

From #Hashtags to Legislation

Engagement and Support for Economic Reforms in the Gulf Cooperation Council Countries

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Abstract

Ownership of reforms by citizens is often presented as important for success. This paper explores media engagement and support for economic reforms in the Gulf Cooperation Council countries using text analysis techniques on publicly available sources. The results show that while reform efforts have intensified in recent years in the Gulf Cooperation Council countries, these efforts tend to focus on stronger rather than weaker policy areas, potentially limiting the growth-enhancing effect of reforms. Social media analysis using Twitter shows that the population's support for

reforms has been declining. The analysis of traditional news media points to more engagement by international than by local media. However, sentiment from international media is less positive about economic reforms in the Gulf Cooperation Council countries. Sentiment in international media and social media matters, as evidenced by its positive and strong correlation with foreign direct investment inflows into the Gulf Cooperation Council countries.

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From #Hashtags to Legislation: Engagement and Support for Economic Reforms in the Gulf Cooperation Council Countries

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I. Introduction

Before the pandemic, growth in the Middle East and North Africa region (MENA) recorded a noticeable slowdown due to structural barriers and shocks. The region experienced a systematic slowdown in growth, with the average growth rate declining from 4.6% between 2000 and 2009 to 3% between 2010 and 2019. As a result, most MENA countries lagged behind their income peers in growth in income per capita over the last two decades (Arezki et al., 2020a). In addition, the region has shown considerable heterogeneity in economic growth across countries. Most notably, developing oil exporters witnessed negative growth before the pandemic. The protracted low-growth performance has been caused by external shocks (e.g., sluggish global growth, falling oil prices), domestic shocks, and structural impediments to growth. Therefore, economic reforms will be crucial to restoring growth, especially after the Covid-19 crisis.

In recent years, the GCC countries - Saudi Arabia, United Arab Emirates, Kuwait, Oman, Bahrain, and Qatar- have engaged in profound economic reforms (IMF 2016, World Bank 2018). From initial reforms such as spending restraints, efforts are moving to deeper reforms, such as rolling back costly and distortionary energy subsidies, increasing revenues from the non-oil sector, implementing business environment and labor reforms, and public financial management reforms (World Bank 2018). Efforts to understand and support economic reforms in the GCC are much needed.

A key component in ensuring the sustainability of economic reforms is broad participation, engagement, and support for the economic reform process by the population and other domestic and international stakeholders. Broad participation in economic policies could bring many benefits. Broad participation and public deliberation have the potential to aggregate preferences and reshape them through dialogue and argumentation (World Bank, 2017). Examining these norms and preferences and how they evolve is key to understanding why conflicts of interest persist and how reformers can find common ground for socially beneficial reforms (Khemani, 2020). Broad participation and engagement could also increase the contestability of policy ideas. Consequently, reforms could be of higher quality, and efforts could be focused on the most-needed reforms. Available empirical evidence shows that citizen engagement largely improves outcomes at the local level (Baiocchi, 2005; World Bank, 2017). Citizen support can also be instrumental in improving the legitimacy of decisions. The Arab Spring is a powerful reminder of the importance of inclusiveness and public support.

Little has been done to analyze the engagement and support for economic reforms² in the GCC. This paper is an effort to fill in the needed gap using novel data from news and social media. The paper contributes to the existing literature on economic reforms, which has typically focused only on the effects of implemented reforms (see Prati et al., 2013, Alesina et al., 2020).

The paper uses text analysis techniques on publicly available big data sources: passed laws and decrees, social media, and news media. The use of data from newspapers and social media platforms has several advantages. They can be real-time and cover many countries. They can provide more granular and

² Economic reforms are understood as changes introduced with the intention to improve the economy. For example, we do not examine political reforms in this paper.

insightful analyses that are not possible with traditional economic reform data or surveys.³ For example, the paper measures engagement in economic reforms by constructing the share of news articles that discuss economic reforms. Sections III and IV discuss this in detail.

The remainder of the paper is organized as follows: Section II takes stock of the GCC's past and current economic reforms. It constructs a novel data set of passed laws and decrees by web-scraping national legislative archives from 1980 to 2019. Section III uses tweets in Arabic and text analysis techniques to understand the population's engagement and support for economic reforms. Section IV provides a similar analysis using a large data set of newspaper articles on economic reforms in English and Arabic. Finally, Section V concludes.

Section II reveals that reform efforts have intensified in recent years. The number of laws and decrees passed in the GCC has been quickly rising, driven partly by GCC countries' efforts to diversify their economies. However, these nations tend to pass more laws and decrees in stronger than weaker policy areas, indicating that reforms do not address lagging policy areas.

Section III documents increasing engagement but declining support for economic reforms from the population in recent years. The number of engaged users who tweet about economic reforms has increased in recent years. In addition, the number of economic reform tweets per engaged user has been rising dramatically. However, the sentiment of economic reform tweets is worsening, suggesting either growing discontent about the current economic situation or shrinking support for the current direction of economic reforms.

Section IV shows that international media is more engaged in economic reform discussions in the GCC countries than local media (and potentially domestic participants, more broadly). In addition, international media is more critical of the GCC's current economic situation or the directions of current economic reforms compared with local media. Sentiment from international media matters because it is correlated with FDI inflows into the GCC.

II. Taking Stock of Economic Reforms in the GCC

This section takes stock of the implemented economic reforms in the GCC because their content and focus could impact engagement and support from the population and other stakeholders. The objective is to understand whether these reforms are geared towards lagging policy areas. In doing so, a novel database of laws and decrees passed by the GCC countries is constructed. Data are obtained by web-scraping countries' national legislative archives (see Appendix A1 for the details). All recorded laws and decrees from 1980 to 2019 are collected for each country. Each downloaded legislation has a title, source, and date of the legislation.⁴

II.1 A Novel Database of Laws and Decrees in the GCC

Since we focus on economic reforms, we map the extracted laws and decrees to ten economic policy

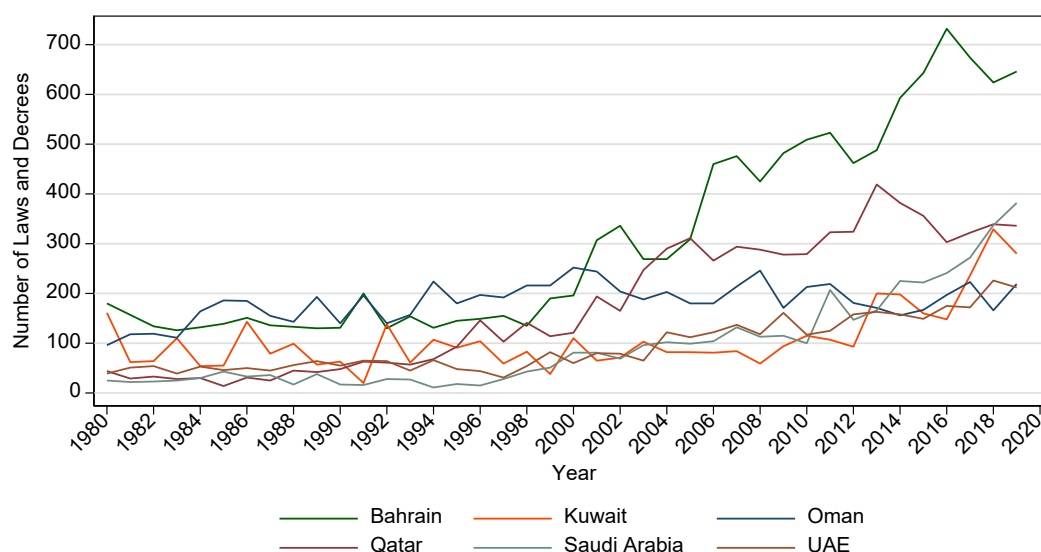
³ For example, the Arab Barometer (<https://www.arabbarometer.org/>) surveys people's view about current economic conditions among other issues in the MENA region. This is a related, but narrower, approach. GCC countries are not typically covered in the Arab Barometer. For example, only Kuwait was covered in the Fifth Wave (2018-2019).

⁴ Since many laws are in unpassable pdf or image format, we did not obtain the full content of all laws. This is left for future research.

pillars from the World Economic Forum's (WEF) Global Competitiveness Indices (GCI) and export diversification from the United Nations Conference on Trade and Development (UNCTAD).⁵ The mapping process was conducted using keyword searches in the titles of extracted laws and decrees.⁶ To the best of our knowledge, this presents the first comprehensive data set covering all GCC reforms passed from 1980 to 2019 by policy pillar (see Appendix A1 for a detailed explanation).

The number of passed laws and decrees has increased rapidly across the GCC countries in the last few years (see Figure II.1), reflecting intensifying reform efforts. Among the policy pillars, “Diversification” contributes most significantly to the increase in many countries (see Figure A1.2 in Appendix A1).

Figure II.1: Total Number of Laws and Decrees in the GCC countries – 1980-2019



II.2 Do Economic Reforms in the GCC Focus on Lagging Policy Areas?

We examine whether the GCC countries implement reforms in lagging policy areas, as measured by the World Economic Forum's (WEF) Global Competitiveness Indices (GCI) and the United Nations Conference on Trade and Development (UNCTAD)'s Export Diversification. We construct a "Distance to Policy Frontier" measure for each GCC country and policy pillar. A higher score implies that the country is further away from the policy frontier, based on the ranking of WEF's GCI and UNCTAD (see Appendix A2 for details).

Figure II.2 presents scatterplots between the Number of Laws and Decrees passed versus lagged Distance to Policy Frontier (i.e., the distance to policy frontier *in the previous year*) between 2008 and 2018. The figures reveal that the GCC countries passed more laws and decrees in policy areas closer to the policy frontiers. In other words, economic reforms in the GCC do not focus on lagging policy areas, at least in terms of quantity. This finding is true for all countries except Saudi Arabia. “Innovation” and “Technology

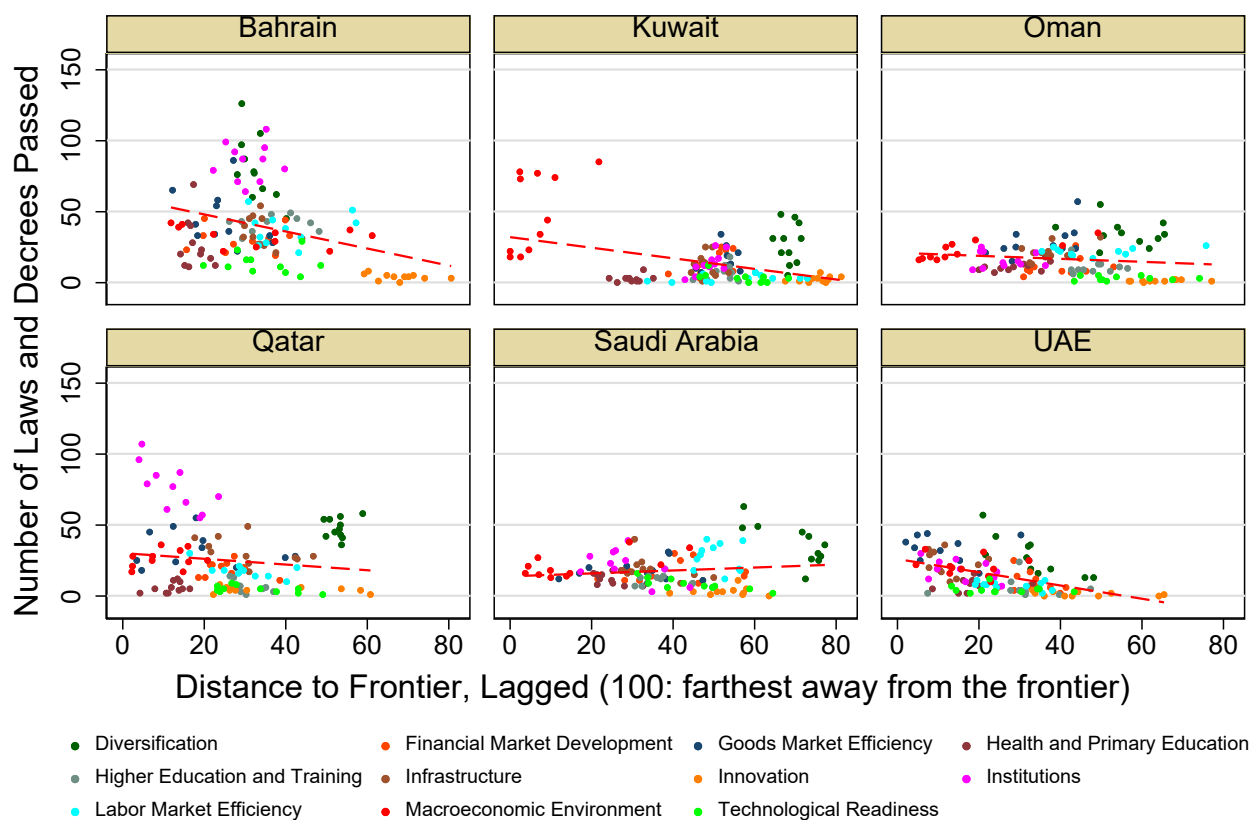
⁵ The final eleven policy pillars are as follows: Institutions; Infrastructure; Macroeconomic Environment; Health and Primary Education; Higher Education and Training; Goods Market Efficiency; Labor Market Efficiency; Financial Market Development; Technological Readiness; Innovation; and Export Diversification.

⁶ Note that many laws and decrees are not mapped to any policy pillar (see Appendix A1).

Readiness” are two important lagging policy areas that have relatively few numbers of laws and decrees. In contrast, “Diversification”, also a lagging policy area, has received more laws and decrees. We test this hypothesis formally in Appendix A2 with different econometric specifications and confirm the robustness of this finding.

One possible explanation for the finding is that countries enter a 'virtuous cycle' whereby they have more capacity to implement reforms in areas of pre-existing strength. Another argument is related to the sequencing of reforms. The ‘right’ reforms are not necessarily on weak policy areas but the most logical next step (Edwards, 2009; Feltenstein and Nsouli, 2003). More studies and thoughtful debates are needed to understand the countries’ current reform efforts. They will likely help policy makers boost the engagement and support for economic reforms, which we will discuss in the next section.

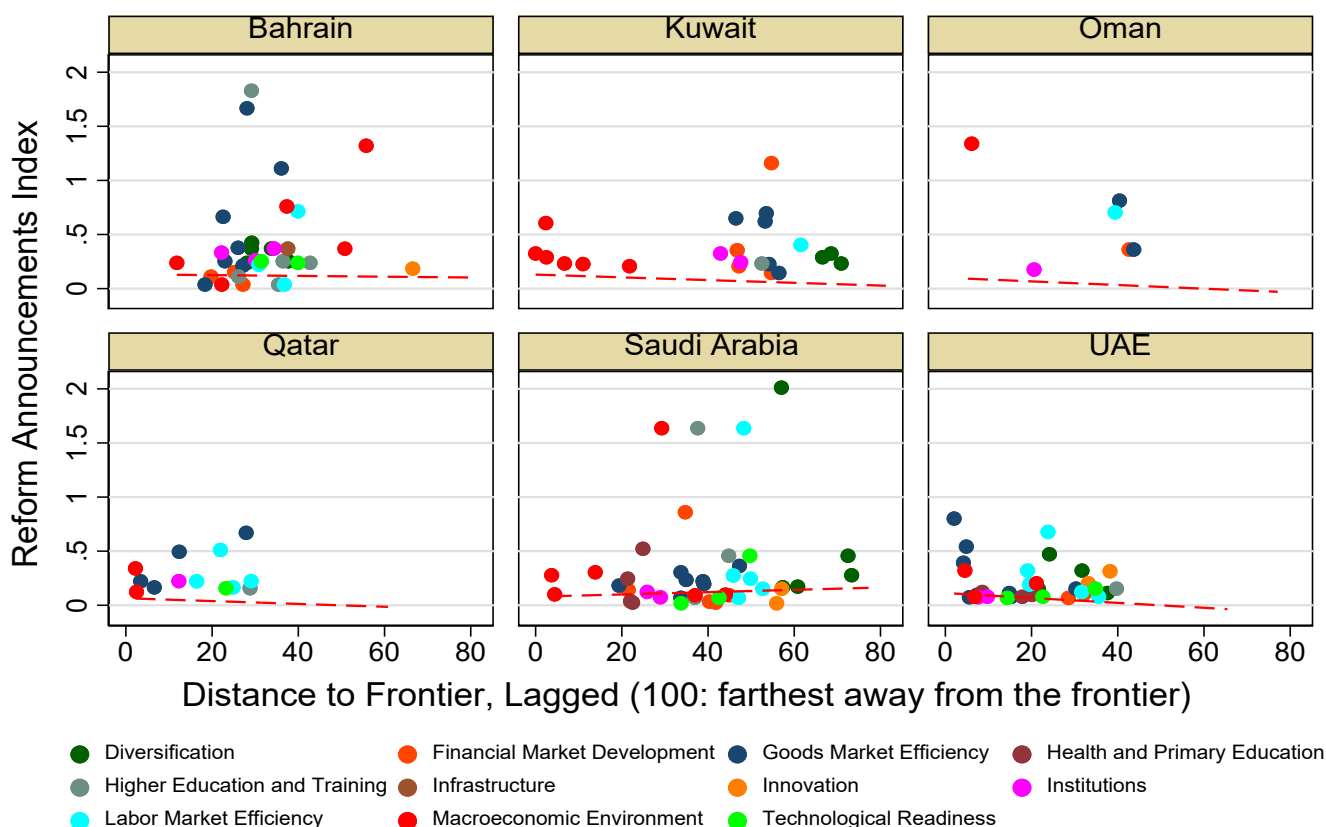
Figure II.2: Number of Laws and Decrees Passed and Lagged of Distance to Policy Frontier



Note: A higher ‘Distance to Policy Frontier’ implies being farther away from policy best practices. GCI data are from 2007 to 2017 due to data constraints from WEF’s GCI database (the GCI scores are only methodically consistent and comparable across years during this period).

The number of the laws and decrees might not capture the most important laws and decrees. In other words, it might not reflect the depth and significance of economic reforms. We use news media to provide a robustness check by focusing on reform announcements in the press. The argument is that media chatter about reform announcements can pick up reforms that are perceived as important. Similar results are obtained when reform announcements are used instead of the number of laws and decrees. Figure II.3 shows scatterplots between the reform announcements about a policy pillar versus its lagged Distance to Policy Frontier (i.e., the distance to the policy frontier *in the previous year*) between 2007 and 2017. A policy pillar's lagged distance to the frontier is not significantly correlated to reform announcements (see Appendix A2 for more detail).

Figure II.3: Number of Laws and Decrees Passed and Reform Announcements



Note: A higher 'Distance to Policy Frontier' implies being farther away from policy best practices. GCI data are from 2007 to 2017 due to data constraints from WEF's GCI database (the GCI scores are only methodically consistent and comparable across years during this period).

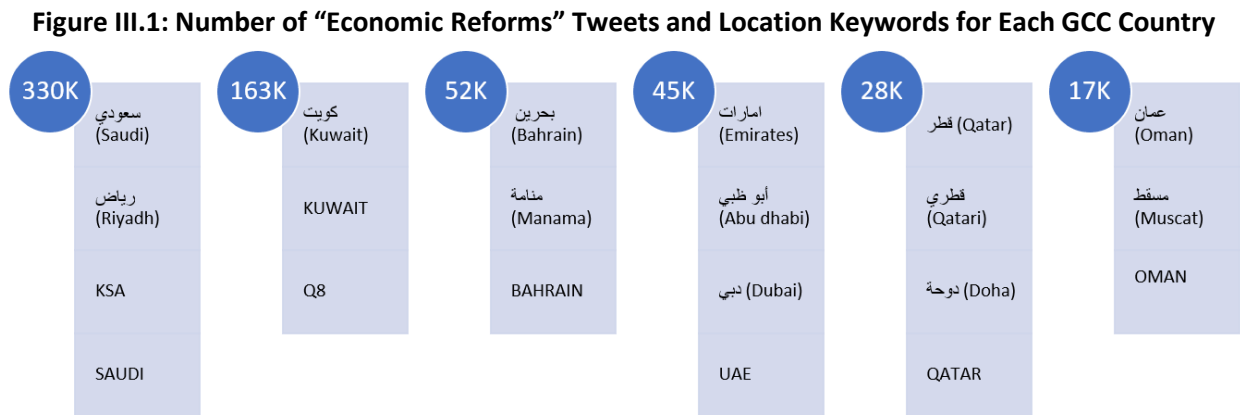
III. Population's Engagement and Support for Economic Reforms: Insights from Social Media

Drawing insights from social media, this section examines the people's engagement and support for current economic reforms in the GCC. As demonstrated by the long-lasting consequences of the Arab Spring, this aspect is critical for the long-term sustainability of economic reforms. Our thesis is that social media can reflect the population's true sentiment toward economic reforms. To our best knowledge, this paper is the first systematic effort to shed light on the general attitude towards economic reforms in the GCC countries.

Over the last decade, social media has grown as a medium through which people communicate, obtain information, and express themselves. Naturally, this has been reflected in economic research, with an increasing number of studies using data from Facebook, Twitter, and other platforms to study real-world outcomes. Most existing research examines the role of social media in protests and other extreme social actions. For example, Muller and Schwarz (2020a) show how anti-refugee posts on Facebook are associated with hate crimes against refugees across German municipalities; Muller and Schwarz (2020b) obtain similar results for anti-minority crimes in the United States. Several studies show how social media can galvanize protest participation (Enikolopov et al., 2020; Arezki et al., 2020c), increase xenophobic attitudes (Bursztyn et al., 2020), and expose corruption in state-owned companies (Enikolopov et al., 2018). We contribute to this literature by examining the engagement and support for economic reforms in the GCC via social media. Despite rising government reform efforts and engagement from the population, sentiment about economic reforms is declining. Sentiment matters because we find strong correlations between social media sentiment and FDI inflows (Table A7.2 in Appendix A7).

III.1 Economic Reform Tweets

We select Twitter for the analyses because of its increasingly powerful role in social media. It is also technically simpler to analyze compared with other social media tools. We collect tweets in Arabic between 2009 and mid-2020. However, since tweet data were not fully downloaded for 2009 and 2010, we focus on 2011 and onwards. Using the keywords “reform(s)” in Arabic as filters, we collected more than 16 million tweets in Arabic during the 2011-2020 period. After filtering out tweets that do not discuss economic reforms, we are left with about 2 million tweets in Arabic. Consequently, we obtain about 650,000 economic reform tweets mentioning the GCC countries. Appendix A3 explains the process in detail, including discussions on other issues such as data cleaning and the removal of fake accounts. Figure III.1 shows the number of economic reform tweets for each GCC country.



Note: The number of tweets includes comments and retweets. Data are from 2011 to mid-2020

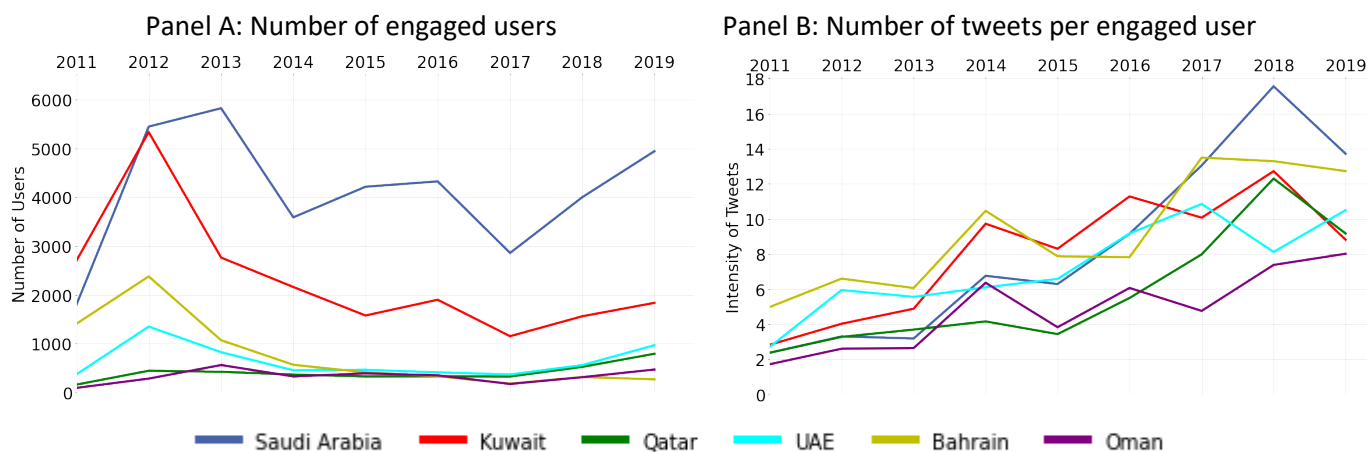
III.2 Population’s Engagement in Discussions on Economic Reforms

We compute the intensity of economic reform tweets by calculating the ratio of the number of “economic reform” tweets to the number of users who tweeted at least once about economic reforms in a year. In other words, the

intensity of tweets is defined as the average number of economic reform tweets per user who participated in the economic reform discussions. This index is our measure of the population's engagement.⁷

The population's engagement appears to pick up in recent years. In 2011 and 2012, discussions on economic reforms intensified in social media, corresponding to the demand for change during the Arab Spring (Panel A of Figure III.2). The number of people tweeting about economic reforms slowed down after the Arab Spring before increasing again. Interestingly, the intensity of discussion among engaged people has risen over the years (Panel B of Figure III.2). In other words, the average number of tweets per engaged user has been growing. For example, in Saudi Arabia, the average number of tweets per account tweeting about economic reforms is about 14 in 2019.

Figure III.2: Intensity of Tweets over Time in the GCC Countries.



Note: "Engaged users" are those that tweet about economic reforms in a year. Panel B shows the average number of "economic reform" tweets per engaged user.

III.3 Population's Support for Economic Reforms

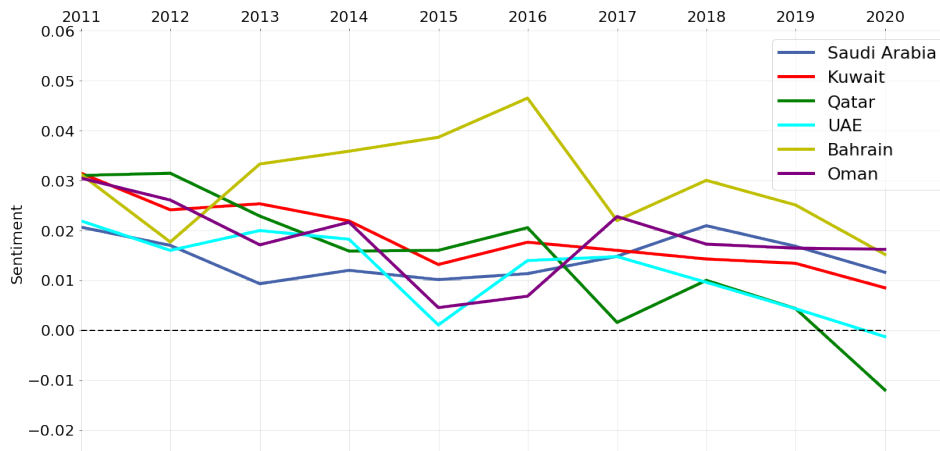
After documenting rising public engagement in economic reforms, we examine the level of the population's support. Sentiment analysis of economic reform discussions on social media is valuable to gauge the population's support for the current economic situation and the current direction of economic reforms. We extract people's sentiment from economic and social reform tweets in the GCC based on dictionaries of positive versus negative words that we manually label (see Appendix A3 for detail). An economic reform tweet with a *negative* tone could imply either discontent about the economic conditions and demand for economic reforms *or* disapproval of the current economic reforms. Although our approach cannot distinguish between the two possibilities, it is safe to assume that a more negative sentiment implies growing discontent about the economic "status quo".

Public support for the current economic situation or current economic reforms remains positive but is declining for the GCC countries (Figure III.3). This downward trend is most apparent in the case of Qatar. On the other hand,

⁷ Ideally, a measure of population's engagement should be the number of economic reform tweets divided by the total number of tweets about a country. Since we could not obtain the total number of tweets about a country, we rely on the number of users in our data set. Another disadvantage of this approach is data for 2020 are not comparable to other years since we only have tweets for the first half of 2020.

sentiment picked up slightly in 2016 in many countries, coinciding with a recovery in oil prices. It is also interesting to note an uptick in sentiment in 2018 in Saudi Arabia. However, the support faded in 2019 and 2020, mainly driven by declining sentiment in tweets about “Energy” and “Fiscal” topics (see Figure A3.1 in Appendix A3). This trend may reflect the population’s worry about the energy sector and fiscal conditions of Saudi Arabia.

Figure III.3: Sentiment about Economic Reforms in Twitter



Note: A declining sentiment indicates growing discontent about the economic conditions and demand for economic reforms or growing disapproval of the current economic reforms.

It is important to understand the sources of public support for economic reforms. In other words, is the sentiment of local tweets high or lower than that of international tweets? To answer this question, we classify tweets discussing economic reforms by the location of each user (see Appendix A3). For each country, we create five sentiment indexes of tweets based on: (i) All tweets about the country, (ii) Tweets from users not disclosing their locations in their Twitter accounts (46% of users), (iii) Tweets from users registered inside the country, (iv) Tweets from users registered outside the country, and (v) Tweets from users registered outside all the GCC countries. Figure III.4 shows the five sentiment indices for each country.

Local tweets generally have higher support regarding current economic reforms than international tweets or those without location information. This finding suggests relatively stronger support from the local population. The divergence of sentiment between local and international tweets is noteworthy.⁸ In some cases, such as Saudi Arabia in 2019 and 2020, the divergence grew quickly.

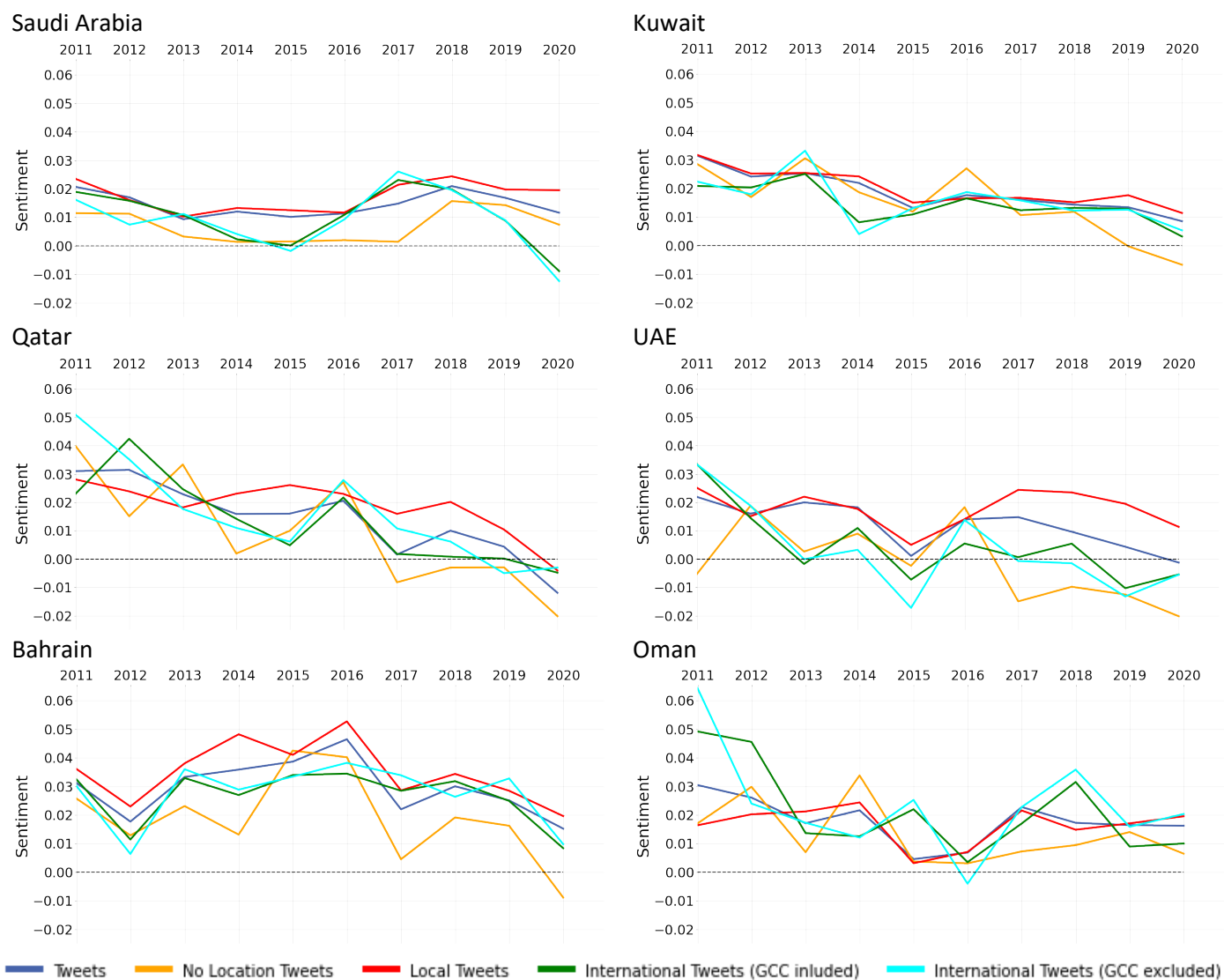
The final part of this section attempts to uncover the extent to which government-friendly users drive local support. Although It is difficult to identify government-friendly users, we try the following approach. First, we remove tweets from accounts we identify as bots (see Appendix A3). Second, we select tweets from officials and state organizations for each country (see Appendix A3) and compare the tweets’ sentiment to the rest of the population.

Our findings show that sentiment from official accounts has moved in tandem with common people’s. However, there is an important exception in Saudi Arabia, where the sentiment of common people’s tweets is much lower

⁸ Note that we apply the same methodology to measure sentiment (see Appendix A3), the divergence of sentiment cannot be explained by the methodology.

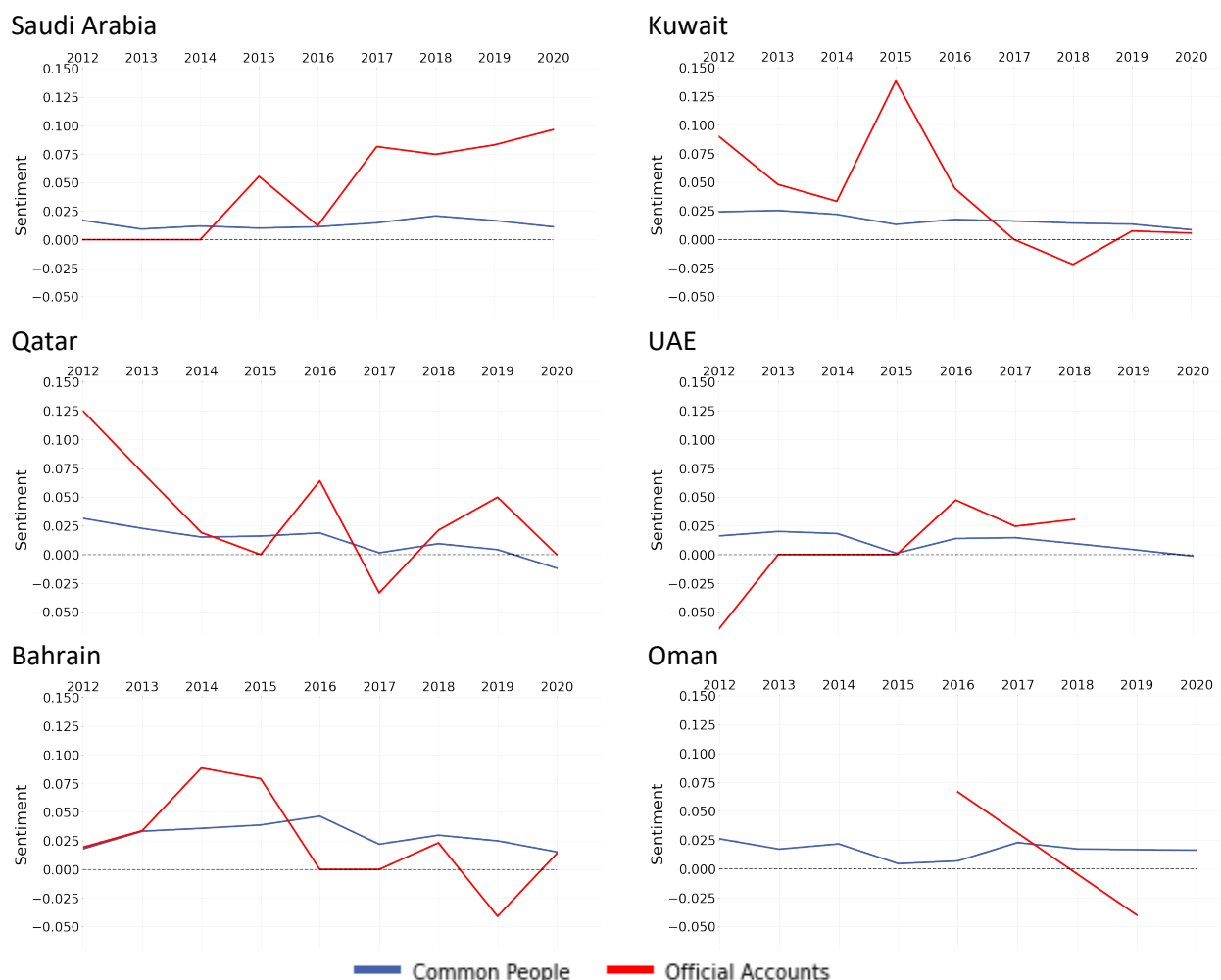
than that of official accounts (see Figure III.5). Moreover, this divergence has been especially sharp over the last few years. This finding merits further investigation.

Figure III.4: Sentiment about Economic Reforms, by User Location



Note: The five series are (i) all economic reform tweets about a country, (ii) tweets from users not disclosing their locations in their Twitter accounts, (iii) tweets from users registered inside the country (local tweets), (iv) tweets from users registered outside the country, and (v) tweets from users registered outside all the GCC countries.

Figure III.5: Sentiment by Account Types: Official Accounts vs. Common People



Note: some countries have incomplete lines across years because of insufficient data for Official Accounts.

IV. Engagement and Support for Economic Reforms: Insights from News Media

This section examines news media's engagement and support for economic reforms in the GCC. News media analyses can complement and validate social media analyses. News articles are longer, contain richer information than tweets, and may reflect other stakeholders' views, such as international investors, international governments, and organizations. On the other hand, news media could be more biased than social media.

News media has been recognized as an important reflection and driver of economic, political, and social phenomena.⁹ Arezki et al. (2020b) use newspaper data from Factiva to study how discussions about economic reforms respond to economic conditions in over 180 countries. Several other research papers have used newspaper data to study economic policy uncertainty (Baker et al., 2016), the ideological bias of media coverage (Gentzkow and Shapiro, 2010; Groseclose and Milyo, 2005), terrorism, and other

⁹ See Zhuravskaya et al. (2020) and DellaVigna and Ferrara (2015) for two excellent surveys on media and political economy. Gentzkow et al. (2019) provide a broader survey on the use of 'text as data'.

violent activities (Besley et al., 2019), and public support for foreign military interventions (Fetzer et al., 2021). Our paper focuses on news media coverage and sentiment about economic reforms in the GCC.

We use newspaper data from the Dow Jones News Snapshot API. This global news database provides access to newspaper articles from thousands of sources in 28 languages. In addition to the full text, it also includes tags for each document, which identify the following: (i) country or countries discussed in the article, (ii) the country of origin of the newspaper, and (iii) the subject(s) of the articles. For this paper, we carefully select articles in the 28 languages which contain terms relating to "economy" and "reforms" for each of the six GCC countries (see Appendix A4). Our methodology yields 138,782 articles that are tagged to one or more of the six GCC countries. Of these, 46% are in English, 39% are in Arabic, and the remaining 15% are in 26 other languages. Therefore, this paper focuses on English and Arabic media.

IV.1 Engagement in Discussions on Economic Reform the from News Media

We begin by analyzing the evolution of reform coverage across the GCC countries. We find that the number of economic reform articles varies significantly over time and across countries. To address this, we create an index for each country that captures *the percentage of all news articles that discuss economic reforms*. In other words, we normalize the number of economic reform articles about a country by the total number of articles about that country. For country i in year t , the index has the following form

$$Reform\ Chatter\ Index_{i,t} = 100 \times \frac{Economic\ Reform\ Articles_{i,t}}{Total\ Articles_{i,t}}.$$

The reform chatter index can be classified by source: local news (e.g., UAE newspapers writing about the UAE), GCC international news (e.g., Bahraini newspapers writing about the UAE), and non-GCC international news. The index can also be classified into different reform topics based on topic analysis techniques. Appendix A5 provides a detailed description of the topic analysis as well as its findings.

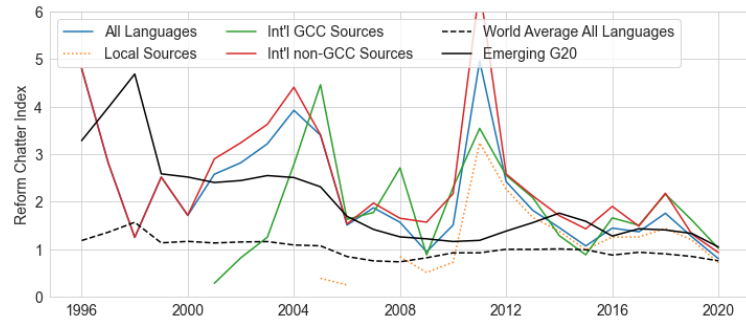
Figure IV.1 shows the overall index and the subindices by source type. The reform chatter index for the GCC is in the same range as emerging G20 countries in recent years. However, Saudi Arabia has the highest chatter index in recent years, much higher than the emerging G20 average. In addition, reform talks spike around important years. For example, the chatter index rises for Bahrain and Oman around the Arab Spring, indicating a response of economic reform discussions to political pressure. Saudi Arabia has seen a strong rise in reform chatter, consistent with its significant reform agenda in recent years. The figures also show how reform chatter from local sources is consistently lower than that from international sources in many GCC countries, except Qatar. This finding suggests a *relative* disengagement from economic reform discussions from local media and potentially other local stakeholders.

Another aspect of the relative local disengagement is that reform chatter in local media is less responsive to economic shocks than international media. We focus on commodity price shocks (which is dominated by oil price for the GCC countries).¹⁰ When commodity prices are low, chatter in the GCC increases. Interestingly, in these moments, chatter rises more significantly in international news than in local news (see Figure IV.2), pointing to relative disengagement with economic reforms from local media.

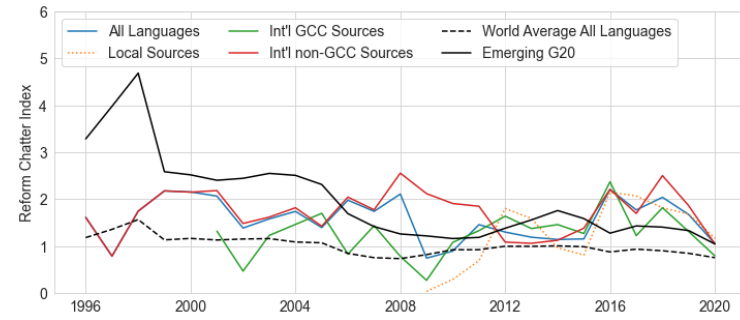
¹⁰ A commodity price shock of a country at time t is constructed by Gruss and Kebhaj (2019), as follows $\Delta \log(ComPI)_t = \sum_{j=1}^J \Delta \log(P_{j,t}) \Omega_j$, where $P_{j,t}$ is the price of commodity j in year t ; Ω_j denote commodity-specific average share of commodity j in the country's export. For the GCC, oil constitute a big share of exports.

Figure IV.1: Reform Chatter Index for the GCC– Number of Reform News Articles as % of Total News Articles

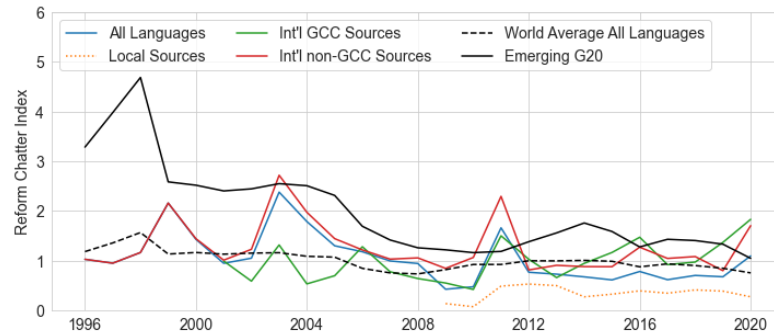
Bahrain



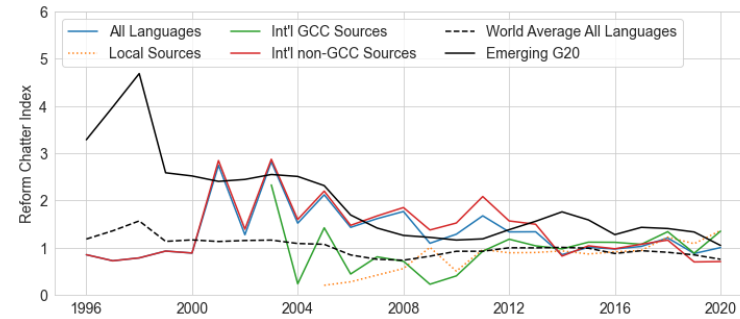
Kuwait



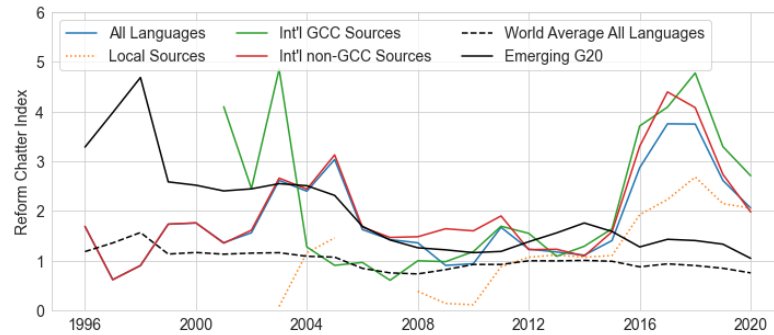
Oman



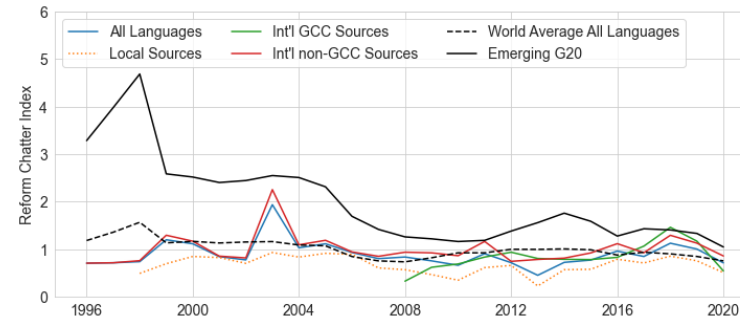
Qatar



Saudi Arabia



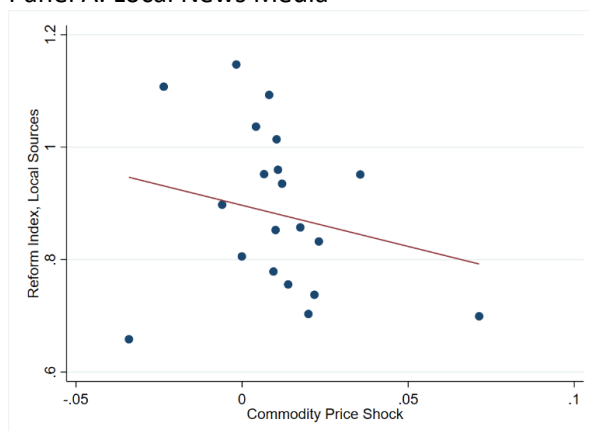
UAE



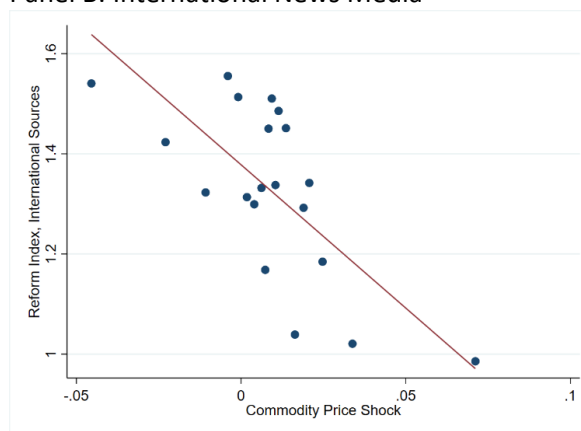
Note: Emerging G-20 countries include Argentina, Brazil, China, India, Republic of Korea, Mexico, Russia, South Africa, and Turkey.

Figure IV.2: GCC Economic Reform Chatter Index and Commodity Shocks

Panel A: Local News Media



Panel B: International News Media



Note: This figure presents two partial bin scatterplots on the relationship between reform chatter index and commodity shocks for the GCC countries. Country and time fixed effects are controlled. Reform chatter about the GCC in international media is more responsive to commodity price shocks.

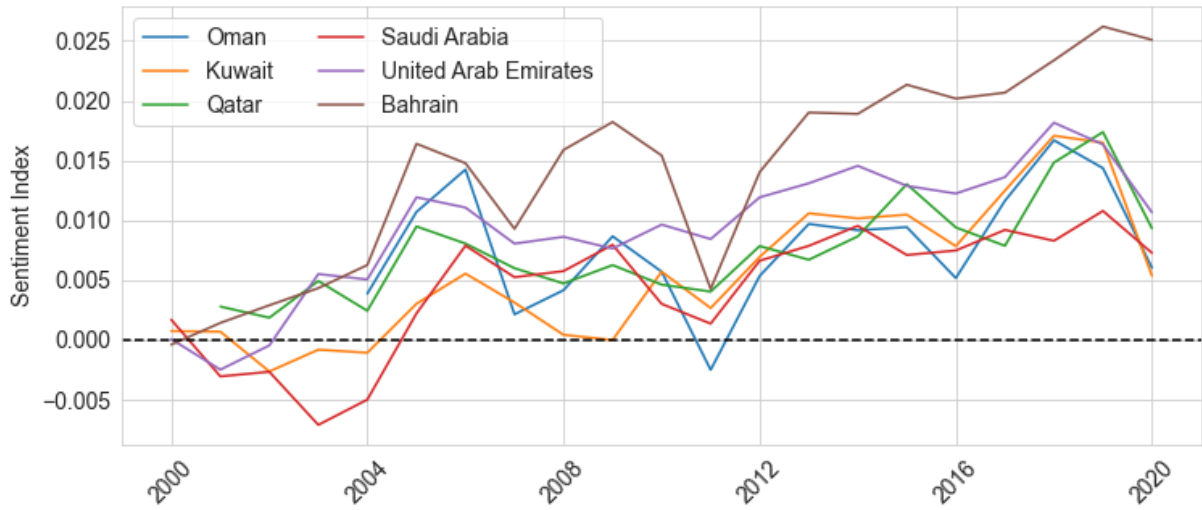
IV.2 Support for Economic Reforms from the News Media

The sentiment of economic reform discussions is important because it reflects news media's support, and potentially the public's support, for economic reforms. Based on the relative use of positive and negative words in news articles, we construct a sentiment index for each economic reform news article and then construct the average sentiment. The methodological details are discussed in Appendix A6. The sentiment index can be interpreted as support for current economic conditions or current directions of economic reforms.

Our results suggest that the news media sentiment has been trending upwards for all GCC countries (Figure IV.3). However, the upward trend is driven mostly by local news media (Figure IV.4). There have been periods of depressed sentiment, particularly following the Arab Spring in 2010 in Bahrain and Oman—a possible reflection of the discontent towards economic conditions and demand for economic change in these countries. Similarly, we observe troughs around the Global Financial Crisis.

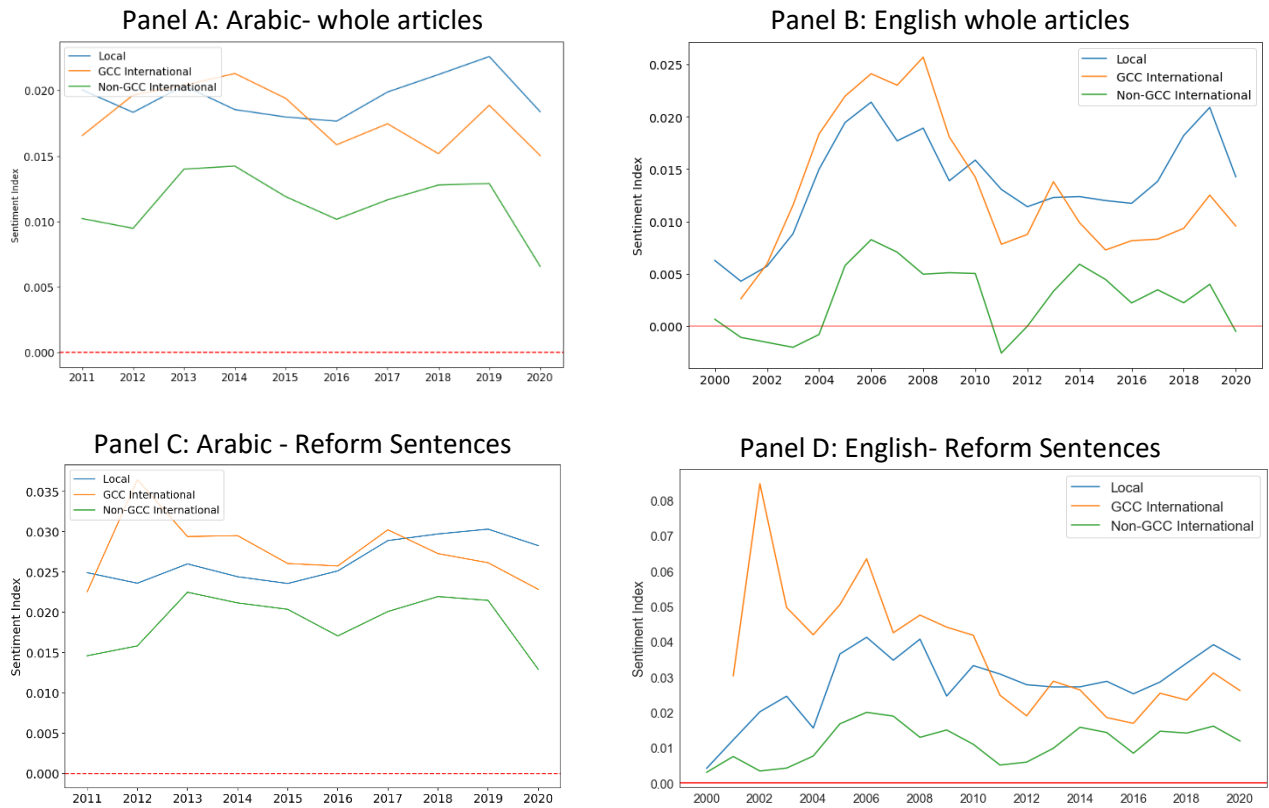
As with reform chatter, economic reform sentiment indices by local news, GCC international news, and non-GCC international news diverge. News originating outside the GCC has consistently exhibited less positive sentiment than news originating from the GCC. Since 2017, the three sources display a clear trichotomy, with local news being the most positive, followed by GCC international, followed by non-GCC international news (Figure IV.4). The pattern holds for whole articles (Panels A and B). This finding indicates that international news media is more critical of the economic status quo in the GCC than local media. Finally, sentiment dropped sharply in 2020, probably due to the Covid-19 pandemic and associated economic conditions.

Figure IV.3: Sentiment of Reforms Discussions



Note: The sentiment is constructed using newspaper articles in English and Arabic

Figure IV.4: Sentiment of Reform Discussions, by Sources



Note that sentiment can be interpreted as either support for current economic conditions or current directions of economic reforms, or both. To zoom into sentiment about economic reforms, we examine sentiment on “reform sentences” only. Reform sentences contain the word “reform(s)”. The argument is that these sentences are more likely about economic reforms than about the economic status quo. We manually check a small set of reform sentences in Arabic and English and confirm that these reform sentences do discuss reforms and not the economic conditions. The sentiment divergence remains the same. The sentiment of reform sentences in news articles outside the GCC is consistently more negative than news from the GCC and local news (Panels C and D of Figure IV.4), suggesting that sentiment about economic reforms in the GCC is robustly more negative from the international news.

Two other findings provide indirect evidence to support the argument that reform news articles talk about economic reforms. First, the sentiment of full articles and of reform sentences is highly correlated. Second, sentiment for local and international sources is not significantly correlated with oil price shocks. In other words, reform sentiment does not drop when oil prices drop. This finding suggests reform news articles are more likely to discuss economic reforms than just economic conditions. If news articles discuss the latter, the sentiment (about economic conditions) will likely decline when oil prices drop.

Why does sentiment from outside the GCC matter? We explore whether non-GCC international media sentiment has real effects. One such outcome that attracts great interest is FDI inflows. We find that sentiment about GCC economic reforms in the non-GCC international media is significantly and robustly correlated with the level of FDI inflows to the GCC (see Table A7.1 in Appendix A7).¹¹ Interestingly, reform chatter is not correlated with FDI inflows. This finding suggests that the support for the current reforms matters for FDI decisions. In other words, “talk is not cheap”. FDI inflows also correlate with the GCC’s GDP growth and trade openness in the same year.

V. Conclusion

This paper finds that GCC reform efforts have intensified in recent years, as indicated by the rapidly rising number of passed laws and decrees. Nevertheless, the GCC countries tend to pass more laws and decrees in stronger policy areas. Using data from the social media platform Twitter, the paper discovers increasing engagement from the population. In addition, the number of economic reform tweets per engaged user has risen dramatically. Nevertheless, support for economic reforms from the population is declining, suggesting either growing discontent about the current economic situation or shrinking support for the current direction of economic reforms. Data from news media show that international media is more engaged but less positive about the GCC’s economic reforms than local media. These findings suggest a relative disengagement from economic reform discussions by local media (and potentially domestic participants). The more negative tone from international media, which possibly reflects international stakeholders’ views, is noteworthy. Sentiment in international media and social media matters because it is found to be correlated with FDI inflows into the GCC.

¹¹ The literature on the determinants of FDI inflows is very broad, covering different regions, time periods, data sets, and employing different methodologies. Some examples include Gammoudi and Cherif (2016) who study the MENA region, Hintosova et al. (2018) for the ‘Visegrad’ countries in Eastern Europe, and Asongu et al. (2018) on the BRICS and MINT countries. Our estimations follow the literature in including variables for GDP growth, inflation, trade openness, and institutional quality, in addition to the media-based variables.

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Appendix

Appendix A1: A Novel Database of Laws and Decrees in the GCC

Our first contribution is a novel database of past and current economic reforms from all the GCC countries. We obtain these data from each country's national legislative archives by web-scraping from the following sources:

- **Bahrain:** The Legislation & Legal Opinion Commission ([link](#))
- **Kuwait:** The General Secretariat of the National Assembly ([link](#))
- **Oman:** Oman Law ([link](#))
- **Qatar:** Al-Meezan (Qatar Legal Portal) ([link](#))
- **Saudi Arabia:** National Center for Archives and Record ([link](#))
- **UAE:** The Ministry of Justice ([link](#))

After extracting laws and decrees from the online archives, we tagged them according to a classification system corresponding to the WEF's Global Competitive Index (GCI) pillars and an additional diversification category corresponding to UNCTAD's Export Concentration Ratio. We conducted the tagging by creating keywords for each category and searching for those terms in each title. For example, the "innovation" category's key terms include research, intellectual property, artificial intelligence, technology, inventions, etc. If at least one word in a category's keywords is found, we apply that category's tag. We allow for a law to fall under multiple categories. We do not include laws for which we found no category matches in our analysis. The WEF's GCI pillars and their definitions are in Table A1.1.

Table A1.1 Definitions of policy pillars

Pillar	Definition
<i>Institutions</i>	The legal and administrative framework within which individuals, firms, and governments interact to create wealth. This measure is weighed down by excessive bureaucracy, lack of transparency, corruption, improper management of public finances, etc. Private institutions are also included.
<i>Infrastructure</i>	Transportation and communications infrastructure, including roads, ports, railroads, air transport, fixed telephone lines, and mobile penetration. The availability and reliability of electricity supplies are also included.
<i>Macroeconomic Environment</i>	Macroeconomic environment's stability, including fiscal deficits, public debt, inflation rates, and national savings.
<i>Health and Primary Education</i>	A general assessment of the population's health (including investment in the provision of health services) and the quality and quantity of basic education.
<i>Higher Education and Training</i>	Measures secondary and tertiary enrollment rates as well as the perceived quality of education by business leaders. Staff, vocational and on-the-job training are also included.
<i>Goods Market Efficiency</i>	Measures the ease of trade and doing business, healthy market competition, absence of restrictions on FDI, buyer sophistication, customer orientation, etc.
<i>Labor Market Efficiency</i>	Measures the flexibility of wages, productivity, female participation in the labor force, hiring and firing practices, and labor-employer relations. Workplaces must also promote meritocracy.

<i>Financial Market Development</i>	A combined measure of the amount of capital and capital markets' efficiency. Measures local equity market size, venture capital availability, ease of accessing loans, regulations of exchanges, banking regulations, and investor rights and protections
<i>Technological Readiness</i>	The economy's adoption of existing technologies to enhance productivity, with a focus on ICT. Measures availability of latest technologies, FDI and technology transfer, internet penetration, and firm-level technology adoption
<i>Market Size</i>	Combined measurement of local and foreign (via exports) market sizes
<i>Business Sophistication</i>	The overall quality of business networks and individual firms' operations and strategies. Measures cluster development, process sophistication, value chain breadth, competitive advantages, quality and quantity of suppliers, the extent of marketing, etc.
<i>Innovation</i>	Measures capacity for innovation, R&D spend (both public and private), quality of research institutions, availability of scientists and engineers, and procurement of advanced technology

Source: World Economic Forum

Two of these twelve pillars—market size and business sophistication— cannot be comfortably tagged. Hence, we do not include them.

We include an additional category—Diversification—tied to UNCTAD's Export Concentration Ratio.

<i>Diversification</i>	Measures progress in key non-oil sectors into which GCC countries have been attempting to diversify, including tourism, manufacturing, logistics, SMEs, and financial markets. Any laws containing any element related to these sectors is included
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Since finding keywords for Business Sophistication and Market Size is difficult, we drop the two pillars. Adding diversification, we establish our eleven legislative categories:

- | | |
|----------------------------------|------------------------------------|
| I. Institutions | II. Infrastructure |
| III. Macroeconomic Environment | IV. Health and Primary Education |
| V. Higher Education and Training | VI. Goods Market Efficiency |
| VII. Labor Market Efficiency | VIII. Financial Market Development |
| IX. Technological Readiness | X. Innovation |
| XI. Diversification | |

Table A1.2 shows the Arabic keywords we used to tag the laws and decrees into pillars.

Table A1.2 Arabic keywords for policy pillars

Pillar	Keywords
<i>Institutions</i>	منازعات مظالم محكمة محاكم جزاءات جزائي قضاء قضائي النيابة مرافعات محكوم عقوب محامي محاماة محاماه عدال قضا طعن قانونية تحكيم عدالة محام وسائل الإثبات نيابات محكم معاقب احداث الأحداث الاستئنافي جزائي جنائي خدمة قاض مستشار القانون قضائي كتاب بالعدل قاضي فساد هدايا

	توظيف بحرنة تقطير تعمين سعودة تكويت سوق العمل الجزاءات المالية حماية الأجور قانون العمل ساعات العمل القوى العاملة مواعيد العمل وزارة العمل نظام العمل عقد العمل إصابة عمل مزاوله العمل العمل المؤقت تصاريح العمل ميثاق عمل إقامة إقامة
Financial Market Development	سيولة سهم إكتتاب سوق المال أسواق المال بنك إفلاس السوق بنوك القانون المالي إكتتاب استثمار مستثمر استثمار رأس مال تمويل أموال مصارف صكوك قطاع المالي بورصة سوق الأسهم مصرفي الإسناد بنوك إفلاس شيك إعسار تسليف أوراق المالية مستندات الصرف كفاية المالية صرافة غسيل الاموال
Technological Readiness	إحصاء إحصائي معلومات كمبيوتر إحصاء إحصائي إلكتروني إلكتروني تقنية حوسبة السحابية حاسبات الآلي الحاسب الآلي حواسيب الآلي
Innovation	أبحاث اختراع بحوث مختبرات الذكاء الاصطناع دراسات أبحاث فضاء معرفي تكنولوجيا ملكية فكرية ملكية الفكرية
Diversification	سياح تأشير سفريات عطلات المنشآت الصغيرة المؤسسات الصغيرة مؤسسات متناهية الصغر مشروعات الصغيرة شركات الصغيرة مشاريع الصغيرة هايدرو كاربون تعدين صناع مصنع معادن معدني مصانع ألنيوم فنادق متاحف متحف معارض فندق مهرجان كيمائي سكك الحديد بحار ميناء موانئ لوجست خطوط الحديد طائر طيران موانئ جوي مخازن ترانزيت الشحن بضائع موانئ خطوط حديد كيميائي سيولة سهم إكتتاب سوق المال أسواق المال بنك إفلاس السوق بنوك القانون المالي إكتتاب استثمار مستثمر استثمار رأس مال تمويل أموال مصارف صكوك قطاع المالي سوق الأسهم مصرفي الإسناد بورصة إفلاس شيك إعسار تسليف أوراق المالية مستندات الصرف كفاية المالية صرافة غسيل الاموال سفن مطار بحر جوي

Table A1.3 provides loose English translations for the terms in Table A1.2. Please note the translations are mostly in spirit, rather than literal, to retain the content of these laws.

Table A1.3 Translations of Arabic keywords for policy pillars

Pillar	Keywords
Institutions	Dispute, grievance, court, penal, judge, judicial, prosecution, plead, accused, punishment, lawyer, justice, legal, adjudication, means of proof, juvenile, appeal, legal counsel, judicial services, notary, corruption, gifts, monitoring, audit, bribery, forgery, accountant, public monitoring, tender, auction, public/government purchase, governance, transparency, account auditor, cover up, money laundering, restructure
Infrastructure	Railway, transportation, traffic, truck, car, bus, road, public transportation, taxi, passenger, marine, port, logistics, collision, accident, plane, aviation, vehicle, storage, driving, transit, cargo, street, goods, ship, boat, electricity, electrical, infrastructure, telephony, news agency, broadcast, communications, media, internet, phone, satellite, radio, airport, post
Macroeconomic Environment	Tax, value add, evasion, interest, Arab Monetary Fund, bonds, currency, monetary supply, central bank, inflation, deposit, fiscal policy, budget, budgetary, public/government borrowing, loan, government bonds,

		deficit, current account, sukuk, ending balance, balance, treasury, financial support, housing loans, aid, social welfare, social security, support fund, support financing, family subsidy, support needs, support economy, national program to support, project administration subsidy, citizen account, support associations, support lines, educational subsidies, disbursement support, support entities, farmer subsidies, project subsidies, wages, salaries, bonus, retirement fund, insurance against, fines, public/governmental accounts, family fund, Ministry of Finance, reserves, ending balance, generational reserve, supplementary insurance, public finds, national payments, financial affairs, public budget, fees
<i>Health and Primary Education</i>		Health, virus, pharma, medicines, drugs, smoking, preventative, tobacco, fertility, disease, cure, treatment, vaccination, veterinary, clinics, anesthetic, COVID, steroid, ambulance, hospital, DNA, cancer, diabetes, nursery, health insurance, influenza, AIDS, fever, cigarette, medical, illiteracy
<i>Higher Education and Training</i>		Training, university, college, student, school, collegiate, teacher, educational, education
<i>Goods Efficiency</i>	<i>Market</i>	Competition, intellectual property, compete, economic zone, measurement, instrument, national transformation, monopoly, privatization, price, pricing, manipulation, consumer, standards, measurement, measuring, free zone, special development zone, worker rights, public-private partnership, quality assurance, tariff, trade, customs, import, export, stamp, installment
<i>Labor Efficiency</i>	<i>Market</i>	Unemployment, lay off, firing, job, union, employee, of employment, salary, wage, Minister of Labor, retirement, human services, bonus, profession, bonus, attract labor, nationalization, Bahrainization, Qatarization, Saudization, Kuwaitization, Omanization, labor market, financial rewards, wage protection, rent protection, labor law, working hours, Ministry of Labor, work contract, work system, labor force, parttime work, workplace injury, work permit, charter, laborer, employing, conduct business
<i>Financial Development</i>	<i>Market</i>	Liquidity, stock, public offering, subscription, financial market, bank, bankruptcy, the market, financial law, investment, investor, invest, capital, financing, monies, sukuk, financial sector, borse, stock market, banking, listing, check, insolvency, borrowing, securities, exchange documents, financial adequacy, teller, money laundering,
<i>Technological Readiness</i>		Statistics, statistical, information, computer, electronic, information technology, cloud computing
<i>Innovation</i>		Research, invention, studies, laboratories, artificial intelligence, space, knowledge, technology, intellectual property
<i>Diversification</i>		Tourism, visa, travel, vacation, small enterprises, small companies, small projects, hydrocarbon, mining, manufacturing, factory, mineral, aluminum, hotel, museum, exhibition, festival, chemical, railways, marine, port, logistics, aviation, airplane, storage, transit, cargo, goods, port, financial market, securities, public offering, invest, investor, investment, capital, financing, monies, bank, bankruptcy, financial law, sukuk, financial sector, stock market, exchange documents, financial adequacy, banking, money laundering, ships, airport

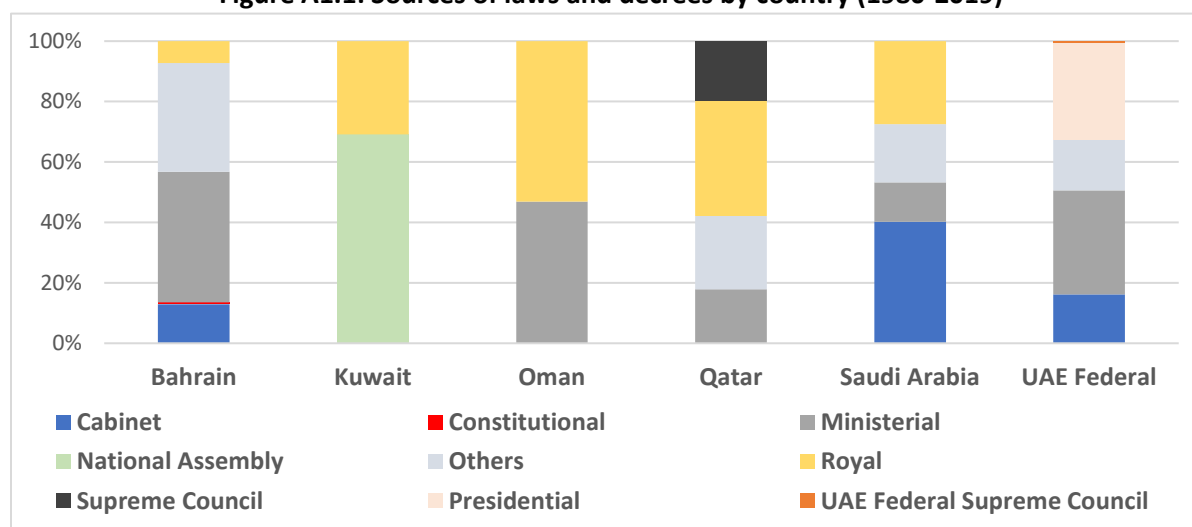
Table A1.4 provides the total number of laws and decrees. Figure A1.2 shows the number of laws and decrees by policy pillars over time for the 6 GCC countries. They are rising rapidly in recent years, especially the laws and decrees associated with “Diversification”.

Table A1.4 Cumulative Number of Laws and Decrees (1980-2019)¹²

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Diversification	1652	833	1371	978	701	654
Financial Market Development	655	415	387	390	298	246
Goods Market Efficiency	1109	322	898	703	347	721
Health and Primary Education	588	70	415	210	258	207
Higher Education and Training	765	217	543	188	231	227
Infrastructure	958	363	821	666	411	517
Innovation	95	87	45	86	72	64
Institutions	1761	287	614	1376	377	435
Labor Market Efficiency	979	75	714	420	523	264
Macroeconomic Environment	900	2052	949	559	400	501
Technological Readiness	220	87	52	77	139	102
Others (not matched)	6602	3045	4289	3870	2394	2579
Country Total across all Categories	12361	4345	7322	7052	3837	3762

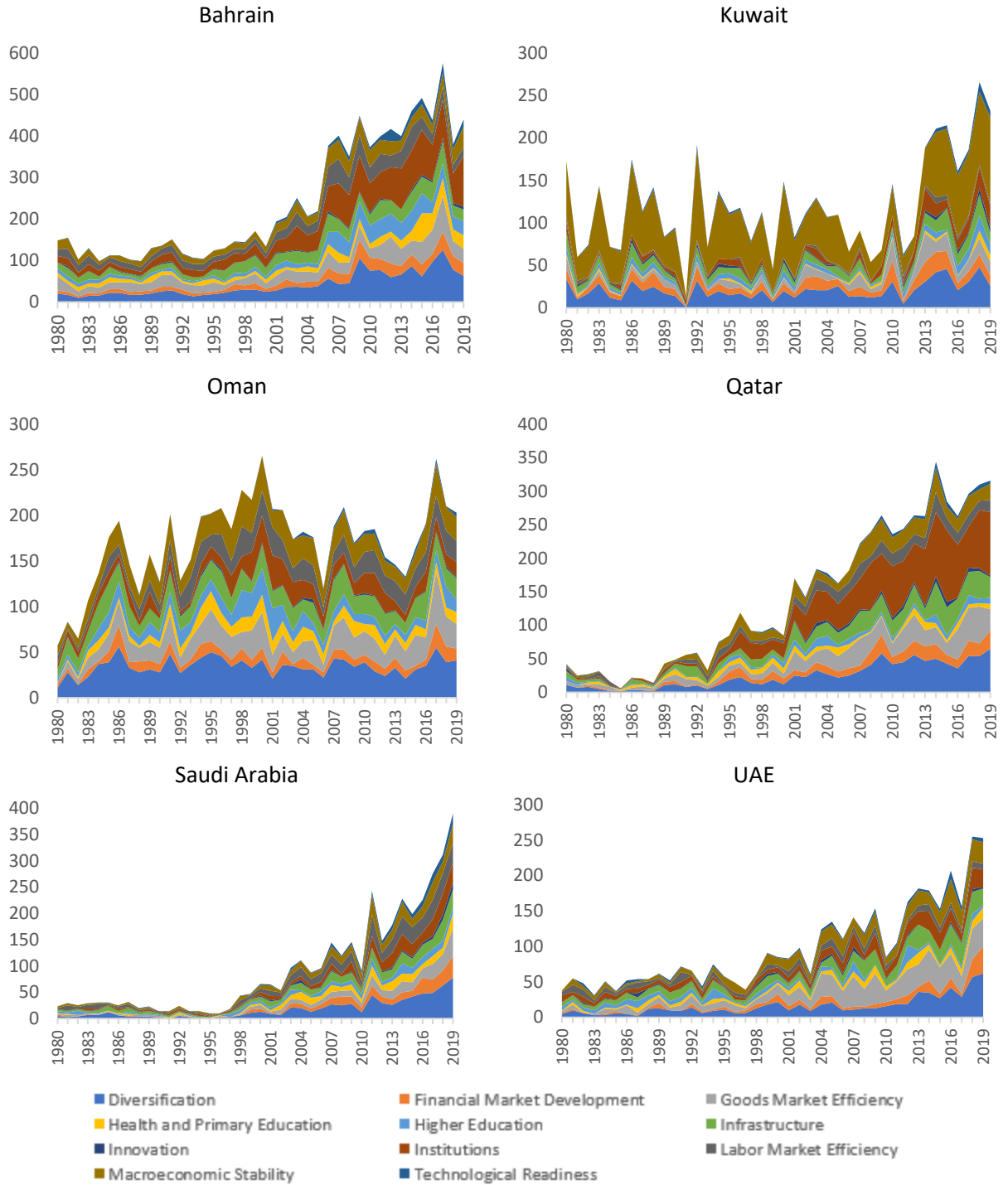
Though notable differences exist, the GCC countries have four primary sources of laws and decrees: 1) Royal Resolutions and Decrees, 2) the Council of Ministers/Cabinet, 3) individual ministerial decrees and resolutions, and 4) other, including parliament, administration and authorities. Figure A1.1 breaks down the source of laws from 1980 to 2019. Kuwait stands out as a country that has many laws from the National Assembly. In other countries, royal and ministerial sources play an important role.

Figure A1.1: Sources of laws and decrees by country (1980-2019)



¹² The last row accounts for double counting, so the figures will differ from the sum of all preceding rows.

Figure A1.2: Number of tagged laws and decrees by country (1980-2019)



Appendix A2: Do Reform Efforts Focus on Lagging Policy Areas?

The World Economic Forum's Global Competitive Index (GCI) measures each country's performance across the policy pillars through unit-less 'progress scores' on a scale of 0 to 100 (100 being the highest performance). Formally, each indicator is scaled according to the formula below:

$$progress\ score_{i,c,t} = \frac{value_{i,c,t} - worst\ performance_{i,c,t}}{frontier_{i,c,t} - worst\ performance_{i,c,t}} * 100$$

We scale these progress scores into distance-to-frontier metrics as:

$$distance\ to\ frontier_{i,c,t} = 100 - progress\ score_{i,c,t}$$

The GCI has all twelve indices for each of the six GCC countries from 2007 to 2017. This period is the only time where the GCI scores are methodically consistent and comparable across years.

The final source, UNCTAD's Export Concentration Ratio (also known as the Herfindahl-Hirschmann Index), measures a country's export market concentration as follows:

$$H_c = \frac{\sqrt{\sum_{i=1}^n (\frac{x_i}{X})^2} - \sqrt{1/n}}{1 - \sqrt{1/n}}$$

where H_c is the index for country c , x_i is the value of exports for product i , X is the sum of export values across all products, and n is the number of products. We rescale the index so that 0 is the least concentrated portfolio while 100 is the most concentrated. This transformation allows us to include diversification as an additional 'pillar' to complement the GCI's ten. We obtain for each GCC country for the years 2007 to 2017. Table A2.1 shows the average Distance to Frontier. Overall, the GCC performs well in Macroeconomic Environment, Health and Primary Education, and is underperforming in Diversification, Innovation and Technological Readiness.

Table A2.1 Average Distance to Frontier (2007-2017)

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	GCC Average
Diversification	32.6	68.4	55.8	52.9	70.1	32.9	52.1
Financial Market Development	29.8	49.0	39.3	25.8	39.4	33.0	36.0
Goods Market Efficiency	24.7	51.3	35.0	18.8	31.2	13.4	29.1
Health and Primary Education	17.8	29.9	28.9	11.9	24.6	18.3	21.9
Higher Education and Training	36.4	52.8	48.1	30.1	37.9	30.4	39.3
Infrastructure	33.8	48.1	36.8	30.8	34.9	12.2	32.8
Innovation	67.9	75.4	64.4	36.3	53.0	45.5	57.1
Institutions	30.9	48.8	25.8	12.5	28.4	15.9	27.1
Labor Market Efficiency	40.2	55.2	48.2	30.0	50.6	27.8	42.0
Macroeconomic Environment	32.9	6.2	17.2	10.3	16.4	17.1	16.7
Technological Readiness	34.7	57.5	55.1	32.4	44.6	25.4	41.6
Country Average across Categories	34.7	49.3	41.3	26.5	39.2	24.7	36.0

Note: 100 is farthest away from the frontier

To investigate whether GCC countries focus on areas farthest from the frontier, we utilize the following specification in a Poisson regression (given that the outcome variable is a count):

$$Laws\ Passed_{i,c,t} = \alpha + Distance\ to\ Frontier_{i,c,t-1} + Total\ Laws\ Passed_{c,t} + \varepsilon_{i,c,t}$$

where $Laws\ Passed_{i,c,t}$ is the count of laws and decrees passed for pillar i in country c in year t ; $Distance\ to\ Frontier_{i,c,t-1}$ measures the performance for pillar i in country c in year $t-1$ (i.e. lagged) on a scale of 0-100 (with 100 being the worst) and $Total\ Laws\ Passed_{c,t}$ is the total number of laws and decrees country c passed in year t . We present the results in Table A2.2. We run five specifications:

1. With country and year fixed effects
2. With country and pillar fixed effects
3. With country, year and pillar fixed effects
4. With country and year fixed effects, along with interactions of country and lagged distance to policy frontier
5. With country, year and pillar fixed effects, along with interactions of country and lagged distance to policy frontier

Regardless of specification, the coefficient for the lagged distance to frontier is statistically significant and negative (see Table A2.2), indicating that the GCC countries pass reforms in areas of strength rather than weakness. Saudi Arabia focuses more on weaknesses than other GCC countries (see column [4]- the coefficient is the most positive, indicating the most positive relationship between Distance to Frontier and Law Count). The country fixed effects allow us to interpret the finding as follows: within a country, the number of laws and decrees passed rises relatively more in improving policy pillars. The pillar fixed effects take care of a potential concern that a policy pillar could be over- or under-tagged due to keyword choice.

The findings are subject to caveats. First, the timeframe spans 2008 to 2018, so the GCC countries may have corrected focus in recent years. Second, reforms need not be pushed through as legislative reforms, as improvements in operations and procedures could close the gap to the frontier. Another explanation for the finding is that countries enter a ‘virtuous cycle’ whereby they have more capacity to implement reforms in areas of pre-existing strength. There might also be an argument about the sequencing of reforms. The “right” reforms are not necessarily on weak policy areas but the most logical next step (see Edwards, 2009; Feltenstein and Nsouli, 2003).

Table A2.2 Number of Laws and Decrees vs. Distance to Frontier (Lagged)

Poisson Regression	Dependent Variable: Laws and Decrees Passed, Count				
	(1)	(2)	(3)	(4)	(5)
Distance to Frontier, Lagged	-0.013*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)	-0.018*** (0.001)	-0.008*** (0.002)
Total Laws Passed in Country-Year	0.002*** (0.0002)	0.002*** (0.0001)	0.002*** (0.0002)	0.002*** (0.0002)	0.002*** (0.0002)
Kuwait	-0.153** (0.073)	0.014 (0.057)	-0.190** (0.074)	0.216** (0.094)	0.502*** (0.102)
Oman	-0.093 (0.067)	0.058 (0.052)	-0.126* (0.068)	-0.423*** (0.096)	-0.479*** (0.104)
Qatar	-0.132*** (0.046)	0.035 (0.037)	-0.085* (0.046)	-0.422*** (0.068)	-0.026 (0.074)
Saudi Arabia	-0.069 (0.066)	0.123** (0.051)	-0.063 (0.066)	-0.930*** (0.092)	-0.390*** (0.095)
UAE	-0.378*** (0.073)	-0.150*** (0.057)	-0.360*** (0.073)	-0.034 (0.095)	-0.008 (0.101)
Year: 2009	0.088** (0.041)		0.094** (0.041)	0.100** (0.041)	0.109*** (0.042)
Year: 2010	-0.085** (0.043)		-0.073* (0.043)	-0.075* (0.043)	-0.047 (0.043)
Year: 2011	-0.057 (0.042)		-0.032 (0.043)	-0.039 (0.043)	-0.003 (0.043)
Year: 2012	-0.035 (0.042)		-0.002 (0.042)	0.007 (0.042)	0.042 (0.042)
Year: 2013	-0.020 (0.042)		0.015 (0.043)	0.017 (0.043)	0.054 (0.043)
Year: 2014	0.067 (0.042)		0.101** (0.043)	0.094** (0.043)	0.132*** (0.043)
Year: 2015	0.023 (0.043)		0.066 (0.043)	0.032 (0.044)	0.078* (0.044)
Year: 2016	-0.030 (0.045)		0.003 (0.046)	-0.024 (0.046)	0.008 (0.046)
Year: 2017	0.162*** (0.044)		0.193*** (0.044)	0.160*** (0.044)	0.191*** (0.044)
Year: 2018	0.139*** (0.045)		0.171*** (0.045)	0.132*** (0.045)	0.177*** (0.045)
Financial Markets		-1.054*** (0.037)	-1.055*** (0.037)		-1.002*** (0.037)
Goods Markets		-0.596*** (0.034)	-0.597*** (0.034)		-0.549*** (0.035)
Health and Primary Education		-1.598*** (0.046)	-1.601*** (0.046)		-1.553*** (0.047)
Higher Education and Training		-1.241*** (0.039)	-1.242*** (0.039)		-1.201*** (0.040)

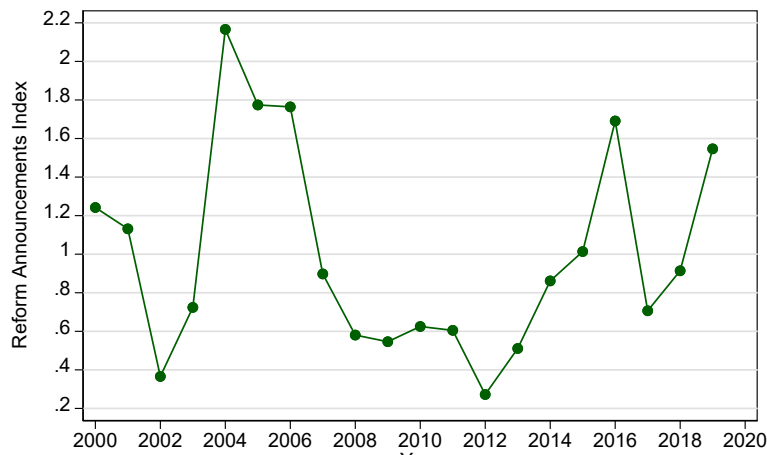
Infrastructure	-0.717*** (0.033)	-0.719*** (0.033)	-0.687*** (0.034)
Innovation	-2.647*** (0.077)	-2.646*** (0.077)	-2.636*** (0.078)
Institutions	-0.306*** (0.032)	-0.309*** (0.032)	-0.241*** (0.033)
Labor Markets	-0.860*** (0.034)	-0.859*** (0.034)	-0.841*** (0.035)
Macroeconomic Stability	-0.662*** (0.037)	-0.663*** (0.038)	-0.666*** (0.039)
Technological Readiness	-2.003*** (0.053)	-2.005*** (0.053)	-1.984*** (0.053)
Lag Distance to Frontier * Kuwait			-0.006*** (0.002)
Lag Distance to Frontier * Oman			0.011*** (0.002)
Lag Distance to Frontier * Qatar			0.012*** (0.002)
Lag Distance to Frontier * Saudi Arabia			0.025*** (0.002)
Lag Distance to Frontier * UAE			-0.016*** (0.002)
Constant	3.042*** (0.089)	3.517*** (0.079)	3.754*** (0.095)
Observations	726	726	726
Log Likelihood	-5,834.873	-3,319.760	-3,277.996
Akaike Inf. Crit.	11,705.750	6,675.521	6,611.992

Notes: Clustered standard errors in parentheses. *p**p***p<0.01. The sample covers 2008 to 2019 for the 6 GCC countries and 11 policy pillars.

We use media to identify reforms perceived as important by the media. To identify articles introducing new reforms, we use the corpus of articles in English and focus on article titles.¹³ In total, there are around 63,000 articles in English in our data set. Then, we use keyword searches to locate article titles that include at least one of the following 13 terms: ‘reform’; ‘unveil’; ‘adopt’; ‘introduce’; ‘implement’; ‘roll out’/‘rolls out’; ‘reveal’; ‘announce’; ‘sign’; ‘approve’; ‘declare’; ‘present’; ‘outline’. From this subset, we manually select the titles which correspond to reform announcements. This selection process yields 595 reform announcements over the sample period. Finally, we categorize each article into one (or more) of the 11 GCI pillars. These data – at the country-year-pillar level – form the basis of our analysis. Finally, we generate a reform announcement index, the number of articles announcing reform in a country-year normalized by the number of English reform articles in that country-year. Figure A2.1 summarizes the aggregate evolution of reform announcements in the GCC.

¹³ Although we only consider articles in English in this exercise, since our objective is to identify ‘major’ reforms in the media, it is likely these will be covered in both English and Arabic.

Figure A2.1: Aggregate reform announcement in the GCC



Note: Reform announcement index captures the number of articles announcing reform in GCC in a year normalized by the number of English reform articles in a year

Using the media to filter what is perceived as important reforms, a similar finding emerges: the GCC countries did not pass more reforms, perceived as important and covered by the media, in areas of weakness. Table A2.3 shows that a pillar's lagged distance to frontier is not significantly correlated with reform announcements about that pillar.

Table A2.3: Lagged Distance to Frontier and Reform Announcements

	(1)	(2)
Dependent Variable:	Reform Announcements Count	Reform Announcements Index
Estimation:	Poisson	OLS
Distance to Frontier t	-0.0172 (0.0147)	-0.00131 (0.00165)
Distance to Frontier t-1	0.00676 (0.0134)	0.000152 (0.00180)
Country FE	✓	✓
Year FE	✓	✓
Reform Pillar FE	✓	✓
R2		0.122
pseudo R2	0.399	
Number of Countries	6	6
Observations	660	660

Notes: This table presents the effect of the distance to the frontier along 11 reform pillars on reform announcements captured in the media. The dependent variable in Column 1 is the number of articles announcing reform in a country-year-reform pillar. The dependent variable in Column 2 is the number of articles announcing reform in a country-year-reform pillar normalized by the number of English reform articles in that country-year. Column 1 is estimated using Poisson; Column 2 is estimated using OLS. The distance to frontier measure is on a scale of 0 to 100, where 100 denotes the *farthest* distance from the frontier along a given reform pillar. Standard errors are clustered at the country level and papered in parentheses, where * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix A3: Twitter Data Analyses

We collect tweets in Arabic from 2009 to mid-2020. However, our dataset starts from 2011 due to data availability issues for the 2009-2010 period. To filter data related to reforms from Twitter, we use four keywords in Arabic, as presented below. These four keywords refer to the word ‘reform’ in Arabic in its singular and plural forms as well as with and without an article.¹⁴

اصلاحات	الاصلاحات	الاصلاح	اصلاح
---------	-----------	---------	-------

Using these four keywords as a filter, we collect more than **16 million tweets in Arabic** over the 2011-2020 period.

Overcoming lexical issues: Multiple meanings to the word ‘reform’ in Arabic: The first hurdle was not directly related to the data but rather to the multiple meanings of the word ‘reform’ in Arabic. We found out that information collected from Twitter using the term ‘reform’ in Arabic is not necessarily related to social and economic reforms, as the term ‘reform’ in Arabic has many different meanings such as ‘repair’, ‘rehabilitation’, ‘correction’, or ‘reconciliation’. Consequently, the Arabic term for ‘reform’ can also talk about religious topics related to reconciliation. The word ‘reform’ is also the name of many political parties in the region. For instance, we found information referring to the Yemeni war using this filter since ‘reform’ is the name used to call the Yemeni political party ‘Yemeni Congregation for Reform’, ‘التجمع اليمني للإصلاح’ in Arabic. Consequently, these tweets are excluded. To select the meaning of ‘reform’ we are interested in, we relied on specific topical keywords (see Appendix A5) to keep the relevant tweets and delete the others. After applying this filter, we are left with about 2 million tweets in Arabic about economic reforms.

Breaking down the data set by country: To break down the collection of tweets into six data sets (one per country), we link a tweet to a country by detecting keywords such as the country's name (both in Arabic and English) and the name of its capital city. If a tweet contains two GCC countries, it is included in both countries’ data sets. As there are many tweets in which we could not detect the country of origin using these keywords, we leverage the user’s location. Our assumption is when a user declares a country when the user first registers, the user will probably tweet about this country. Nevertheless, to avoid the situation in which a user located in “Country A” is talking about another “Country B” – be it in the GCC or not - we dropped all tweets made by a user containing the name of a country other than its declared location. For example, suppose a user is located in Saudi Arabia in our user’s database. In that case, the tweet will be used if it mentions no other countries and will be deleted if “Egypt” or “United States” appears in the post since the user may be talking about reforms in these countries rather than in Saudi Arabia. To detect the presence of other countries in tweets, we used Name Entity Recognition (NER), a technique that identifies specific entities in the text of each tweet (e.g., person, organization, location, etc.). By adding this technique, we increased our database of tweets from around 420,000 to 635,000 (see Figure III.1).

Cleaning vocalization marks: In the Arabic alphabet, each letter can have a vocalization mark. A vocalization mark is an optional symbol giving a hint to the reader on the pronunciation of a letter. However, in our analyses, the same word was considered as two different words depending on if it has

¹⁴ Note that using these four keywords, we include tweets containing these words written with vocalization marks or any other characters above or below a letter.

vocalization marks or not. To improve efficiency, we deleted all vocalization marks (see an example below).

```
nlp_cleaning_ar('في عملٍ دائمٍ، ينتقلُ من مكانٍ إلى آخر')  
'عملٍ دائمٍ ينتقلُ مكانٍ آخر'
```

Although few tweets have vocalization marks, it is still useful to apply this pre-processing to prevent such words from affecting our methodology to compute sentiment.

Lemmatization: We use dictionaries made up of words expressing positive sentiments and those interpreted as negative. A tweet is considered positive if it contains more positive words than negative ones. We would like to match many words between the tweets and the sentiment dictionary and hence use the technique of lemmatization.

The lemmatization technique consists of giving the origin of a word. For example, the words 'changing' and 'changed' will have the same result once processed with lemmatization: 'change'. Hence in Arabic, 'تغيير', 'تغير', 'يتغير' will be processed to 'تغير'. Therefore, lemmatization has an important impact on the efficiency of our analysis as it increases the number of matching words between tweets and our dictionaries. Without lemmatization, we get only 10% of tweets with more than two words matching with our dictionaries, compared to 38% matching with lemmatization.

Identifying user locations and removing fake accounts: We classify the economic reform tweets by user location. Ideally, one would hope to obtain a user's real-time location when they tweet. Unfortunately, location data are not available for most tweets. We opt for an alternative, leveraging the user-supplied information of locations when they registered their accounts with Twitter. This approach is not perfect. For example, a location would not be correct if a user moves to another country.

Nevertheless, this potential bias is acceptable in our view. The assumption is that a user registered in a GCC country talks about that country. From the Arabic tweets on the GCC's economic reforms, we construct a database of about 203,000 users with information on their profiles and activities. Of these users, 54.2% had disclosed their locations when they registered their accounts.

This user's database also enabled us to remove fake accounts (or bots) by filtering them according to the number of followers and frequency of tweets. We consider an account fake if it has few followers and sends the same tweets many times.

We also separate official accounts from those of common people. The selected official accounts are in the footnote below.¹⁵

¹⁵ **Saudi Arabia:** Ministry of Municipal and Rural Affairs, Ministry of Justice, Public Prosecution, Saudi Vision 2030, Ministry of Finance, Ministry of Education, Ministry of Economy and Planning, Ministry of Health, Ministry of Environment Water and Agriculture, Ministry of Interior, AbdelAziz Ben Turki AlFaisal, King Salman, Majed Abdallah AlQasabi, Tawfiq AlRabeea, Minister of Education, Mohamad Ben AbdelAziz.

Kuwait: Council of Ministers, Ministry of Education, Ministry of Commerce and Industry, Ministry of Public Works, Ministry of Interior, Khaled AlRoudan, Rana AlFares, Safa AlHashem, Ahmad Nasser AlSabah, Marzouq AlGhanim.

We identify locations as follows: a tweet is considered local if the user's location is in the same country as the tweet is referring to. For each country, we establish a list of names characterizing a 'local location': the names of the country's main cities and multiple ways to write the country's name.

Sentiment analyses: In this analysis, we extract people's perceptions and opinions from tweets about economic and social reforms in the GCC based on the dictionaries of positive versus negative words we manually labeled.

We created three dictionaries by extracting the words most frequently used in the Tweets and then labeling them as positive, negative, or neutral. We considered using existing dictionaries, but we manually created our dictionaries tailored to this specific case. Our dictionaries match the tweets we collected better since they enable us to avoid words with a general meaning different from those in our specific context. The dictionaries we created contain 271 positive words, 307 negatives, and 5113 neutral words. Only positive and negative words are used to compute sentiment.

We count the number of words matching the dictionary of positive words and negative words for each tweet. We then compute the support metric as follows:

$$support = \frac{\# \text{ of positive words} - \# \text{ of negative words}}{\text{total \# of words in the tweet}}$$

The positive or negative sign of the support (as computed above) indicates the tweet's sentiment.

An illustration of calculating sentiment: Below is an example of tweets collected and the steps for text processing and calculating sentiment.

- ✓ Source Tweet (in Arabic):

ضريبة إصلاح ما أفسده الدهر عالية وتأثيرها في المدى القصير محدود .. لذا الجميع سيدفع ما جناه المجتمع بشأن حل مشكلة البطالة

- ✓ Translation of the Tweet in English (only for the example): The tax of reforming what has been corrupted by time is high, and its impact in the short term is limited. So everyone will pay what society has earned in solving the unemployment problem.
- ✓ Lemmatized and cleaned Tweet:

ضريبة اصلاح افسده دهر عالية وتأثيرها مدى قصير محدود لذا الجميع دفع جن مجتمع بش حل مشكل بطالة

- ✓ List of positive words matching with our dictionary (1 word): [حل]
- ✓ List of negative words (4 words): [افسده, عالية, مشكل, بطالة]

Qatar: Ministry of Administrative Development Labor & Social Affairs, General Electricity & Water Corporation, Project Office for the State of Qatar, Public Works Authority, Khaled Ben Khalifa AlThani, Mohamad Ben AbdelRahman, Mohamad AlHamadi.

UAE: Office of Foreign Minister International Cooperation, Ministry of Foreign Affairs and International Cooperation, Ministry of Education, Ministry of Justice, Anwar Gargash, Mohamad Ben Rashed AlMakthoum, Hussein AlHamadi, Darar Belhol AlFlasi, Suhail AlMazroui, Thani AlZeyoudi.

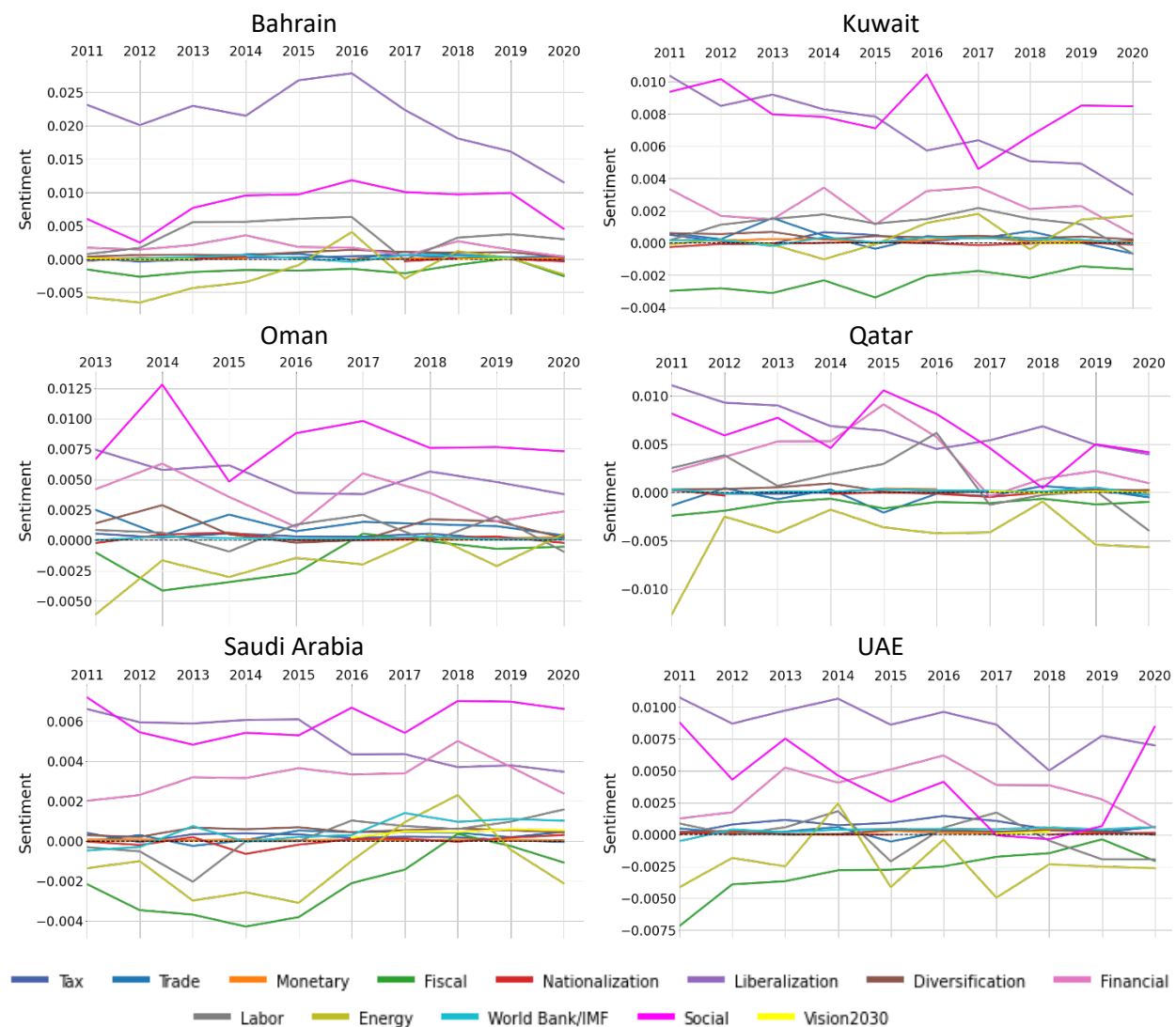
Bahrain: Ministry of Interior, Ministry of Finance and National Economy, Ministry of Labour & Social Development, Ministry of Education, Ministry of Education, Ministry of Foreign Affairs, Khaled Ben Ahmad.

Oman: Khalfan AlShueili, Ministry of Education, Royal Oman Police, Badr AlBusaidi, Ministry of Interior, Ministry of Labor, Ministry of Energy and Minerals, Ministry of Health.

- ✓ Total number of words: 18
- ✓ Compute the sentiment. Sentiment = $(1-4)/18 = -0.16$ --> Negative

Sentiment by topic: We categorize tweets into tax, trade, monetary, fiscal, labor, energy/oil, social policies, liberalization, nationalization, and diversification policy (see the keywords in Appendix A5). Figure A3.1 presents sentiment by economic categories (weighted by the number of tweets). This breakdown provides rich insights into what reform areas drive the overall sentiment. For example, for Saudi Arabia, declining sentiment in tweets about “Energy” and “Fiscal” topics was largely responsible for the overall decline in sentiment in 2019 and 2020. For Bahrain, declining sentiment on “Liberalization” and “Social” topics was largely responsible for the decline in sentiment in 2019 and 2020.

Figure A3.1: Sentiment by reform areas



Note: Sentiment by topics, weighted by the number of tweets

Appendix A4: Economic Reform News

To compile our database of economic reform articles, we use carefully selected keywords in the 28 languages available in the Dow Jones database. In particular, we search for all articles which contain the words ‘economy’ or ‘economic’ and ‘reform’ or ‘reforms’ in the text of the article. Table A4.1 presents our translations of these terms in the 28 languages.

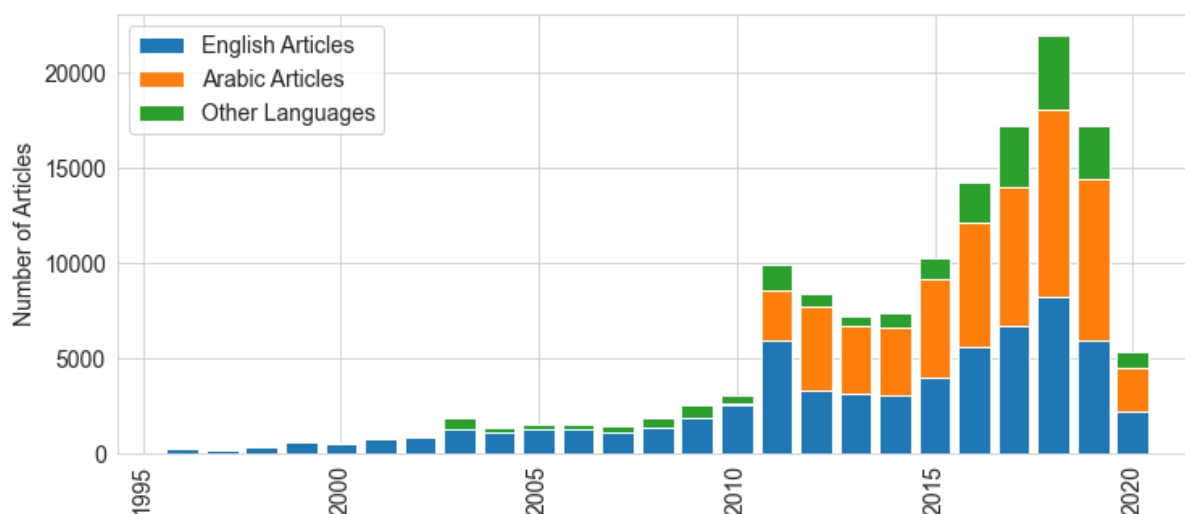
Table A4.1 Keywords for economic reforms articles

Language	Economy	Economic	Reform	Reforms
Arabic	اقتصاد		الإصلاحات	
	اقتصادية		اصلاحات	
	اقتصادي		إصلاحات	
			الاصلاحات	
			الإصلاح	
			إصلاح	
			الاصلاح	
			اصلاح	
Malay	ekonomi	ekonomi	pembaharuan	pembaharuan
Indonesian	ekonomi	ekonomis	pembaruan	reformasi
Bulgarian	икономика	икономически	реформа	реформи
Catalan	economia	econòmic	reforma	reformes
Chinese - Simplified	经济	经济	改革	改革
Chinese - Traditional	經濟	經濟	改革	改革
Czech	hospodářství	hospodářský	reforma	reformy
Danish	økonomi	økonomisk	reform	reformer
Dutch	economie	economisch	hervorming	hervormingen
		economische		
English	economy	economic	reform	reforms
Finnish	talous	taloudellinen	uudistaa	uudistuksia
French	économie	économique	réforme	réformes
		économiques		
German	wirtschaft	wirtschaftlich	reform	reformen
		wirtschaftsreformen	reform	reformen
Hungarian	gazdaság	gazdasági	reform	reformok
Italian	economia	economico	rimforma	rimforme
		economica		
		economici		
		economiche		
Japanese	経済	経済的	改革	改革
Korean	경제	간결한	개정	개혁
Norwegian	økonomi	økonomisk	reform	reformer
Polish	ekonomia	ekonomiczny	reforma	reformy

	<i>gospodarka</i>	gospodarcze		
Portuguese	economia	económicas	reforma	reformas
		económica		
Russian	экономика	экономической	реформа	реформы
		экономические		
		экономический		
Slovak	hospodárstvo	hospodársky	reforma	reformy
Spanish	economía	económico	reforma	reformas
		económica		
		económicas		
Swedish	ekonomi	ekonomisk	reformera	reformer
Thai	เศรษฐกิจ	ด้านเศรษฐกิจ	ปฏิรูป	การปฏิรูป
Turkish	ekonomi	ekonomik	reform	reformlar
Vietnamese	nền kinh tế	kinh tế	cải cách	cải cách

Figure A4.1 displays the number of articles by year over the last 25 years and provides a breakdown of the two main languages. Two important points should be made. First, newspaper data in Arabic was only introduced into the Dow Jones database after 2011. Second, the number of articles in 2020 is significantly less than in previous years because the data are updated until June 2020. For this reason, in our analysis, we always normalize article counts, which deals with the fact that the number of articles changes significantly over time.

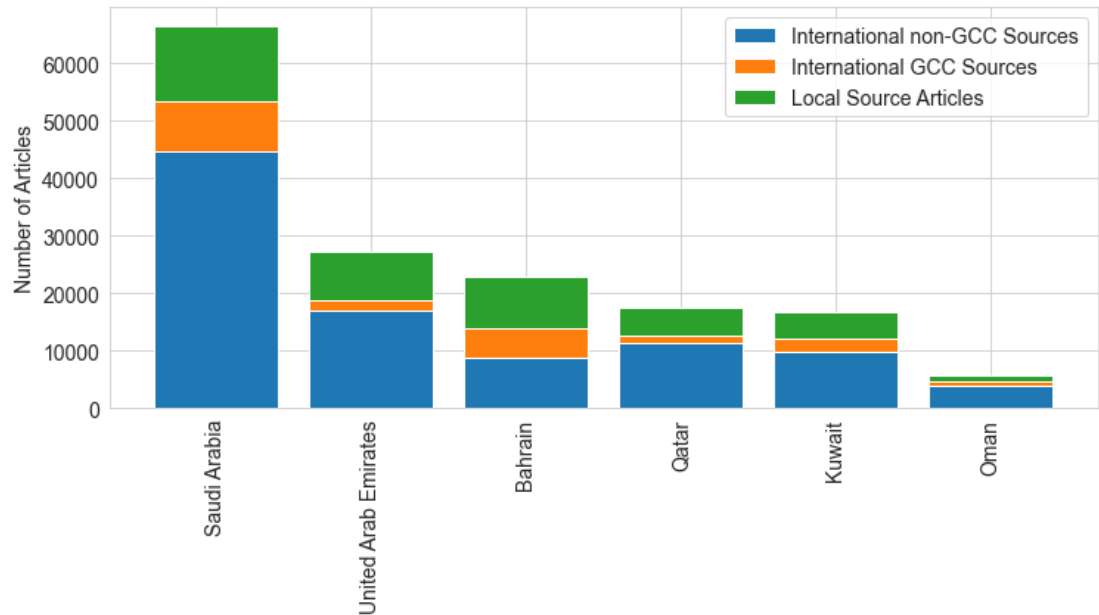
Figure A4.1 Evolution of GCC Economic Reform Articles by Language (until June 2020)



Finally, Figure A4.2 breaks down articles by source type. In our analysis, we distinguish three types of sources: (i) local sources, where the article country of origin is the same as the country being discussed, (ii) international GCC sources, where the article is not from the country of origin but is from one of the other GCC countries, and (iii) international non-GCC sources, which encompasses other foreign media outlets outside the GCC. Between 20% and 40% of articles are from local sources, while between 40%-

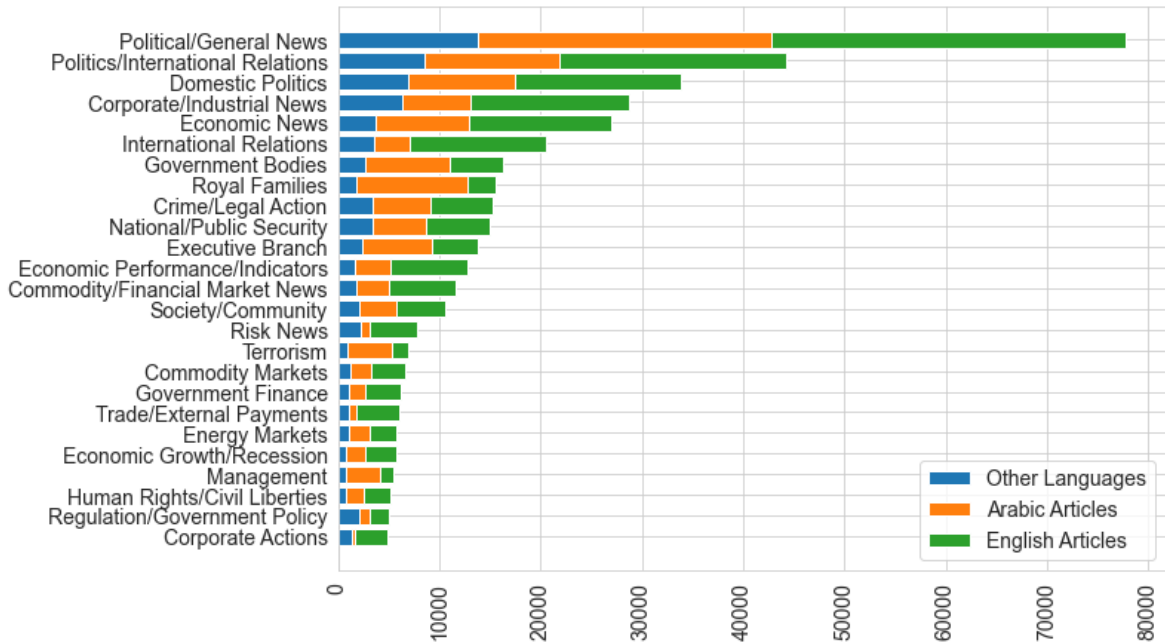
70% are from international non-GCC sources. In later sections, we analyze how the dynamics of reform discussions and the tone vary by source type.

Figure A4.2: GCC Economic Reform Articles by Source



The Dow Jones database provides proprietary tags that identify which countries and subjects are being discussed in the article. Naturally, any given article can be focused on one or multiple countries. Around 91% of the articles in our dataset are tagged to a single GCC country only. Figure A4.3 presents the most common subjects and the top 25 countries discussed in the data set.

Figure A4.3 Main Subjects of GCC Economic Reform Articles



Below are two examples of economic reform articles in English and Arabic:

Example 01: Mondaq



Saudi Arabia's New Public Procurement Law

Heinrich Köllisch
1227 words
19 December 2019
Mondaq Business Briefing
BBPUB
English
(c) 2019 Mondaq Ltd

The Kingdom of Saudi-Arabia (KSA) is the largest **economy** in the Middle East & North Africa (MENA) region. The country's public spending in infrastructure, health care, transport, and other government-driven sectors is among the highest the MENA region. In an unparalleled program of **reform** under its Vision 2030, the Kingdom tries to make its **economic**, social and legal landscape ready for coming generations. As part of this **reform**, KSA recently enacted a new Public Procurement Law that governs public tenders. This legal briefing gives an overview of the new Public Procurement Law and its key features.

1. What is the Public Procurement Law (PPL) and who is concerned by it?

The New Public Procurement Law ("PPL" or "Law") is the main legal regulation for all government procurement in the KSA. All government entities such as the State and its Ministries, Regional Authorities and Municipalities as well as Public Entities with an individual legal personality are subject to this new law.¹ The Law regulates how these entities can cater to their needs in terms of procuring goods and services. It should be noted, however, that for certain sectors (especially in relation defence and security), many of the regulations are eased and facilitate an easier approach for the concerned government entities.

The Law establishes several new institutions for the Kingdom's procurement structures. The overarching responsible authority for the Law and its implication will be the Ministry of Finance (MoF). A new procurement portal, named Etimad (www.etimad.sa) under the supervision and constant development of the MoF.²

The Law also establishes a Unified Purchase Entity (UPE). The UPE's assumes several tasks. It is the unit directly interacting with the tendering parties in cases of more than one government entity being involved. It mainly provides background support such as research and guidance to government entities in procurement processes.

Example 02: Misr Information Services & Trading (MIST)

ارتفاع التسهيلات الائتمانية في الإمارات إلى 448 مليار دولار نهاية الربع الثاني

266 words
26 December 2019
Mist News
MISTAR
Arabic

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أبوظبي -

أكد صندوق النقد العربي وجود تحسن كبير في التسهيلات الائتمانية والسيولة الإجمالية والودائع المصرفية في الإمارات خلال النصف الأول من العام الجاري، مشيراً إلى أن نمواً بنسب إيجابية تراوحت بين 3.8% إلى 5.9%.

وأشار الصندوق في نشره الإحصاءات الاقتصادية ربع السنوية لشهر ديسمبر 2019 التي أصدرها أمس للمرة الأولى إلى أن السيولة الإجمالية لدولة الإمارات ارتفعت بشكل جيد مسبقاً بنسبة نمو 5.9% لتصل إلى 448 مليار دولار (1.64 تريليون درهم) بنهاية الربع الثاني من العام الجاري لتحتل الإمارات بذلك المرتبة الثانية عربياً بعد السعودية، والتي بلغ حجم السيولة لديها 501 مليار دولار.

وأكدت النشر الإحصائية أن الإمارات احتلت المرتبة الثانية عربياً من أصل 19 دولة في التسهيلات والفروض الائتمانية، حيث بلغ إجمالي هذه التسهيلات لديها 420.4 مليار دولار (1.54 تريليون درهم) بنهاية الربع الثاني بنسبة نمو 3.8%، بينما جاءت السعودية في الترتيب الأول بنحو 502 مليار دولار.

وحذرت الإمارات بنهاية الربع الثاني نحو 424.4 مليار دولار ودائع مصرفية بنسبة نمو سنوية 5.8%. وبلغ صافي الأصول الأجنبية لدى القطاع المصرفي في الإمارات بلغ نهاية الربع الثاني 119.7 مليار دولار (439 مليار درهم) لتحتل المرتبة الثانية عربياً بعد السعودية 529 مليار دولار.

وأشارت الدراسة إلى ارتفاع الناتج المحلي الإجمالي الربعي لدولة الإمارات بنسبة 3.7% بنهاية الربع الأول من العام الجاري على أساس سنوي، وذلك عكس غالبية البلدان العربية النفطية التي شهدت تراجعاً في ناتجها المحلي، كما تراجع التضخم في الإمارات خلال النصف الأول من العام الجاري بشكل كبير نتيجة الانتهاء من إصلاحات تحرير أسعار الطاقة، واستكمال منظومة الضرائب التي هدفت لتحقيق الانضباط المالي.

Appendix A5: Topics of Reform Discussions- Supervised Topic Analyses with News Media

Two big-data approaches are used to analyze reform topics in the paper. The first one is unsupervised topic analyses (i.e., we let the machine learning process identify the topics based on words that frequently go with each other). The second approach uses many topics based on keyword searches, which we will detail here.¹⁶ Utilizing a similar methodology Baker et al. (2016), we tag articles according to 15 categories using lists of key terms. If an article contains at least one sentence with the word 'reform(s)' containing at least one key term in the category, the article receives that category's tag. The 15 categories are as follows: 1) taxation, 2) trade, 3) fiscal policy, 4) monetary policy, 5) financial markets, 6) diversification, 7) nationalization, 8) liberalization, 9) oil/energy, 10) labor, 11) social, 12) political, 13) international, 14) IMF/WB (IMF or World Bank is mentioned) and 15) Vision 2030. These categories were inspired by the results we obtain from the word2vec and LDA analyses, particularly the liberalization, diversification, and IMF/WB tags. The list of keywords for each language is provided below:

Arabic keywords

Category	Keywords
<i>Tax</i>	ضريبة، ضرائب، ضريبي
<i>Trade</i>	جمارك، جمركة، تبادل، تجار، جمركية، واردات، استيراد، صادرات
<i>Monetary</i>	السياسة النقدية، الفائدة، البنك المركزي، الأوراق النقدية، سندات الحكومة، سياسة نقدية، أوراق نقدية، كمية المال، بنك مركزي
<i>Fiscal</i>	السياسة المالية، ميزانية، الاقتراض الحكومي، اقتراض حكومي، الدين الحكومي، دين حكومي، انفاق، إنفاق، مصروف، سياسة مالية، ديون، نقشف، موازنة، دين العام، عجز، الاقتراض، حساب جاري، الحساب الجاري
<i>Nationalization</i>	توطين، استبدال العمالة، إستبدال العمالة، القطاع الحكومي، قطاع حكومي، بحرنة، تستبدل العمالة، تسريح الوافدين، العمالة الوافدة، العمالة الاجنبية، العمالة الأجنبية، تعمير، سعودة
<i>Liberalization</i>	انفتاح، إنفتاح، ديمقراطي، ديمقراطي، حرية، ليبرالي، خصخصة، السوق الحر، قطاع الخاص، إصلاح السوق، رفع القيود، شفافية السوق
<i>Diversification</i>	تنويع، تنوع، استدام، مستدام
<i>Financial</i>	سيولة، سهم، تداول، إكتتاب، سوق المال، أسواق المال، الأوراق المالية، اكتتاب، استثمار، مستثمر، رأس مال، تمويل، رؤوس أموال، مالية، مصارف، قطاع المالي، بورصة، سوق الأسهم، قطاع المصرفي
<i>Labor</i>	بطالة، تفنيش، فصل العامل، عمال، تسريح، سوق العمل، وظيفة، وظائف، نقابة، نقابات، راتب، رواتب، عامل، فرص العمل، قانون العمل
<i>Energy/oil</i>	بتترول، غاز، نفط، ارامكو، كهرباء، كهربائي، ماء، مياه، مائي، يرميل، أوبك، طاقة
<i>World Bank/IMF</i>	صندوق النقد الدولي، البنك الدولي، imf
<i>Political</i>	سياسي، أمن، حرب، تشريعي، سياسية، دستور، امن، طائفي، إرهاب، ارهاب، عسكري، دفاع، فساد، أحزاب، شعب، مفسد، قمع، تطرف، تعصب، حزب، انتخاب، احتجاج، معارضة، محاسبة، ربيع العربي، احتلال
<i>International</i>	الولايات المتحدة، روسيا، صين، دولي، عالم، الهند، ايران، مصر، إيران، اليمن، سوريا، العراق، الوطن العربي، التعاون الخليج، أمريك، فلسطين، الشرق

¹⁶ The first approach does not generate clean outputs but help guide the topic selection in the second approach. The results of the first approach are available upon request.

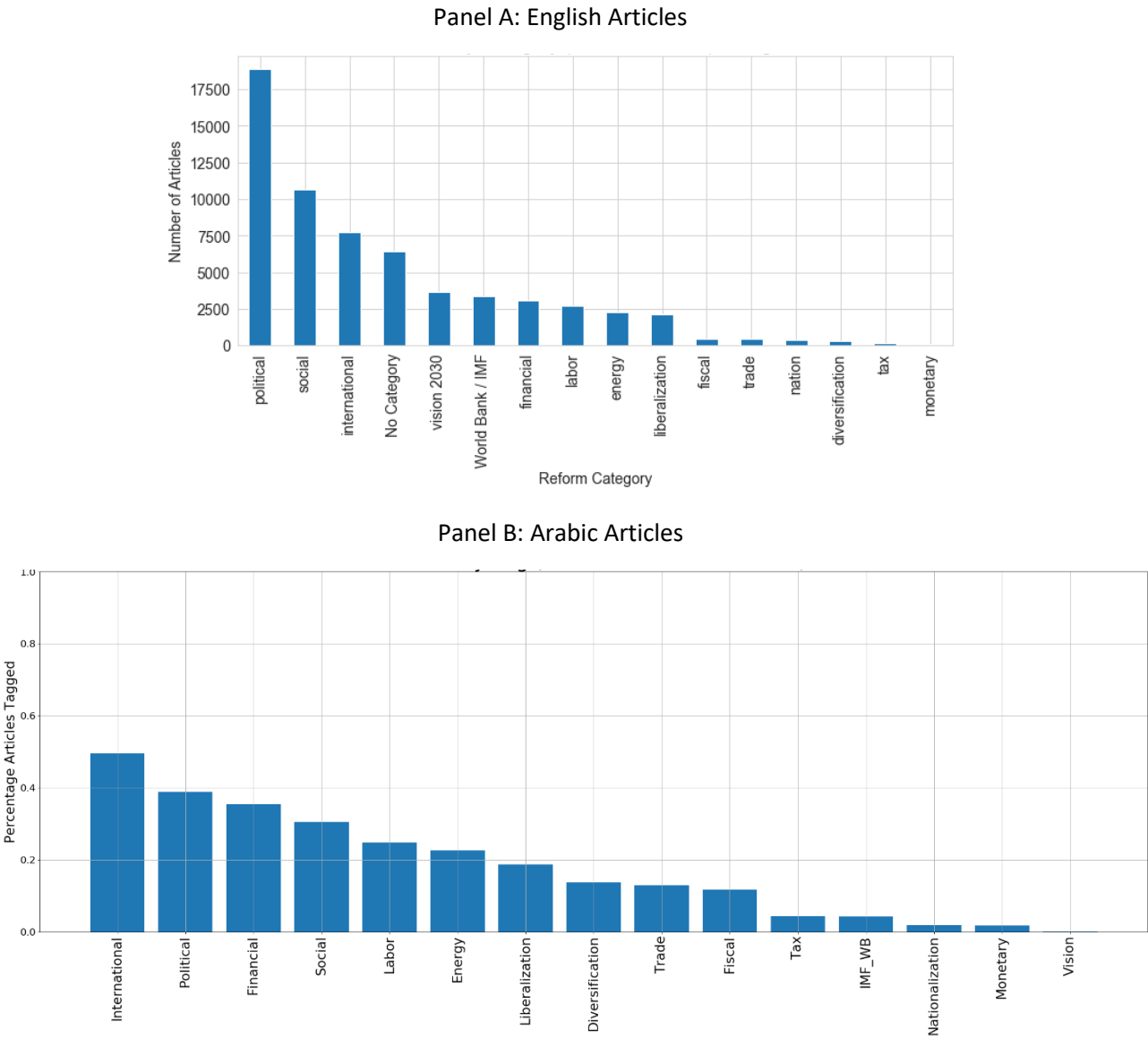
	الأوسط، أوروبا، لبنان، أفريق، برازيل، السودان، إقليم، الأسد، بريطانيا، فرنس، الأمم، مجلس التعاون، يورو، أفغانستان، سوري
<i>Social</i>	سياسي، أمن، حرب، تشريعي، سياسية، دستور، أمن، طائفي، إرهاب، ارهاب، عسكري، دفاع، فساد، أحزاب، شعب، مفسد، قمع، تطرف، تعصب، حزب، انتخاب، احتجاج، معارضة، محاسبة، ربيع العربي، احتلال
<i>Vision</i>	رؤية 2030، رؤية ٢٠٣٠، الرؤية السعودي

English keywords

Category	Keywords
<i>Tax</i>	'taxes', 'tax', 'taxation', 'taxed'
<i>Trade</i>	'import tariff', 'import duty', 'import barrier', 'government subsidies', 'government subsidy', 'wto', 'world trade organization', 'trade treaty', 'trade agreement', 'trade policy', 'trade act', 'doha round', 'uruguay round', 'gatt', 'dumping', 'trade', 'import', 'export', 'tariff', 'world trade organisation', 'trading'
<i>Monetary</i>	'federal reserve', 'the fed', 'money supply', 'open market operations', 'quantitative easing', 'monetary policy', 'fed fundsrate', 'overnight lending rate', 'central bank', 'interest rates', 'lender of last resort', 'discount window', 'saudi arabian monetary authority', 'sama', 'central bank of the united arab emirates', 'central bank of kuwait', 'central bank of oman', 'central bank of bahrain', 'qatar central bank', 'monetary'
<i>Fiscal</i>	'government spending', 'budget', 'budget battle', 'balanced budget', 'defense spending', 'military spending', 'entitlement spending', 'fiscal stimulus', 'budget deficit', 'federal debt', 'national debt', 'debt ceiling', 'debt', 'fiscal deficit', 'fiscal footing', 'government deficit', 'balance the budget', 'fiscal', 'current account', 'citizen's account program', 'primary balance', 'austerity', 'austere'
<i>Nationalization</i>	'nationalis', 'nationaliz', 'state support', 'public sector', 'emiratization', 'emiratisation', 'omanization', 'omanisation', 'qatarization', 'qatarisation', 'saudization', 'saudisation', 'kuwaitization', 'kuwaitisation', 'bahrainization', 'bahrainisation', 'foreign worker'
<i>Liberalization</i>	'liberalis', 'liberaliz', 'privatis', 'privatiz', 'market reform', 'private sector', 'free market', 'transparent market', 'de-regulation', 'public-private'
<i>Diversification</i>	'diversif', 'diverse', 'sustainable', 'sustainability'
<i>Financial</i>	'finance', 'financial', 'business', 'invest', 'capital', 'fdi', 'foreign direct investment', 'stock market', 'ipo', 'banking sector', 'banking system', 'hedge accounting', 'equity', 'equities'
<i>Labor</i>	'labor', 'labour', 'work', 'employ', 'job', 'furlough', 'fire', 'salary', 'salaries'
<i>Energy/oil</i>	'oil', 'aramco', 'gasoline', 'fuel', 'barrel', 'water', 'electricity', 'electric', 'hydraulic', 'aramco', 'petrol', 'opec', 'energy'
<i>World Bank/IMF</i>	'world bank', 'international monetary fund', 'imf'
<i>Political</i>	'government', 'political', 'election', 'democra', 'defense', 'constitution', 'opposition', 'protest', 'terror', 'extremism', 'security', 'crackdown', 'arab spring', 'corrupt', 'military', 'accountability', 'accountable', 'party', 'parties', 'sectarian', 'occupation'
<i>International</i>	'global', 'international', 'china', 'chinese', 'india', 'united states', 'afghanistan', 'usa', 'obama', 'foreign', 'yemen', 'iran', 'syria', 'g20', 'middle east', 'arab world', 'iraq', 'euro', 'lebanon', 'palestine', 'egypt', 'russia', 'france', 'french', 'united kingdom', 'uk', 'brit', 'gulf cooperation', 'sudan', 'brazil', 'africa', 'the un', 'united nations', 'region'
<i>Social</i>	'social', 'education', 'woman', 'women', 'youth', 'healthcare', 'school', 'human right'
<i>Vision</i>	'vision 2030'

For the English articles, our manual categories successfully capture 90% of articles, even though we focus only on the sentences with the word ‘reform.’ The most common tags are political, social, and international, with the political tag accounting for approximately 43% of articles (Figure A5.1). The least common tags are those related to nationalization, diversification, tax, and monetary policy.

Figure A5.1: Reform Categories



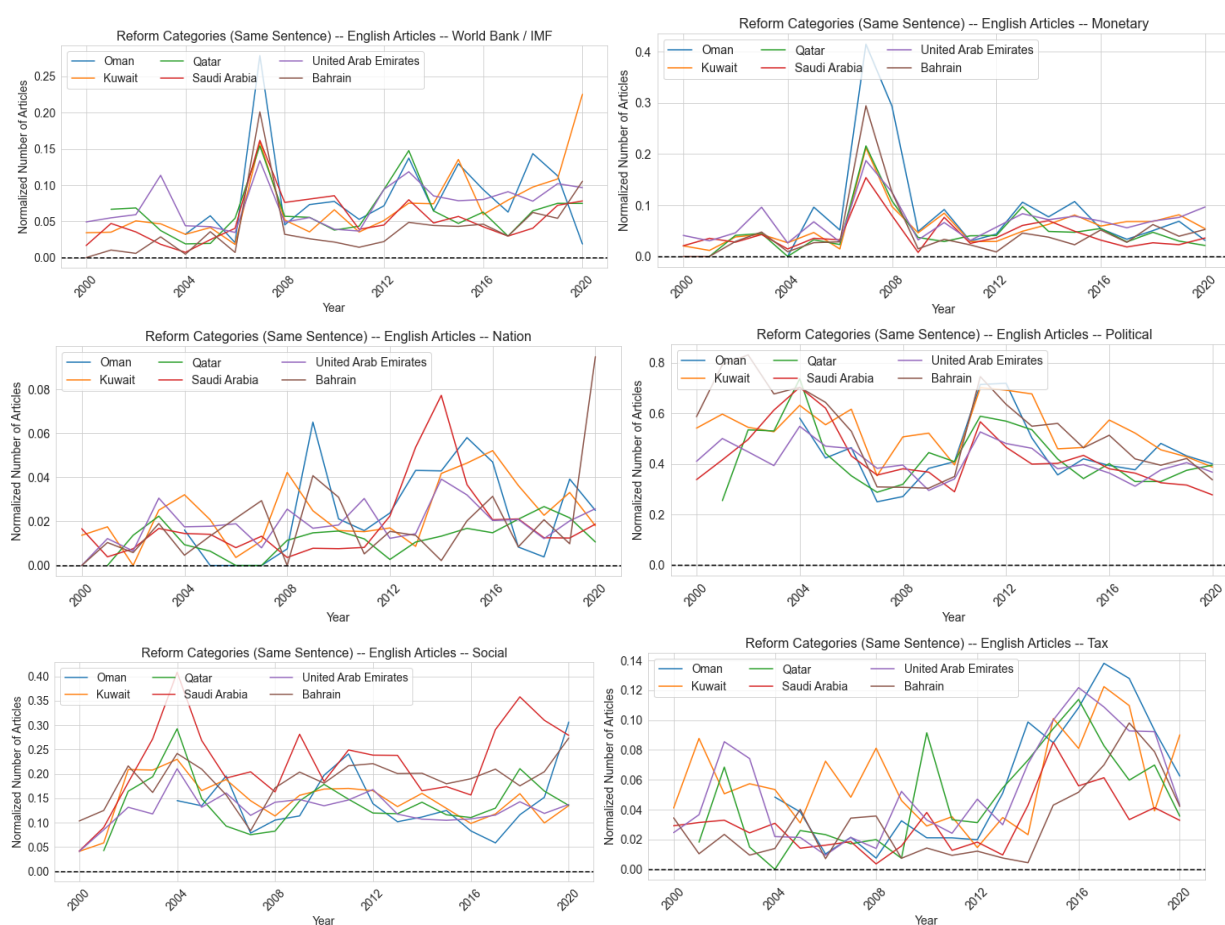
Note: Economic reform news articles are classified based on keywords that appear in the same sentences of the word reforms.

For the Arabic articles, we successfully tag about 92% of articles, and approximately two-thirds of articles receive 1 to 3 tags. The most common tags are the international, political, social, and financial tags. Among the topics more closely related to economics, finance is the most prominent, followed by labor markets and energy. Less common topics include Vision 2030, monetary policy, and taxation. Overall, the ranking of topic prevalence is generally comparable across languages.

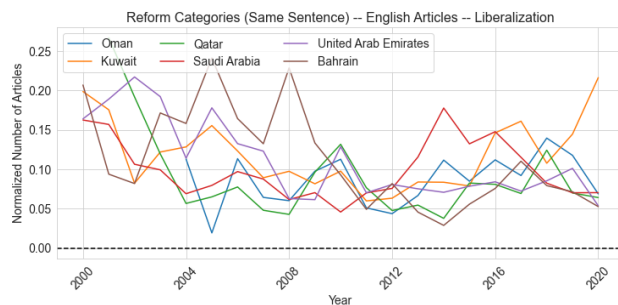
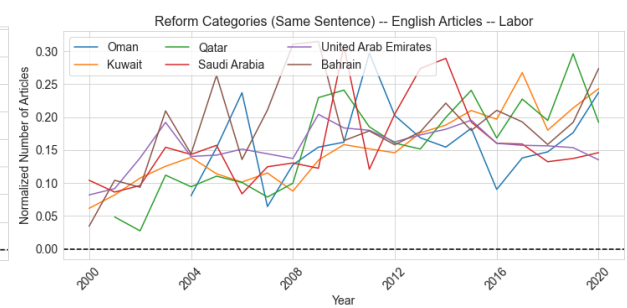
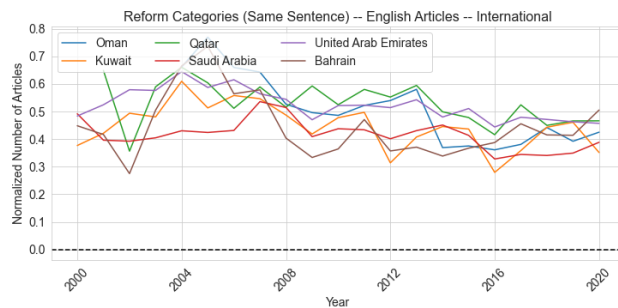
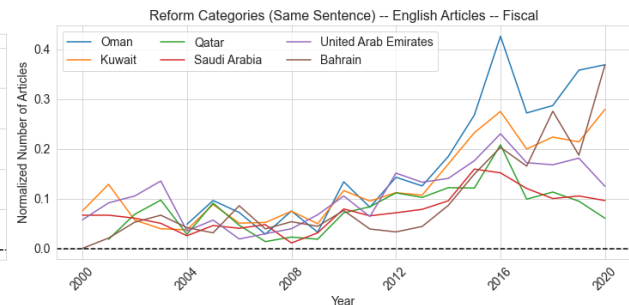
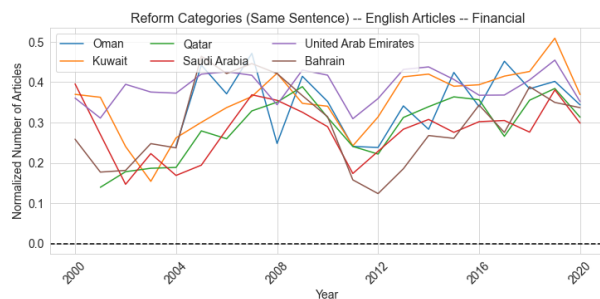
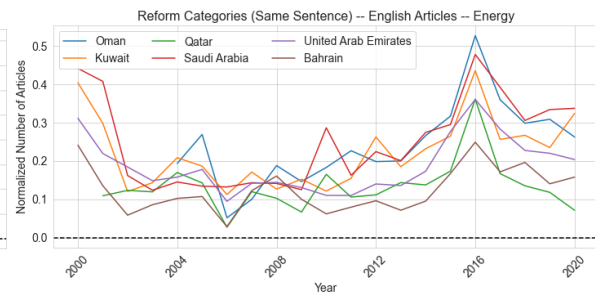
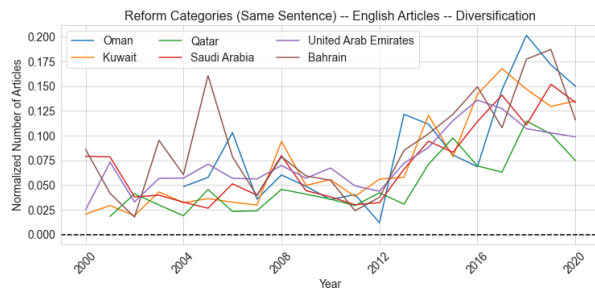
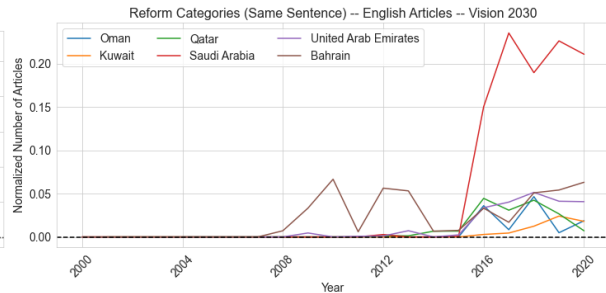
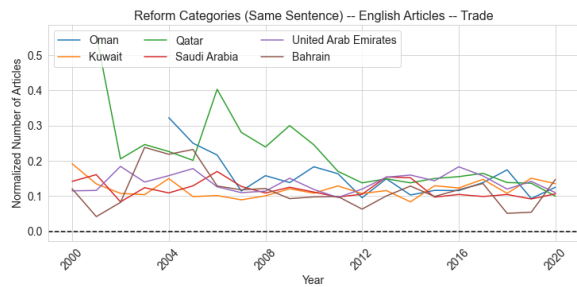
Figure A5.2 plots reform topic dynamics in English across time to examine whether shocks spark discussion of certain topics relative to others.¹⁷ The results generally make sense. Below is a summary of key findings:

- General increase in labor topics over examined since 2000
- Spike in monetary discussion during Global Financial Crisis
- General increase in nationalization talk since 2000 but still infrequent
- Periodic spikes in oil discussions, with the most recent increase in 2016
- General increase in political discussion during and post-Arab Spring, though has somewhat subsided since then
- Massive increase in social topics in Saudi Arabia since 2016 for English articles, with a less dramatic increase in 2014 for Arabic articles
- Increase in tax discussions across all GCC countries since 2012
- General increase in diversification discussion over the past decade
- Vision 2030 appears as a topic in Saudi Arabia starting in 2016
- Relatively stable discussion for other categories such as liberalization and international

Figure A5.2: Reform Dynamics -English Articles



¹⁷ For brevity, reform dynamics of Arabic articles is not shown here and is available upon request.



Appendix A6: Sentiment Analyses with News Media

Sentiment analysis refers to the task of extracting a text's opinions, whether its general stance or its attitudes towards specific topics or persons. Natural language processing provides three general approaches for computing sentiment: 1) knowledge-based techniques, 2) statistical methods, and 3) hybrid approaches. Knowledge-based techniques categorize words with unambiguous effects, such as 'good' and 'bad' (Ortony et al., 1988). Statistical methods utilize techniques from machine learning, such as support vector machines and deep learning to classify sentiment (Turney 2002). Finally, hybrid approaches combine elements from the previous two.

In our analysis, we utilize knowledge-based techniques to compute and compare the sentiment of articles covering the GCC and its economic reforms. Specifically, we use the python package 'polyglot' for Arabic and English articles. The package provides extensive polarity lexicons—dictionaries classifying words as positive, negative, or neutral—in 136 languages, including Arabic and English. We calculate article k 's 'support' by taking the number of positive words minus the number of negative words, scaled by the total word count in the article:

$$sentiment^k = \frac{\# \text{ of positive words} - \# \text{ of negative words}}{\text{total \# of words in the article/document}}$$

In addition to measuring and analyzing overall sentiment, we also examined the most used charged words—both positive and negative—to understand sentiment drivers. The most used positive words in English articles are similar across GCC countries, with 'important', 'strong', 'stable', and 'significant' being most used. There are minor differences related to the relative frequency of specific words. Some examples include 'stability' being relatively larger in Oman, 'ambitious' for Saudi Arabia, and 'sustainable' for the UAE. However, the overall picture is similar. For the English articles, the most used negative word across most GCC countries is 'crisis.' There are notable cross-country differences in other major words. For instance, 'opposition' and 'protests' are the most used negative words in Bahrain, while 'debt' and 'risk' are major concerns in Oman, Kuwait, and the UAE. At the same time, Saudi Arabia sees heavier usage of 'conservative', 'corruption', and 'terrorism.'

As observed when examining the most common words across the whole text in English articles, for the Arabic articles, the most used positive adjectives to describe reforms are similar across GCC countries. The most common adjectives are 'new', 'wide', 'national', 'big', 'structural', 'deep', 'comprehensive', and 'legal.' Minor differences include the word 'competitive' being relatively larger for articles on Oman, and 'ambitious' for those on Saudi Arabia.

Appendix A7: Sentiment and FDI Inflows

The following section investigates the effect of international sentiment and discussions on FDI inflows to the GCC countries. The analysis is particularly important today as more and more GCC countries engage in reforms targeted toward improving FDI.

We perform our analysis using a panel of all six GCC countries over the period 2000-2020. We include a set of macroeconomic and structural variables in our estimation based on the existing literature. Data on GDP growth, inflation, FDI inflows, and trade openness are obtained from the World Development Indicators database; data on six institutional quality indices are obtained from the World Governance Indicators database.

Using the data described above, we estimate the following equation:

$$FDIinflows_{i,t} = \alpha_i + \beta_t + \lambda ReformMedia_{i,t} + X_{i,t} + \epsilon_{i,t}$$

The dependent variable in all specifications is FDI inflows as a percentage of lagged GDP. Our main variables of interest are a group of reform media variables (international reform chatter, international reform sentiment, Twitter reform intensity, and Twitter reform sentiment). Each of these variables is standardized to have zero mean and unit variance in the regression. The construction of these variables is described in the main text. In addition, we control for GDP growth, inflation, trade openness, and institutional quality in all regressions. We consider the latter to be a good proxy for the attractiveness of a country for FDI investors. Finally, we include country and time fixed effects—the former control for unobserved, country-specific, and time-invariant differences in FDI attractiveness across the GCC countries. Time fixed effects capture the effects of any large shocks (e.g., Global Financial Crisis, Arab Spring) on FDI attractiveness across all countries.

Our main results on FDI inflows using news media are presented in Table A7.1. The results from Column 3 suggest that sentiment about GCC economic reforms in international media is significantly and robustly correlated with the level of FDI inflows. Moreover, the size of this effect is economically significant: one standard deviation increase in reform sentiment is associated with a 0.9 percentage point increase in FDI inflows or a 34% increase from the mean level of FDI inflows. This finding suggests that support for current reforms matters for FDI. Put differently, ‘talk is not cheap’. Interestingly, international reform chatter and the interaction between chatter and sentiment are not significantly associated with FDI inflows.

Table A7.2 presents a complimentary analysis of the effects of Twitter reform intensity and sentiment on FDI inflows. The results are very similar to those in Table A7.1, confirming the important influence of media tone on investment behavior. The coefficient on Twitter reform sentiment suggests that a one standard deviation increase in tone is associated with a 0.4 percentage point increase in FDI inflows or a 23% increase from the mean.

Table A7.1 International Reform Sentiment and FDI Inflows into the GCC

Dependent Variable:	FDI Inflows (% of lagged GDP)		
Int'l Chatter (t)	-0.0463 (0.423)		-0.704 (0.488)
Int'l Sentiment (t)	0.965** (0.322)		0.989*** (0.227)
Int'l Chatter * Int'l Sentiment (t)	0.0740 (0.287)		-0.153 (0.251)
Int'l Chatter (t-1)		0.978 (0.719)	1.381* (0.675)
Int'l Sentiment (t-1)		0.785 (0.508)	0.390 (0.378)
Int'l Chatter * Int'l Sentiment (t-1)		0.505 (0.358)	0.484 (0.362)
GDP Growth (t)	0.115 (0.0581)	0.141*** (0.0197)	0.109** (0.0348)
Inflation Rate (t)	0.0226 (0.175)	-0.0174 (0.127)	-0.00993 (0.123)
Trade Openness (t)	0.107** (0.0413)	0.106** (0.0331)	0.106* (0.0443)
Institutional Quality (t)	0.724 (3.495)	-1.534 (2.454)	-0.407 (2.291)
Country FE	✓	✓	✓
Year FE	✓	✓	✓
R2	0.605	0.622	0.655
Mean of Dependent Variable	2.858	2.899	2.899
Number of Countries	6	6	6
Observations	103	100	100

Note: This table presents the relationship between GCC reform chatter and reform sentiment in non-GCC international media and FDI net inflows to the GCC. Coverage includes the six GCC countries between 2000 to 2020. Reform discussion and reform sentiment are in both English and Arabic and normalized to have unit variance. Trade openness is measured as the value of exports plus imports as a percentage of GDP. Institutional quality is the average of six measures from the World Governance Indicators database. Standard errors are clustered at the country level and papered in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7.2 Twitter Reform Sentiment and Intensity and FDI Inflows into the GCC

Dependent Variable:	FDI Inflows (% of GDP)
Twitter Reform Intensity (t)	-0.222 (0.665)
Twitter Reform Sentiment (t)	0.403** (0.119)
Twitter Reform Intensity X Sentiment (t)	-0.894 (0.597)
Twitter Reform Intensity (t-1)	-1.479 (1.082)
Twitter Reform Sentiment (t-1)	-0.478 (0.543)
Twitter Reform Intensity X Sentiment (t-1)	0.647 (0.765)
GDP Growth (t)	0.0816 (0.137)
Inflation Rate (t)	0.437 (0.292)
Trade Openness (t)	0.0930 (0.0685)
Institutional Quality (t)	0.628 (3.686)
Country FE	✓
Year FE	✓
R2	0.663
Mean of Dependent Variable	1.753
Number of Countries	6
Observations	46

Note: This table presents the relationship between GCC Twitter reform intensity and reform sentiment and FDI net inflows to the GCC. Coverage includes the six GCC countries between 2011 to 2019. Twitter intensity and sentiment are derived from Arabic tweets, and the measures are normalized to have unit variance. Trade openness is measured as the value of exports plus imports as a percentage of GDP. Institutional quality is the average of six measures from the World Governance Indicators database. Standard errors are clustered at the country level and papered in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$