q3	Mean	Median	Max.	Min.	Std. Dev.
Australia	-0.813	15.749	-1.414	7.903	-1.086	-2.635	2.951	-0.949	15.749	-2.635	7.335
Austria	3.413	0.111	-2.821	4.676	-3.663	-2.775	-0.177	-1.332	4.676	-3.663	3.533
Belgium	0.355	8.039	-3.857	4.083	-3.456	-1.110	0.676	-0.378	8.039	-3.857	4.620
Canada	15.153	18.657	0.334	4.519	3.880	-5.605	6.156	4.199	18.657	-5.605	9.136
Denmark	8.608	1.699	3.129	3.462	-0.474	-9.002	1.237	2.414	8.608	-9.002	5.845
Finland	-1.826	38.072	-6.899	10.643	-5.852	-6.293	4.641	-3.839	38.072	-6.899	17.654
France	2.181	8.877	-3.247	3.886	-0.391	-1.962	1.557	0.895	8.877	-3.247	4.442
Germany	6.851	-3.359	-2.630	-0.261	-2.630	-2.033	-0.677	-2.332	6.851	-3.359	3.834
Greece	14.372	-0.508	-6.117	-1.761	-1.979	-34.094	-5.014	-1.870	14.372	-34.094	15.892
Iceland	12.057	33.874	-7.346	18.830	-12.658	-33.251	1.918	2.355	33.874	-33.251	24.270
Ireland	-3.166	17.656	-15.437	4.787	6.595	-27.800	-2.894	0.811	17.656	-27.800	16.426
Italy	7.906	10.457	0.841	-2.591	0.739	-2.839	2.419	0.790	10.457	-2.839	5.527
Japan	-0.074	6.919	-0.801	-6.700	4.556	-1.067	0.472	-0.438	6.919	-6.700	4.774
Luxembourg	9.110	5.708	-14.647	13.328	0.440	-12.046	0.315	3.074	13.328	-14.647	11.423
Mexico	-14.369	-12.259	-25.984	15.813	-4.772	-1.784	-7.226	-8.515	15.813	-25.984	14.104
Netherlands	10.331	5.673	-8.490	7.975	-11.476	-6.033	-0.337	-0.180	10.331	-11.476	9.402
New Zealand	-3.189	2.700	13.370	-5.067	9.356	-5.507	1.944	-0.244	13.370	-5.507	7.964
Norway	15.567	-3.138	-2.003	2.434	-1.020	-9.603	0.373	-1.512	15.567	-9.603	8.421
Portugal	2.927	21.171	-13.153	8.667	-7.503	-4.352	1.293	-0.713	21.171	-13.153	12.411
Spain	5.262	17.276	-6.937	1.339	-3.054	-12.863	0.170	-0.858	17.276	-12.863	10.495
Sweden	2.626	21.420	1.481	7.128	3.384	-4.658	5.230	3.005	21.420	-4.658	8.806
Switzerland	-5.792	10.091	-6.499	4.438	-8.992	-4.306	-1.843	-5.049	10.091	-8.992	7.434
Turkey	8.443	6.732	-20.466	14.411	4.992	1.417	2.588	5.862	14.411	-20.466	12.082
United Kingdom	9.397	23.291	2.138	1.138	6.533	-13.196	4.883	4.335	23.291	-13.196	11.919
United States	22.441	8.569	-4.811	9.827	2.341	-7.636	5.122	5.455	22.441	-7.636	10.983

Table 2 presents the output losses as a percentage of the mean level of real GDP during various oil price rise episodes from 1965 to 2022 for different countries. For Australia, the output loss ranged from -2.635 during 2011Q4-2022Q3 to 15.749 during 1987Q1-1991Q3, with an average output loss of 2.951 and a standard deviation of 7.335. Austria experienced output losses ranging from -3.663 during 2001Q4-2010Q3 to 4.676 during 1998Q2-2000Q3, with a mean output loss of -0.177 and a standard deviation of 3.533. Belgium's output losses ranged from -3.857 during 1994Q3-1996Q4 to 8.039 during 1987Q1-1991Q3, with a mean of 0.676 and a standard deviation of 4.620. Canada had output losses between -5.605 during 2011Q4-2019Q3 and 18.657 during 1987Q1-1991Q3, with a mean of 6.156 and a standard deviation of 9.136. Denmark's output losses ranged from -9.002 during 2011Q4-2022Q3 to 8.608 during 1965Q3-1981Q1, with a mean of 1.237 and a standard deviation of 5.845. Finland showed output losses from -6.899 during 1994Q3-1996Q4 to 38.072 during 1987Q1-1991Q3, with an average of 4.641 and a standard deviation of 17.654.

France's output losses ranged from -3.247 during 1994Q3-1996Q4 to 8.877 during 1987Q1-1991Q3, with a mean of 1.557 and a standard deviation of 4.442. Germany experienced losses from -3.359 during 1987Q1-1991Q3 to 6.851 during 1965Q3-1981Q1, with a mean of -0.677 and a standard deviation of 3.834. Greece's losses ranged from -34.094 during 2011Q4-2019Q3 to 14.372 during 1965Q3-1981Q1, with a mean of -5.014 and a standard deviation of 15.892. Iceland's output losses ranged from -33.251 during 2011Q4-2022Q3 to 33.874 during 1987Q1-1991Q3, with a mean of 1.918 and a standard deviation of 24.270. Ireland showed output losses from -27.800 during 2011Q4-2019Q3 to 17.656 during 1987Q1-1991Q3, with an average of -2.894 and a standard deviation of 16.426. Italy experienced losses from -2.839 during 2011Q4-2022Q3 to 10.457 during 1987Q1-1991Q3, with a mean of 2.419 and a standard deviation of 5.527.

Japan's output losses ranged from -6.700 during 1998Q2-2000Q3 to 6.919 during 1987Q1-1991Q3, with a mean of 0.472 and a standard deviation of 4.774. Luxembourg had losses from -14.647 during 1994Q3-1996Q4 to 13.328 during 1998Q2-2000Q3, with a mean of 0.315 and a standard deviation of 11.423. Mexico's losses ranged from -25.984 during 1994Q3-1996Q4 to 15.813 during 1998Q2-2000Q3, with a mean of -7.226 and a standard deviation of 14.104. The Netherlands experienced output losses from -11.476 during 2001Q4-2010Q3 to 10.331 during 1965Q3-1981Q1, with a mean of -0.337 and a standard deviation of 9.402. New Zealand's losses ranged from -5.507 during 2011Q4-2022Q3 to 13.370 during 1994Q3-1996Q4, with a mean of 1.944 and a standard deviation of 7.964. Norway showed output losses from -9.603 during 2011Q4-2022Q3 to 15.567 during 1965Q3-1981Q1, with a mean of 0.373 and a standard deviation of 8.421. Portugal had output losses from -13.153 during 1994Q3-1996Q4 to 21.171 during 1987Q1-1991Q3, with a mean of 1.293 and a standard deviation of 12.411. Spain's losses ranged from -12.863 during 2011Q4-2019Q3 to 17.276 during 1987Q1-1991Q3, with a mean of 0.170 and a standard deviation of 10.495. Sweden experienced output losses

from -4.658 during 2011Q4-2019Q3 to 21.420 during 1987Q1-1991Q3, with a mean of 5.230 and a standard deviation of 8.806.

Switzerland had output losses from -8.992 during 2001Q4-2010Q3 to 10.091 during 1987Q1-1991Q3, with a mean of -1.843 and a standard deviation of 7.434. Turkey's losses ranged from -20.466 during 1994Q3-1996Q4 to 14.411 during 1998Q2-2000Q3, with a mean of 2.588 and a standard deviation of 12.082. The United Kingdom experienced losses from -13.196 during 2011Q4-2019Q3 to 23.291 during 1987Q1-1991Q3, with a mean of 4.883 and a standard deviation of 11.919. The United States had output losses ranging from -7.636 during 2011Q4-2022Q3 to 22.441 during 1965Q3-1981Q1, with a mean of 5.122 and a standard deviation of 10.983.

5. CONCLUSIONS

Citizens from all over the world are constantly concerned with the price of oil for a variety of reasons. Consequently, discussions about the dollar price of a barrel of crude oil frequently dominate conversations among academics, politicians, and journalists. Existing research that attempts to determine the relationship between higher oil prices and GDP losses often overlooks the likelihood that this relationship varies across different time periods and countries. In this paper, we draw upon techniques from the sacrifice ratio literature to develop an episodic method to quantify oil-associated output losses. Our calculations suggest that, on the whole, output losses associated with accelerations in oil prices are minimal. If anything, we appear to see higher real GDP relative to potential real GDP when oil prices climb. This finding challenges the common view that rising oil prices are always detrimental to economic performance. The findings of this paper open up avenues for future research to delve deeper into the causal relationships between higher oil prices and output losses. While this study refrains from attributing the cause of oil price shocks or establishing direct causal links between higher oil prices and output losses, future investigations could explore these aspects in greater detail. For instance, the period of output losses observed from 2009 to 2019 likely stemmed from a combination of factors, including both higher oil prices and the broader impact of the Great Recession. However, despite these complexities, our findings remain significant. It is notable that even with idiosyncratic factors influencing output gains from higher oil prices, we still observe aggregate positive output gains across twenty-five countries over a fifty-five year period. The breadth and duration of the data considered in this study underscore the notion that accelerating oil prices do not necessarily lead to substantial losses in real GDP. Instead, they may even contribute to a modest output boost. Future research could delve into the specific mechanisms through which this occurs and explore the implications for economic policy and decision-making.

REFERENCES

Ball, L. (1994). What determines the sacrifice ratio?. In *Monetary policy* (pp. 155-193). The University of Chicago Press.

Bernanke, B. S. (2004). Oil and the Economy. *Speech presented at Darton College, Albany, Ga*.

Cuñado, J., & de Gracia, F. P. (2003). Do oil price shocks matter? Evidence for some European countries. *Energy Economics*, *25*(2), 137-154.

Dhawan, R., Jeske, K., & Silos, P. (2010). Productivity, energy prices and the great moderation: A new link. *Review of Economic Dynamics*, *13*(3), 715-724.

Hamilton, J. D. (1983). Oil and the macro economy since World War II. *The Journal of Political Economy*, 228-248.

Jiménez-Rodríguez*, R., & Sánchez, M. (2005). Oil price shocks and real GDP growth: empirical evidence for some OECD countries. *Applied economics*, *37*(2), 201-228.

Kilian, L. (2006). Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market.

Kilian, L. (2008). The economic effects of energy price shocks. *Journal of Economic Literature*, *46*(4), 871-909.

Kim, I. M., & Loungani, P. (1992). The role of energy in real business cycle models. *Journal of Monetary Economics*, *29*(2), 173-189.

NEW YORK TIMES (2008). Congress Looks for a Culprit for Rising Oil Prices. New York Times.

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics*, *23*(5), 511-532.

Rasmussen, T., & Roitman, A. (2011). Oil shocks in a global perspective: Are they really that bad? *IMF Working Papers*, 1-29.

The Economists (2010). Oil Prices: Crude Awakening. The Economist.

The Guardian (2011). Oil prices may threaten global economic recovery, says energy agency. The Guardian.

Zhao, L., Zhang, X., Wang, S., & Xu, S. (2014). The effects of oil price shocks on output and inflation in China. *Energy Economics*.