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An Empirical Analysis of the Social Contract in the Middle East and North Africa

Region and the Role of Digitalization in Its Transformation

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Abstract

This paper presents an empirical application and analysis of the social contract in countries in the Middle East and North Africa. The paper suggests a simple operational model that synthesizes a social contract's three main characteristics: participation, protection, and provision, between a government and its citizens. This empirical "3-P" framework allows investigating the role that government provision and protection may have on citizen participation, which is particularly pertinent given the political and economic development of countries in the Middle East and North Africa. The paper compares the evaluation of the health of the social contract in countries in the Middle East and North Africa region to that of countries in the Organisation for Economic Co-operation and Development. The empirical evidence shows that the social benefits provided to citizens through improved delivery of basic services have come at the cost of impaired political participation. This feature of the social contract in the Middle East and North Africa may be considered one of the root causes of the social turmoil some countries have been struggling with in recent decades. Digital transformation is a potentially powerful channel through which the relationship between government and citizens can improve, and the paper finds that it has a three-year lagged positive effect on the quality of the social contract in the Middle East and North Africa and the effect is inversely U-shaped. This suggests that structural and institutional improvements are needed in countries in the Middle East and North Africa for the quality of their social contract to reach levels comparable to those of countries in the Organisation for Economic Co-operation and Development.

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1. Introduction

In recent years, many countries in the Middle East and North Africa (MENA) have experienced popular uprisings that eroded the trust that citizens put in their governments.[1] For some observers, these events take their deep roots in the way the relationships between state and society have been shaped after these countries' independence in the 1950s and 1960s, i.e., the nature of their social contract, SC hereafter. Essentially, governments that have come into power in these countries prioritized providing social benefits, often at the cost of limiting citizens' participation in crucial political and economic decisions. A growing population and an increasingly challenging economic context have weakened this governance system and generated severe discontent with the governments and their institutions.

Countries in the MENA region face multiple challenges due to an increasingly unsustainable SC. This unsustainability results from the rentierism nature of some countries, the political instability of others, and the intensified vulnerabilities of this region to health pandemics and/or climate change. Vertical controls and privileged networking between businesses and the political elites have limited economic opportunities for citizens and increased socio-economic inequalities. As a result, corruption, lack of transparency, elite capture, and political coercion are predominant concerns in this region, leading to a low level of trust in governments and providing sufficient motivation for citizens to seek political change.

Governments in MENA have objective reasons to improve trust with citizens and strengthen their SC. They could leverage digital transformation to modernize public institutions, control corruption, enhance transparency, and increase citizen participation in their countries' decision-making processes.[2] With unchanging institutions, the deployment of digital technology has failed to deliver the expected benefits, thus preventing digitalization from fulfilling its transformative potential in the region. In order to achieve digital transformation outcomes, it is necessary to undertake deeper reform of the ICT sector while spearheading the provision of government services online. This suggests that countries in the MENA region need

[1] In this paper, we use The World Bank's operational definition of the MENA region. See the appendix for the list of countries.

[2] The application of Information and Communication Technology (ICT) in governments' activities, referred to as e-government or digital transformation of governments in the literature, can be expected to have a positive effect on corruption control in MENA (Dhaoui, 2021). This effect has been particularly observed in countries with effective legal systems (Park and Kim, 2019). Recent work that brings evidence of a (mostly) positive impact of e-government on this important aspect of the SC includes Adam (2022), Agostino et al. (2021), Khan et al. (2021), Pérez-Morote et al. (2021), and Setor et al. (2021). Relatedly, Uyar et al. (2021) find that digitalization of government services has a stronger effect on mitigating tax evasion in countries where ICT adoption is higher and Spierings (2019) provides an interesting discussion of the specific drivers of social trust in MENA.

to implement a series of political and administrative reforms to improve service delivery and strengthen accountability.[3]

Our empirical analysis is based on a theoretical framework proposed by Loewe et al. (2021), which represents a set of formal and informal relationships between states and citizens in a given country. This framework allows us to analyze a country's SC in a multidimensional space where each dimension highlights an important feature of the SC. We specify a simple and empirically implementable version of this conceptual framework, which we refer to as a "3-P" model. In this model, a country's SC is represented by a 3-dimensional vector. The first component involves the supply of a basket of basic public utility services, including education, health, water and sanitation, electricity, road connectivity, and telecoms (voice telephone and internet) to citizens (Provision). The second component is the extent to which citizens are protected against violence and violation of the rule of law (Protection), and the third component refers to the degree to which citizens participate in the political and economic decision-making process (Participation). In view of the social instability of the MENA region in recent decades, we focus on the latter dimension (Participation) as a key factor of the relative "quality" of an SC and thus devote much of our empirical investigation to identifying the nature of the causal relationship between this dimension and the two others.[4]

At this point, we should indicate that we use telecoms (voice telephone and internet) as a proxy for the delivery of basic public utility services to citizens and the cautious reader might rightly wonder why. We make this assumption for the following three reasons.[5] First, we realized that the information collection process would take us much more time than expected because the data sources were considerably dispersed. Second, given our goal of exploring the role of digitalization, we found it necessary to gather data on some aspects of digitalization that were also pertinent to the other services of the basket but were merely just unavailable, and the construction of which would necessitate a great deal of time.[6] Third, given our goal of testing

[3] Needless to say that MENA countries need to invest in education to develop digital skills and implement more structural and higher quality human capital projects.

[4] By viewing Participation as a key indicator of the quality of an SC, by no means we think that Provision and Protection have less importance. Our (testable) presumption here is that democracy, liberty, and institutional quality, which, as we will see, are the defining concepts of Participation in this paper, are at the roots of the events that have been shaping society in the MENA region during the recent decades.

[5] It is worth stressing here that the literature on the importance of telecom infrastructure for growth of developed as well as developing countries, academic and institutional, is impressively rich. See, among others, the early work on fixed and mobile infrastructure by Röller and Waverman (2001), Sridhar and Sridhar (2007), and Waverman et al. (2005) and the more recent work on ICT by Adeleye and Eboagu (2019), Nair et al. (2020), Niebel (2018), Roy et al. (2014), and Sarangi and Pradhan (2020). This said though, in some future research we intend to use the enlarged basket of basic public services to represent the Provision dimension of the 3-P SC framework.

[6] This was the case for not only electricity and water in which the introduction of smartmeters is a good indicator of the extent of digital transformation of the services, but also for health, education, and road connectivity.

the 3-P theoretical framework as an empirically operational analytical tool to study the SC in MENA countries and explore the role of digitalization in its transformation, we deemed it worthwhile to pursue despite the admittedly simplifying assumption made.[7]

More specifically, we construct a database that covers the last two decades for countries of the MENA region and use it to estimate the 3-P model. The main variables of interest in this database are three synthetic indices that we calculate from raw data for the purpose of reasonably proxying the three main dimensions of the SC. We also construct a similar database for countries of the Organisation for Economic Co-operation and Development (OECD) that we use as a benchmark, in particular, to assess the relative quality of the SC in MENA countries.[8] Our findings suggest that in MENA countries, contrary to OECD member countries, the social benefits provided to citizens in the form of improved telecom services have come at the cost of weakening their participation in society's decision-making process. This feature of the MENA region's SC could clearly be perceived as a root cause of the social turmoil that the countries of the region have experienced in recent decades.

The weakness of the SC in the MENA region highlighted by our analysis seems to be a structural phenomenon; yet does that mean there is nothing to do about it?[9] As alluded to, there

[7] As regards basic services provision digitization effects, the overall assumption is that it will strengthen service delivery quality through greater efficiency (better matching of customer needs to supply as well as lower cost), greater transparency, and ultimately better accountability between service providers, customers, and government. Digital transformation of health care delivery goes beyond telemedicine applications and utilization as it enhances customization of health services to match specific needs of each patient. For this to be put in motion, each patient needs to be identified and registered in a national social registry as it is the case with the Carte Vitale in France or Medicare Beneficiary Identifier in the US. In developing countries, the World Bank and development partners have been working with client governments to establish a universal access regime to health care which also requires the establishment of social registry identifying citizens eligible to the scheme. In short, the digitization of health care provision systems ultimately improves its ability to deliver services including for the poor. Regarding education, the digital transformation is well advanced through the deployment of digital platforms allowing pedagogical content to be accessible remotely in synchronous or asynchronous modes. The issue to be dealt with here is to ensure affordability and accessibility to such platforms. Deploying broadband internet across the country, ensuring that citizens, teachers and schooling facilities are well equipped, and enhancing digital literacy, e.g., through access to Personal Digital Assistant (PDA) are among the critical policy measures to be considered. Road connectivity ensures access to markets and is therefore indirectly impacted by digitization. Providing farmers with better market information on prices and other aspects of demand through access to digital platforms has an impact on the implementation of mobility solutions offered by the private sector and hence on the way road infrastructure is utilized and even maintained since collected traffic information can also bring along information on quality of the infrastructure. All in all, information digitization is affecting the way basic social services are delivered and how their delivery can be improved. Digitization also brings together greater interplay and convergence of basic social services.

[8] For a list of the OECD countries, see the appendix.

[9] Concerns about the quality of the SC in MENA have been raised both in institutional and academic circles. A top development journal has recently published a special issue on the framing of a new SC in the region. See Loewe et al. (2021) for an enlightening introduction to this special issue. Moreover, the World Bank has recently organized a series of webinars involving high-level decision makers, policy makers, private sector business leaders, and influencers, seeking to examine ways to improve the SC in MENA. See also, Amaney and Robbins (2022) and Robbins (2022). UNDESA (2021) discusses the impact of the COVID-19 pandemic on the world of work and the resulting changes in people's trust in public institutions, a milestone of the SC.

is definitely room for governments to lead the way to improve things in a sustainable manner. One avenue of actions consists in relying on digital transformation that could be a key driver of a new SC in MENA. Indeed, the availability of more data, or data from more sources, such as in the case of open government initiatives or digital media can be expected to increase the accountability of governments toward citizens. Moreover, digitalization can strengthen pluralistic dialogue as giving a voice to citizens will help to foster an environment where multiple perspectives and needs are taken into consideration. This should translate into greater participation in decision-making and service delivery, and greater confidence in more transparent and accountable governments.

After characterizing the SC in MENA countries through regression analysis, we introduce and investigate the impact of an index that serves as a proxy for the degree of digitalization in these countries in order to assess the role of digital transformation in society. Such an extended analysis allows us to reach a conclusion, fairly discussed in the academic as well as institutional literature on e-government, i.e., the application of recent technological advances in governments' activities, that digital transformation has a three-year lagged positive effect on the quality of the SC in MENA. However, this effect on the relationship that binds rulers and citizens in this region has an inverse U-shape, calling for structural institutional improvements in MENA countries before the quality of their SC reaches levels comparable to those of OECD countries.

The rest of the paper is organized as follows. The next section gives an overview of the literature that is most related to our work in the sense that, in one way or another, it emphasizes the need for a new SC that emerged at various points in time in the MENA region throughout the second half of the 20th century. A remarkable feature that is common to most of the papers overviewed is the fact that they emphasize the political economy dimension of an SC and the weakness of the MENA region in that respect. One of our goals in this paper is to contribute to the characterization of this structural flaw that has continuously marked the SC in the region. Section 3 discusses the raw data that we use in this paper, the way we construct and rescale our variables, in particular, the indices we use to measure the three P-dimensions of the SC, and some preliminary evidence conveyed by an examination of the behavior of these indices through time.

Section 4 presents the results of our econometric analysis of the MENA SC. This analysis is carried out in three stages. First, to set the ground for a regression analysis of the 3-P representation model of this SC, we seek to highlight the causal relationships that run from the Provision and Protection indices to the Participation index. Second, the results of the

Granger causality tests being conclusive, we perform a Probit analysis that emphasizes Participation as a dependent variable against Provision, Protection, and some controls as independent variables. Finally, we check the robustness of the results obtained by means of the propensity score matching approach. Section 5 is devoted to the econometric investigation of the impact of the digital transformation of MENA countries on their SC. Section 6 concludes by summarizing the main results of our work and pointing to some potential extensions of this research. The appendix contains some complementary material useful for the discussions in the main text.

2. A long awaited "new" social contract for MENA

In this section, we review a literature on MENA countries that demonstrates that the need for a new SC in these countries has been a recurring issue since World War II (WWII) and that, while its Provision and Protection dimensions have experienced ups and downs, its Participation dimension has experienced a steady decline. This proposition is substantiated by the following five arguments that are discussed in turn. First, after their independence in the 1950s and 1960s, these countries adopted an SC characterized by a strong interventionism that progressively drifted toward an equally strong authoritarianism. Second, MENA countries experienced economic difficulties that challenged the redistributive nature of their SC and led to a major crisis that called for deep reforms. Third, it was not clear that governments really wanted to reform as they realized that reforms were not compatible with their incentives, which led to mixed results. Fourth, the parties involved in the SC reforms felt so strongly the need to improve its quality that their positions radicalized to the point of having adverse consequences on the SC in the end. Last, the weak link of the MENA SC, namely its Participation dimension, has recently come back in the spotlight.

From an interventionist-redistributive to an authoritarian social contract

In the 20th century, the SC of MENA, more specifically its economic development model, has attracted the interest of academics and policy analysts after WWII, particularly at the turn of the independence in the 1950s. The early literature has highlighted the strong "interventionist-redistributive" orientation of this SC (Richards and Waterbury, 1996; Richards, 2004) and analyzed the main historical and structural factors that shaped it (Yousef, 2004). The factors that drew the most attention include the development of a strong perception of the state as the primary provider of economic well-being in MENA countries (Thompson, 2000), the events that led to the freeing of these countries from the colonial powers (Picard, 1993), and the fact

that this region is home to countries with either oil- or labor-exporting economies (Beblawi, 1987; Chaudhry, 1997).

One aspect of the SC in MENA that has been emphasized is its dual nature as a political instrument that confers entitlements to citizens while also providing mechanisms for their control (Vandewalle, 2004). In fact, it has been argued that this SC has cemented a situation referred to as an "authoritarian bargain" in which citizens trade political participation against economic security and social services (Youcef, 2004).[10] Indeed, from the 1950s into the 1970s, the MENA countries' development model delivered economic dividends that allowed them to reach unprecedented economic prosperity (Elbadawi, 2005). Massive public investments in infrastructure, health, education, and protected state-owned enterprises (Yousef, 2004) allowed the MENA region to perform well economically.[11] However, when it came to citizen participation in decision-making processes, the situation was far from ideal.

In parallel to this economic flourishing in MENA, a "governmental gap" was developing giving the countries of the region a disappointedly grim face in terms of, not only political participation, but also respect for civil liberties and government transparency (Bromley 1994; Anderson 1995).[12] This gap was considered to be due to the combined effect of oil, social tensions, and geopolitical considerations (World Bank, 2003). High oil revenues have allowed some governments to ease the burden of relying on socially costly taxation to implement redistribution policies and support large internal security systems that would protect them and prevent popular mobilization (Bellin, 2004). Unprecedently high levels of security and military spending have also accompanied these apparatuses that became clearly coercive. Moreover, MENA authoritarian governments have always found external support, in particular, within the superpower rivalry and the oil supply security concern (Khalidi, 2004). In fact, it has been argued that these regional factors have played a much more significant role than any others, including religion and culture, in hindering democracy in MENA (Ross, 2001).

[10] Desai et al. (2009) provide an econometric confirmation of this authoritarian bargain hypothesis using panel data on 80 non-democratic states during the 1975-1999 period including countries of the MENA region. In the context of our study that uses data only on MENA countries, an implication of this hypothesis is the existence of a negative relationship between Participation and Provision on which our analysis provides robust evidence.

[11] Boosted by the large oil revenue intakes of the 1960s and 1970s, the MENA region's economies reached one of the highest growth rates in the world at the 5% to 6% levels. This extraordinary growth has however not been without raising concerns, in particular, because it was often the result of a highly positive rate of capital accumulation and a negative rate of total factor productivity (Page, 1998). A good example is Algeria where the implementation of the "industrializing industries" development model (Destanne de Bernis, 1966) led to the quadrupling of the rate of physical capital accumulation whereas the total factor productivity collapsed from 1.9% in the 1960s to -0.7% in the 1970s (Yousef, 2004).

[12] MENA countries ranked very low in two important indices that measure this gap, namely, public accountability and institutional quality with values of respectively -0.78 and -0.32 while those of the OECD countries were 1.89 and 1.38 (Yousef, 2004). This gap turned out to be even wider for MENA oil-exporters (World Bank, 2003).

Economic crisis-called reforms

This gap between citizens and states in MENA kept widening to the point of challenging the capacity of governments to sustain their redistributive commitments. During the 1980s, some increasingly threatening tensions appeared and turned into a major crisis by the end of the decade.[13] The resulting slowdown in growth in the region has prompted some countries such as Morocco, Tunisia, and Jordan to launch reforms since the mid-1980s. In the 1990s, with the support of international financial institutions and western democracies most MENA countries implemented deep structural reforms aimed at laying the foundations for a market economy, thus paving the road to what was seen with great hope by the people of the region as the pathway toward a new SC. The question then was the extent to which these reforms effectively brought about a real new SC.

However, the structural reforms of the MENA economies undertaken in the 1990s failed to yield the expected results. Significant unevenness, slowness, and incompleteness of the implementation of the reforms (Dasgupta et al., 2004) as well as the volatility of oil prices faced by oil-exporting countries and the periodic droughts that struck countries with large agricultural sectors (Johansson et al., 2003) have often been invoked as reasons for this failure.[14] Given the fundamental need for MENA countries to diversify their economies, the phenomenon of the curse of natural resources (Sachs and Warner, 2001) has also been cited, in particular, in its interpretation as a consequence of the Dutch economic disease (Corden and Neary, 1982). Interestingly enough and more germane to the purpose of this paper, while the political economy interpretation of the natural resources curse has been almost systematically mentioned, it has rarely been analyzed in depth.[15] To be sure, the natural resources curse story

[13] Declining oil prices, shrinking demand for migrant labor, diminishing remittance flows, and increasing international competitive pressure are among the root causes of this crisis that have been put forward (Yousef, 2004). Moreover, failing to encourage private investment, the regulatory environment hindered the development of export-oriented industrial sectors, thus creating obstacles to the integration of the MENA region's economy into globalized markets (Shafik, 1998; Abed, 2003).

[14] Despite the increase in human capital made up of a predominantly young population, the economic performance of the MENA region was generally weak, with almost no growth in physical capital and productivity (Yousef, 2004).

[15] Using a 1960-2016 dataset on Algeria, Gasmi and Laourari (2017) examine whether this heavily oil-dependent country has suffered from the Dutch disease and find no clear evidence of the existence of this syndrome. They then suggest that the puzzle of the deindustrialization of this country could be better understood by examining the curse of natural resources through the lens of political economy, in particular, the quality of its institutions and the distribution process of the oil rent. Asking whether oil and gas resources are a curse or a blessing in MENA, Aoun (2009) concludes that this phenomenon creates economic and social distortions that impede economic development and impoverish the quality of institutions, in particular, by hindering democracy and encouraging corruption. Looney (2005) emphasizes integration in global markets as an objective for MENA and argues that governments in the region should put a higher priority on enhancing the quality of governance, in particular, by improving voice and accountability and fighting corruption, than on conducting further economic reforms. Abed (2003), Abed and Davoodi (2005), and Abed and Gupta (2002) convey a similar message. Finally, in a dataset concerning 36 oil-rich

has been recognized as applicable for analyzing the SC of the MENA region and the need to reform it. However, some other characterizing factors have been highlighted in the literature.

The interventionist-redistributive tradition has created an inertia in terms of what the populations expected from governments, but compelled to reduce welfare programs, these governments had to face political and social pressures, including political rivalry from religious movements that offered populations social safety shelters (Harik and Sullivan, 1992). In some countries, the austerity measures applied by governments generated large and sometimes even violent mass protest.[16] Moreover, in the instances where some policy reforms generated some economic gains, those gains were almost systematically captured by business elites having ties with governments.

Governments' (dis)incentives for reforms

Governments' incentives to maintain an unsustainable SC have also generated factors that shaped in a specific fashion MENA's SC. By the end of the 1990s, it had become clear that the MENA region's postwar SC was no longer sustainable.[17] Yet, MENA governments had a weak commitment to a comprehensive reform (Yousef, 2004). In the 1970s and 1980s, these governments were able to directly tap on revenues generated outside the circuits of the domestic economy, in particular through oil exports, remittances, and foreign aid. In the 1990s, these revenues had become barely enough to allow them to buffer the impact of economic stagnation and adopt limited reforms, while delaying arduous structural adjustment policy decisions and profound reform of the SC.[18]

The way MENA governments have managed the relationship between the economic and political spaces in the reform context has also affected in a peculiar manner the SC. During the earlier phases of the economic reforms of the 1980s, most governments have found it necessary to simultaneously implement political reforms (Niblock and Murphy, 1993). Some states recognized that the political characteristics of the existing SC hindered their ability to introduce a market economy. Thus, some MENA countries' governments, including Algeria, the Arab

developed and developing countries that covers the period 1970-2016, Alssadek and Benhin (2021) find some evidence of the Dutch disease with differentiated degrees across regional groupings. They argue that a better institutional quality attenuates the disease.

[16] This was for example the case in the Arab Republic of Egypt in 1977, Morocco in 1983, Tunisia in 1984, Algeria in 1988, and Jordan in 1989.

[17] The economic difficulties in the decades of the 1980s and 1990s have called into question the status of this SC, especially among the population too young to remember the earlier era of economic prosperity. A great challenge for states was to respond to the population demand for transparency and governance reform (Richards, 2004).

[18] The impact of soft budget constraints on demand for reform in the context of the Muslim world is discussed at length in Luciani (1994).

Republic of Egypt, Jordan, Morocco, and Tunisia took some measures of political liberalization to secure support for their market-oriented economic reforms. Although these experiments fell short of settling a genuine democracy, they opened the political space to opposition political parties, expanded civil liberties, and increased the participation of civil society (Norton, 1996) to an extent that was certainly welcomed by many observers of MENA's society.

Radicalization of the social contract reform stakeholders' positions

As partial and fragile as they were, the windows of political openness had consequences that challenged their very viability (Brumberg, 2003). Excluded from political life for decades, political opposition movements had turned to increasingly radical and often clandestine modes of organization and mobilization (Esposito and Voll, 1996). Thus, spaces of political openness have been exploited by opposition movements seeking a radical transformation of society. This was the case in some countries such as Algeria, Tunisia, Egypt, the Republic of Yemen, and Jordan, where the Islamist political opposition drew considerable support during the 1980s and early 1990s, to the point of questioning the ability of governments to manage the extent of political change.[19]

Under these circumstances, given that many governments in the MENA region had been reluctant reformers anyway, as soon as they faced strong political opposition, they took measures that weakened the relationship between the economic reform and the political reform (Kienle, 2001). Some governments have responded to the political claims and, in some cases, to the violence of extremist groups by relaunching strategies of political control and reinvigorating national security concerns that had previously hampered economic reform in the MENA region (Yousef, 2004).[20] Thus, while in the 1980s and early 1990s, governments in MENA considered political liberalization necessary for the success of the economic reforms, by the mid-1990s, implementing economic and political reforms simultaneously was seen as a threat to the existing social order.

As a result, a top-down approach to economic reform by decree replaced the earlier bottom-up one in which governments sought to generate support for a market-oriented reform by opening up the political space. By the end of the 1990s decade, this mechanism of reform

[19] Islamist movements have relied on trade unions and professional associations, among other organizations, to successfully compete in local elections (Yousef, 2004).

[20] New constraints on civil society and non-governmental organizations were imposed and so were restrictions on press freedom and other measures aimed at controlling political participation. In the 1990s, the army stopped the national elections about to be won by an Islamist party in Algeria and in Tunisia, Egypt, and Jordan measures were taken to reduce Islamist political participation.

by decree has reproduced the old state-centered system based on interventionism and paternalism in MENA countries, thus moving them away from the prospect of establishing economic and political institutions to sustain a market economy. Most importantly, this top-down approach meant that the prospect for establishing a consensus around a renewed SC became more remote. In the 1990s, government transparency, rule of law, and voice and accountability all suffered in MENA (Yousef, 2004).

Potential for the advent of a new participation-strong social contract

What was the potential for reform at the turn of the 21st century in MENA? On the economic front, the global situation was such that most countries in the MENA region could no longer afford to undertake partial and often reversible reforms while relying on oil revenues and foreign aid, which have declined significantly. Governments in the region have become increasingly dependent on national resources to finance economic and social programs, and the need for an institutional and regulatory framework to foster growth has remained a high priority. On the political front, the public opinion showed significant support for an electoral reform, good governance, and an integration of opposition parties into the political game. For example, respondents to a 2002 survey have rated civil and individual rights as the highest priority in eight MENA countries (Zogby, 2002). Moreover, a Gallup survey undertaken that same year showed that individual attitudes in MENA are more driven by political and economic considerations than religion and family factors (Tessler, 2003).[21]

Unfortunately, this potential has not materialized and around the middle of the last two decades, the MENA region has been the scene of events that have left their mark on people's minds, both in their sheer scale and in the suddenness with which they have occurred. In the early 2010s, a series of anti-government protests, uprisings, and armed rebellions spread across many countries of the region, more specifically, the Arab world. This set of major events, referred to as the "Arab Spring," started in Tunisia and spread rapidly to Libya, Egypt, Yemen, the Syrian Arab Republic, and Bahrain.[22] Some other events of a smaller scale took place in the MENA region around that same period, including sustained street demonstrations in Algeria,

[21] The security context of the 2000s in the MENA region also called for an extension of political reforms. Heavy defense budgets justified by large unresolved conflicts in the region have imposed economic costs that have become unsustainable for people (UNDP, 2002). The objectives of political and social stability could certainly be pursued by strengthening political openness, provided that States are prepared to redefine the terms of the SC that links them to their citizens.

[22] Economic stagnation combined with large-scale corruption involving the highest governmental officials were seen as the key causes of the uprising in Tunisia (Rijkers et al., 2017a and 2017b). For an analysis of how the street took power in Egypt, see Acemoglu et al. (2018). In both cases, the rulers were deposed as were Libya's and Yemen's. In fact, a common demand to all protest movements in these countries is "the complete bringing down of the regime."

Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, and Sudan and minor protests in Djibouti, Mauritania, the West Bank and Gaza, and Saudi Arabia.

While the rather blooming economic context in which the Arab Spring broke out prompted some development economists to label it a puzzle or a paradox (Devarajan, 2015), examining these events through the lens of the SC, which places emphasis on the political context as well, allows to greatly improve the understanding of their root causes. In the first decade of the 2000s, the standard indicators of economic well-being (growth, poverty, and inequality) and human development (child mortality and school attainment) all had encouraging levels and trends. Yet, as shown by World Values Surveys and Gallup surveys, there existed significant dissatisfaction of citizens in MENA and much of it was about political factors such as voice and accountability and freedom of speech to which the middle class and the youth were aspiring. The authoritarianism of governments was also of great concern to these populations.

With no doubt the Arab Spring has given rise to a magnificent wave of hope among young people in the MENA region who have raised their voices strongly against corrupt practices and called for more jobs, freedom and dignity. But recent events in the region suggest the possibility that this hope may have evaporated.[23] Even in the few cases where protest movements have taken place in an extremely peaceful manner, for various reasons that certainly deserve to be explored but go beyond the scope of this document, what has happened is, instead of the advent of a new SC responding to the aspirations of the frustrated population, at best, governments attempted to return to a governance of the authoritarian bargain-type discussed earlier.[24]

Thus, although the SC of the post WWII in the MENA region has been seriously challenged by the difficulties of the countries of this region in the 1980s and 1990s and that the Arab Spring 2010 has severely shaken their social structures to the point of alerting governments to the urgent need to facilitate the emergence of a higher-quality SC (Devarajan and Mottaghi, 2015; Ibrahim, 2020), the events that have followed the Arab Spring have demonstrated, once again, that the development in peace of the region would necessarily require a new SC. It is striking, however, that, despite the richness of the historical events that marked the evolution of MENA's SC, to the best of our knowledge, the only attempt to develop a unified

[23] As a high-level World Bank manager has recently put it: "But as we now know, the wave crashed into a maelstrom of disillusionment, political opportunism, authoritarianism, violence, and civil war." (Belhaj, 2021).
[24] For a long time, MENA states have chosen the politically easy but economically disastrous SC where basic goods and services are made available at low prices in return of political allegiances and social peace. Governments can no longer bear the cost of such a policy and the population, especially the youth, is no longer willing to accept a quid pro quo that silences their aspirations (Belhaj, 2021).

conceptual analytical framework came from Loewe et al. (2021) in their introduction to a recent special issue of *World Development*.[25] From a methodological standpoint, our objective is to contribute to making operational this conceptual framework for the purpose of characterizing the main features of an SC, in particular, that of MENA countries. An attractive feature of the operational framework that we propose in this first attempt is that it allows us to analyze the impact of digital transformation of society on this SC, a question that has recently drawn much attention.

3. Data and preliminary analysis

This section will detail the construction of the MENA database and preliminary analysis. We first visualize the 3-P model of the SC and describe the raw data used to proxy the three dimensions of Provision, Protection, and Participation or those used as controls. We then examine descriptive statistics between MENA and OECD countries as an initial base of comparison, and proceed to process the data, including reducing dimensionality using a principal component approach (PCA). Finally, we discuss descriptive evidence from the transformed data on the three indices. Table A.6 in the appendix lists the MENA and OECD countries on which we collected data over the 2007-2020 period.

Raw data for the 3-P model of the social contract

Following Loewe et al. (2021), we represent a given SC as a vector in a 3-dimensional space (see Figure 1) whose components are levels of Protection, Provision, and Participation, noted respectively P1, P2, and P3 hereafter.[26] For our empirical analysis, we collected data on variables that are good candidates for proxying each of the three dimensions. Table 1 lists these variables, along with control variables that may plausibly impact at least one of the three fundamental dimensions of the SC.[27]

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[25] We must indicate here that while each of the papers published in this special issue makes use of Loewe et al.'s (2021) framework in an interesting way, e.g., El-Haddad (2020), Furness and Trautner (2020), Revkin and Aram (2020), and Sobhy (2020), none of them brings this framework to actual statistical data. Contributing to filling this gap is also one of our contributions to this literature.

[26] In fact, Loewe et al. (2021) also discuss a 4th dimension of an SC that is meant to capture factors that are external to a given country but have a significant impact on its economic and political development pathway. As indicated in the previous section, geopolitics and market globalization have indeed played a role in the way MENA's societies have functioned throughout the second half of the 20th century. However, this international dimension, it seems to us, has significantly less weight nowadays than it used to. For this and other reasons related to data collection, we do not consider it in this first empirical attempt to analyze an SC.

[27] The definition of each of these variables and the sources from which we obtained the data on them are given in the appendix.

Figure 1. The 3-dimensional space used to represent a social contract.

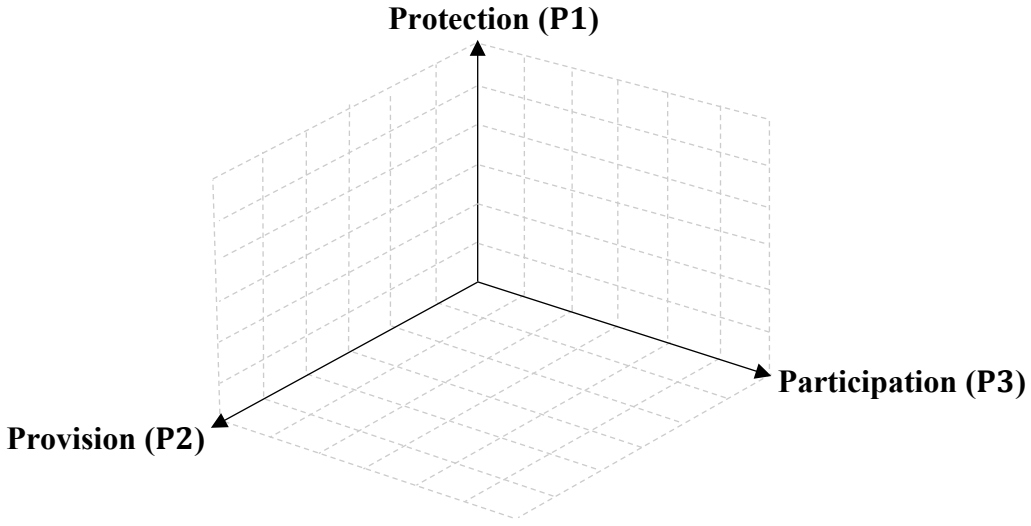


Table 1. Proxies for the 3 dimensions of a social contract and some controls

SC dimension	Variable	Label
Protection (P1)	Political stability	pve
	Regulatory quality	rqe
	Rule of law	rle
Provision (P2)	Fixed phone	fts
	Mobile phone	mcs
	Fixed broadband	fbs
	Internet bandwidth	$ibpiu$
Participation (P3)	Voice and accountability	vae
	Control of corruption	cce
	Democracy index	di
Controls	Rural vs. urban population	rp
	Unemployment	un
	Human development index	hdi

The variables selected as proxies for Protection reflect the degree of security available to individuals and firms through the government's ability to maintain order, regulate effectively, and enforce the law. The set of proxies for Provision reflects the degree to which citizens have access to (quality) telecommunication and internet services. To measure Participation, we utilize a set of proxies consisting of variables that gauge how effectively citizens can freely express themselves, the level of government accountability for its actions, the effectiveness of corruption control measures, and the extent to which democratic principles are being upheld.

Finally, the Controls category contains variables that provide information on the structure of the population (relative importance of rural versus urban), the degree to which this population is active, healthy, and educated, and the quality of its standard of living.

Table 2. Descriptive statistics of the original data for the MENA and OECD samples

SC dimension	Variable	MENA			OECD		
		Obs.	Mean	Sd.	Obs.	Mean	Sd.
Protection (P1)	pve	266	−0.82	1.11	532	0.61	0.70
	rqe	266	−0.38	0.81	532	1.24	0.49
	rle	266	−0.36	0.77	532	1.21	0.67
Provision (P2)	fts	263	13.40	8.05	532	36.02	14.72
	mcs	265	103.86	44.85	532	117.80	19.74
	fbs	249	5.92	5.90	531	27.94	9.67
	$ibpiu^{+}$	244	44.07	79.33	438	187.47	821.48
Participation (P3)	vae	266	−1.09	0.46	532	1.09	0.46
	cce	266	−0.37	0.75	532	1.17	0.82
	di	247	3.36	1.15	494	8.13	0.98
Controls	rp	266	25.63	17.03	532	22.71	11.08
	un	266	10.38	7.14	532	7.62	4.11
	hdi	209	0.71	0.11	418	0.87	0.05

[+]This variable has been divided by 1000.

Table 2 exhibits some descriptive statistics of the variables in the samples of the MENA and OECD countries, where the latter sample will be used as a benchmark in upcoming econometric analysis. To handle certain data irregularities, we imputed missing values between any two reported values using the annual growth rate. As documented in historical analysis of the SC of MENA countries over the past half-century, we also observe that, on average, MENA countries have lower quality SC than OECD SC. This disparity is particularly evident in the Participation dimension compared to the other two dimensions. We will later return to this point.

Rescaling and reducing dimensionality of the data

We construct indices for the three dimensions of an SC, $P1$, $P2$, and $P3$ using PCA, which is one of the most commonly used methods to calculate composite indices for large datasets. It is known to reduce the dimensionality of the data, which enhances parameter parsimony, and eases parameter interpretation while at the same time minimizing the loss of information

incorporated in the data (Jolliffe, 1990; Mishra, 2007; Jolliffe and Cadima, 2016). Jolliffe (1990) argued that it is important to standardize the data prior to applying the PCA procedure for two reasons. First, standardization allocates the same weight to all the variables while using the original data could potentially lead to the high-variance variables dominating the first few principal components. Second, the measurement units of the different variables can affect the relative sizes of variances and covariances, a problem that can be overcome by standardization.

With respect to the first argument put forward by Jolliffe (1990), Gewers et al. (2021) pointed out that this practice could potentially lead to erroneous conclusions on the data generating process. These authors argue that standardization should be used only if the data variability is meaningful and intrinsic. Otherwise, if this variability is only a consequence of an unwanted effect, for instance, if it is due to an experimental error or noise, then Gewers et al. (2021) claim that "… standardization may emphasize what should have been otherwise eliminated." In our case, because most of our variables are obtained by estimation, they are likely to be exposed to significant noise and therefore we would tend to avoid standardization. However, Jolliffe (1990)'s second argument strongly militates for standardization. Indeed, from Table 2 we see that there are significant differences in the variances of some of the variables due to the different units in which these variables are measured.[28]

We thus apply a (rescaling) procedure referred to as "min-max scaling." Let i indicate a country and t a year. For any variable var, define its rescaled version as:

$$rs\_var_{it} \equiv \frac{var_{it} - min\{var\}}{max\{var\} - min\{var\}} \tag{1}$$

where rs_var_{it} is rescaled var_{it}, $min\{var\}$ and $max\{var\}$ are respectively the minimum and maximum realizations of the variable var for all countries i and all years t in our dataset, corresponding to the worst and best performance across countries and years in terms of the variable var. Note that when $var_{it} = min\{var\}$, $rs\_var_{it} = 0$ and that when $var_{it} = max\{var\}$, $rs\_var_{it} = 1$. This transformation enables us to normalize the values of each variable to a unitary segment and evaluate the performance of a particular country in a relative sense by comparing it to the highest and lowest levels of the variable under consideration. As a result, this method also enables the comparability of each variable across different countries.

[28] For instance, we see from Table 2 that there is an extreme difference in the standard deviations of the variables mcs and $ibpiu$ that are both proxies for the Provision dimension of an SC.

Table 3 shows the descriptive statistics of the rescaled variables in which we see that the variability of the data is somewhat "normalized." Table A.2 in the appendix gives the correlation coefficients among these rescaled variables for the MENA sample.[29]

Table 3. Descriptive statistics of the rescaled data for the MENA and OECD samples

SC dimension	Variable	MENA			OECD		
		Obs.	Mean	Sd.	Obs.	Mean	Sd.
Protection (P1)	rs_pve	266	0.49	0.22	532	0.77	0.14
	rs_rqe	266	0.46	0.16	532	0.79	0.10
	rs_rle	266	0.47	0.16	532	0.81	0.14
Provision (P2)	rs_fts	263	0.10	0.06	532	0.27	0.11
	rs_mcs	265	0.49	0.21	532	0.55	0.09
	rs_fbs	249	0.11	0.10	531	0.50	0.17
	rs_ibpiu	244	0.01	0.01	438	0.02	0.10
Participation (P3)	rs_vae	266	0.30	0.11	532	0.83	0.11
	rs_cce	266	0.35	0.17	532	0.70	0.19
	rs_di	247	0.28	0.13	494	0.80	0.11
Controls	rs_rp	266	0.28	0.19	532	0.25	0.12
	rs_un	266	0.28	0.19	532	0.20	0.11
	rs_hdi	209	0.66	0.16	418	0.89	0.08

Now that we have standardized our data, we adopt the approach proposed by Cámara and Tuesta (2018) to define the PCA indices $P1$, $P2$, and $P3$ as follows:[30]

$$P\#_{it} \equiv \sum_{j=1}^{m} \omega_j \left(rs\_var_{it}^{j}\right) \tag{2}$$

where $\# = 1,2,3$, $rs\_var_{it}^{j}$ is the value for country i in year t of the rescaled variable j that is included in the dimension P# of an SC, and ω_j is the weight attached to this variable. This weight is defined as:

$$\omega_j \equiv \frac{\sum_{k=1}^{m} \lambda_k \phi_{kj}}{\sum_{k=1}^{m} \lambda_k}$$

[29] We note that these correlation coefficients are generally high, which suggests that the three dimensions used to represent an SC may be relevant, an aspect of the data that we further explore in the next section.
[30] Note, as pointed out by Cámara and Tuesta (2018), that PCA is robust to information redundancy.

(3)

where λ_k is the eigenvalue of the k^{th} principal component, ϕ_k is its respective eigenvector in the correlation matrix, and thus ϕ_{kj} is the element of this eigenvector that corresponds to the variable j. Since $\forall j, \omega_j \in [0,1]$ and $\sum_{j=1}^{m} \omega_j = 1$, each of the three indices $P\#$, $\# = 1,2,3$, is a convex combination of the (rescaled) values of the variables that proxy the dimension P#, and as such, has values between 0 and 1. Note that this PCA procedure assigns a greater weight to the variables that contribute more to the variability of the data, i.e., the proposed indices will tend to track the more volatile variables.

Some empirical evidence on the 3-P indices' temporal evolution

Recall that because of the way they are constructed, the indices are such that $P\#_{it} \in [0,1]$ for $\# = 1,2,3$ and any country i and year t. The interpretation of an index taking on the value 0 (1) for a given country during a given year is that this country had the worst (best) performance during that year ever according to all the variables that are used in the construction of the index. Thus, those cases are very unlikely, and in fact, we do not have any such cases in our database. Table 4 shows the summary statistics for each of the three indices for both MENA and OECD.[31]

We can see that, on average, across countries and time, an OECD country outperforms a MENA country in all three dimensions of the SC. We find a gap of 60% in Provision (0.32 for OECD vs. 0.20 for MENA), 65% (0.79 vs. 0.48) in Protection, and most importantly 148% (0.77 vs. 0.31) in Participation.

To gain some insights on the quality of the MENA countries' SC relative to that of the OECD countries, and given the relative gaps highlighted by the three indices that can be seen from Table 4, we focus on some representative countries and the way the indices of Provision ($P2$) and Participation ($P3$) have evolved through time. We examine more closely one group of countries considered as "authoritarian-leaning," which includes Egypt, Jordan, and Morocco and another group of countries considered as "democratic-leaning," which includes Iraq, Lebanon, and Tunisia (Amaney and Robbins, 2022; Robbins, 2022).[32] To make the exercise more meaningful, we compare these two groups of countries with Algeria, Saudi Arabia, and the Syrian Arab Republic. Figure 2 shows the evolution of these indices in the nine countries.

[31] Table A.3 in the appendix gives the correlation coefficients between the three indices and the controls, which are relatively high as could have been expected from the figures shown in Table A.2.

[32] It should be noted that Tunisia, which has long been considered as belonging to the category of MENA countries with a democratic tendency, is no longer so since Kaïs Saïed's authoritarian government came to power in October 2019, a period that is not covered by our data.

Table 4. Descriptive statistics of the 3-P indices for the MENA and OECD samples

Countries	Index	Obs.	Mean	Sd.	Min.	Max.
MENA	$P1$	266	0.48	0.17	0.13	0.79
	$P2$	235	0.20	0.08	0.02	0.46
	$P3$	247	0.31	0.10	0.06	0.55
OECD	$P1$	532	0.79	0.12	0.43	0.96
	$P2$	437	0.32	0.07	0.11	0.69
	$P3$	494	0.77	0.13	0.36	0.98

A characteristic of the data that this figure clearly shows is that, for the nine countries examined above for illustrative purposes, the $P2$ index (Provision), which, recall, is a composite index that measures the content as well as the quality of the delivered basket of telecommunication and Internet services, has steadily increased over time. As for the $P3$ (Participation) index, which incorporates factors reflecting the extent to which a society is on a democratic path, its evolution is not uniform across these nine countries. The situations that seem unequivocal are those of Tunisia, where this index has been steadily increasing, and Egypt, Lebanon and the Syrian Arab Republic, where it has been declining in trend. This index remained relatively stable for the other five countries, namely Algeria, Iraq, Jordan, Morocco, and Saudi Arabia, with slight declines at certain periods.[33,34]

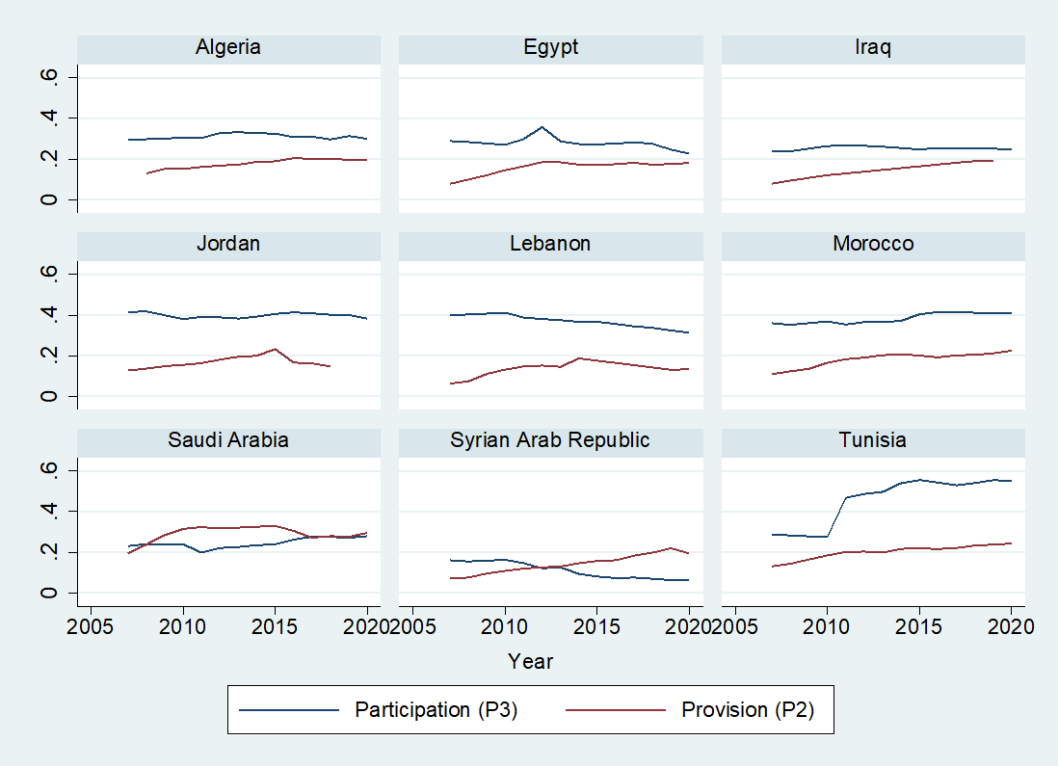
These observations on the relationship between $P2$ and $P3$ give us a sense of what the quality of the SC in MENA could be, a question that we will investigate at length in the next section. We should, however, incorporate the third index used to represent an SC, namely, $P1$ (Protection) in this preliminary analysis. As, on average, an OECD country has outperformed a MENA country on all three indices (see Table 4), we determine the three-dimensional vector representation of the SC of these two "average" countries and track the way the distance between these two vectors, hence the distance between the two average countries' SCs, has

[33] It is then interesting to note that the fact that Iraq and Tunisia are considered as countries with a democratic tendency is not contradicted by Figure 2, whereas the same cannot be said for Lebanon. It is also worthwhile noting that the Syrian Arab Republic and Saudi Arabia have experienced a "scissors effect," i.e., in these countries the $P3$ (Participation) curve was above the $P2$ (Provision) curve and then the two curves crossed, and the former passed underneath the latter. However, in the Syrian Arab Republic, this effect occurred around the civil war period in 2011 due to a substantial drop of $P3$, whereas in Saudi Arabia it happened around 2008 due a jump of $P2$ rather than a drop of $P3$.

[34] Again, given that the period covered by our data ends in 2020, a note moderating the case of Tunisia deserves to be made here. Since a referendum in 2021, the country has turned to an authoritarian regime with political parties suspended and a president gaining full power while the parliament was frozen for 12 months. Figure 2 shows that Tunisia has experienced a sharp increase in Participation after the 4-week revolution that occurred between December 2010 and January 2011. We see from this figure that Participation has stabilized thereafter but, as indicated, things seem to have fallen apart beyond 2020 after the election of President Kaïs Saïed.

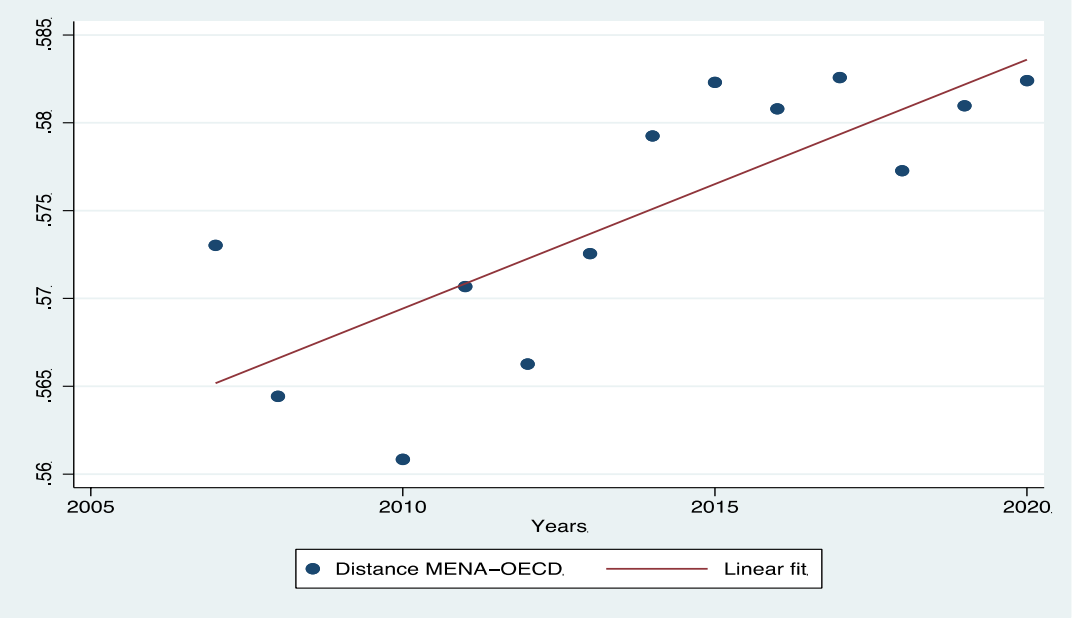
evolved over time. Figure 3 depicts this evolution and shows that this distance has been steadily increasing. Interpreting this distance as saying "how far" MENA countries are from OECD countries in terms of the quality of their SC, we see that MENA is moving further away from OECD.[35]

Figure 2. Evolution of Provision ($P2$) and Participation ($P3$) in representative MENA countries



[35] It is interesting to note that even if the SC gap between OECD and MENA has increased over years, most MENA regimes have embraced some degree of market liberalization and multi-party politics. Egypt is one of those exceptions where things have gone downside. Sudan, for instance, has shown stronger civil society empowerment/mobilization, even though a military dictatorship has tried to establish itself a la Egypt. The GCC monarchies are unfortunately not on track for further political openness.

Figure 3. Distance between the social contracts in MENA and OECD



4. Econometric analysis

Our econometric analysis proceeds in three steps. First, since we are mainly interested in the Participation (P3) dimension of the SC, we perform some Granger-type causality tests to investigate its causal relationships with the Provision (P2) and Protection (P1) dimensions. Second, we run a Probit analysis that takes into account the fact that the data are fractional. Third, we test the robustness of our results by applying a propensity score matching analysis.

Causality

To test whether both $P2$ and $P1$ cause $P3$, we use Dumitrescu and Hurlin's (2012) variant of the Granger (1969) causality test, which is one of the most widely used tests for its simplicity and its suitability for heterogenous panels. Prior to running this causality test, we check whether the indices need to be differenced in order to make them stationary. Table 5 shows the results of a Pesaran (2007) second generation panel unit root test that rejects the null hypothesis of non-stationarity of the three Ps in levels when both the MENA and OECD data are used.

Table 5. Panel unit root tests[+]

H_0	MENA	OECD
$P3$ nonstationary	-3.83^{***}	-3.53^{***}
$P2$ nonstationary	-3.41^{***}	-4.89^{***}
$P1$ nonstationary	-3.95^{***}	-4.62^{***}

[+] Standardized Z statistics reported; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 6 reports then the results of the causality tests. We see from this table that there is no statistical evidence that Provision does not cause Participation when using both the MENA and OECD data. The same is true for Protection. These results suggest that a regression of $P3$ (Participation) on $P2$ (Provision) and $P1$ (Protection) is warranted using both the MENA and OECD datasets, though the latter will only serve the purpose of a benchmark. We now turn to the regression analysis of our data.

Table 6. Causality tests[+]

H_0	MENA	OECD
$P2$ does not Granger-cause $P3$	7.22^{***}	6.59^{***}
$P1$ does not Granger-cause $P3$	3.29^{***}	2.39^{**}

[+] Standardized Z statistics reported; Optimal lag length = 1 in all cases (choice based on the Bayesian information criterion); *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Probit analysis

Our variable of main interest, $P3$, is "fractional," that is, it may take all possible values in the unit interval. Hence, a linear regression is not appropriate to analyze the effects of $P2$ and $P1$ on $P3$ as it does not ensure that the predicted values of $P3$ lie in the unit interval (Papke and Wooldridge, 1996). Instead, we should estimate a fractional outcome model (Papke and Wooldridge, 1996, 2008; Wooldridge, 2019).

Given the panel nature of our datasets, we run the fractional Probit regression proposed by Papke and Wooldridge (2008).[36] This model guarantees that the predicted values of $P3$ lie in the unit interval through a link function, that is, a cumulative distribution function (CDF). Let $\mathbf{x}$ denotes a $1 \times K$ vector of explanatory variables. The fractional Probit model is as follows:

$$E(P3_{it}|\mathbf{x}_{it}, c_i) = \Phi(\mathbf{x}_{it}\boldsymbol{\beta} + c_i) \tag{4}$$

where $0 \leq P3_{it} \leq 1$, i and t refer respectively to the country and the year, $\Phi(.)$ is the standard normal CDF, $\boldsymbol{\beta}$ is a $K \times 1$ vector of parameters to estimate. c_i denotes the unobserved effects. As stressed by Papke and Wooldridge (2008), the use of a Probit link function, i.e., a standard normal CDF instead of a logistic one, does not cause any "conceptual or theoretical" problem. Instead, in the presence of endogenous covariates, using the Probit link function is

[36] For cross-sectional data, interested readers may refer to Papke and Wooldridge (1996). Wooldridge (2019) discusses recent theoretical developments on the fractional Probit within the framework of the correlated random effects modeling with unbalanced panels.

advantageous as it allows us to get computationally simple estimators (Papke and Wooldridge, 2008). As will be seen latter, our explanatory variables of interest are endogenous, which makes it relevant to choose a Probit link function in the same line as Papke and Wooldridge (2008).

This regression model is estimated using the generalized estimating equation (GEE) method discussed in Liang and Zeger (1986) and Zeger and Liang (1986). Table 7 reports the results of the regression, which, as is shown by the level of the Wald-statistic, is significant overall. We see that while Protection has a positive and significant effect on Participation in both MENA and OECD, Provision has a negative and significant effect in MENA and is not significant in OECD.[37] This negative relationship between Provision and Participation in MENA is in line with the descriptive evidence provided by the data in the previous section and the discussion in the overview of the MENA SC in section 2. We will thus further investigate this hypothesis.

While this hypothesis is verified when using a simple fractional Probit regression, it is necessary to account for potential endogeneity of Provision and Protection. This is all the more necessary as in the conceptual framework on which our empirical methodology is based, the three dimensions of an SC are determined simultaneously. For this purpose, we rely on IV techniques (Papke and Wooldridge, 2008). More specifically, in the same line as Papke and Wooldridge (2008), the fractional Probit model is estimated using the pooled quasi-maximum likelihood estimator (QMLE) and the endogeneity of Provision and Protection is handled through a control function approach.[38] Hence, the standard errors of the parameter estimates are obtained using bootstrapping.[39] The results are reported in Table 8. This table also gives the parameter estimates of the variables $\hat{v}_{21}$ and $\hat{v}_{22}$ that are used to perform a Hausman (1978) test of endogeneity of Provision and Protection.[40] The hypotheses that the variables $P1$ and $P2$ are not endogenous in the MENA and OECD datasets are both rejected, which justifies the need to instrument them as we did.

The results reported in Table 8 confirm those from the simple fractional Probit as to our main hypothesis, i.e., Provision ($P2$) and Participation ($P3$) are negatively and significantly related in MENA, implying that governments in the region seem to bargain more Provision

[37] As to the controls, we see that rurality is associated negatively to Participation in OECD countries and that human development is associated positively to it in MENA countries. As we will see later, because we have not yet accounted for potential endogeneity problems, these results should not be taken as final.
[38] For an overview of the control function approach, see Wooldridge (2015).
[39] Following Papke and Wooldridge (2008), we consider 500 bootstrap replications.
[40] For a contribution on the application of the Hausman approach to testing for exogeneity in the Probit modeling framework, see Rivers and Vuong (1988).

against less Participation.[41] They also confirm that the same is not true for Protection ($P1$) as can be seen from the positive and significant relationship of $P1$ with $P3$. In contrast, when using data on OECD countries both Provision and Protection are in a positive and significant relationship with Participation, which rules out the potential existence of any bargain between governments and citizens through $P1$, $P2$, and $P3$ in these countries.[42] This contributes to strengthening the idea that the link between Provision and Participation in the MENA region is somewhat specific, and thus deserves particular attention.

As to the controls, we see that the higher the rurality, the lower the Participation in both MENA and OECD. This seems plausible as more rural countries are often less developed than more urban countries. People living in rural countries are more often worried than those living in urban countries about ensuring the livelihood of their families due to stronger financial constraints. This is generally a result of fewer job opportunities in rural areas compared to urban ones. Fighting for democracy and participation in society's decision making is usually not their highest priority and public authorities do not have any incentives to improve Participation. Against this backdrop, increases in rural population may then result in lower participation.

Human development is found to be negatively related to Participation both in MENA and OECD. For the case of MENA, this suggests that health, education, and standard of living, the components of the human development index, have somehow improved overall but at the expense of citizens' Participation. As to the OECD, as discussed previously, on average, this region's level of Participation is far from being qualified as "poor" as it includes mostly developed countries that are committed to democracy. Because Participation is somewhat already a reality in their economies, as they develop, these countries tend to rest on their laurels and focus their financing and efforts on other topical societal issues such as global warming or gender inequality. This may have been detrimental to Participation in OECD.[43]

As to unemployment, we see that it is positively related to Participation in MENA and negatively in OECD. For the case of MENA, this result may reflect the fact that the unemployed

[41] See the authoritarian bargain story (Desai et al., 2008) discussed in Section 2.

[42] Founded in 1961, the OECD intergovernmental organization includes mostly developed countries that are committed to democracy and the market economy. In the 3-P framework, these countries recognize each P as a major source of economic and social prosperity and, as such, effectively engage in simultaneously improving their levels.

[43] These results on the impact of human development on participation might reflect the growing distrust of political systems by educated population groups, as evidenced by the increasingly low election turnout over the last two decades in both MENA and OECD countries. Empirical evidence has shown that voter turnout decreases as the general population's level of education increases, a trend observed in advanced democracies, or as the chances of power transition decrease, a trend observed in autocratic regimes. By increasing transparency and accountability, digital transformation of governments is expected to empower citizens and strengthen their participation. In the next section, we introduce digitalization in the analysis.

persons are somewhat more attentive to situations where their voice is being trampled in view of the fragility of their situation. The story is different for the OECD that mostly includes developed countries. To some extent, unemployed persons in OECD may be more under pressure to become active as the cost of living (housing, heating, various insurances, etc.) is generally higher in OECD relative to MENA countries. The expenses are actually diverse and the costs often significant. Unemployment benefits are rarely sufficient to allow them to face these costs and have a decent life. In this context, unemployed persons in OECD may be more focused on finding a job given the greater level of job opportunities, and thus be somehow less attentive to some situations where their voice is violated.

At this stage, it is important to check the reliability and the strength of the instruments used. To this end, Table 9 reports the results of the Anderson and Rubin (1950) test of overidentifying restrictions (OIDR) that checks the validity of the instruments and the Stock and Yogo (2005) test that checks the weakness of the instruments. The latter is based on the Cragg and Donald (1993) minimum eigenvalue (CDME) statistic, the value of which is compared to the critical values relating to the Limited Information Maximum Likelihood (LIML) size of a nominal 5% Wald test.[44] This testing approach corresponds to the Stock and Yogo (2005) second characterization of a weak instrument. We do not consider the first characterization due to both the estimation method and the number of instruments.[45]

We see from Table 9 that the null hypotheses of validity of the instruments are not rejected, saying that the instruments used with both the MENA and OECD datasets are valid. As to the strength of these instruments, we see that the values of the CDME statistics are higher than the respective critical values, thus rejecting the null hypothesis that the instruments used with both datasets are weak.

[44] For details on the LIML method, see Rivers and Vuong (1988).
[45] For more details on these characterizations, interested readers may refer to Stock and Yogo (2005).

Table 7. GEE parameter estimates of a fractional Probit for $P3$ (Participation)[+]

Variable	MENA	OECD
$P2$ (Provision)	-1.45^{**}	-0.27
	(0.70)	(0.39)
$P1$ (Protection)	1.19^{***}	3.10^{***}
	(0.33)	(0.32)
rs_rp	-0.01	-0.97^{***}
	(0.23)	(0.21)
rs_un	0.36	0.01
	(0.34)	(0.15)
rs_hdi	1.03^{**}	0.48
	(0.51)	(0.56)
Constant	-1.65^{***}	-1.70^{***}
	(0.44)	(0.35)
Wald statistic	97.61^{***}	453.68^{***}
Obs.	172	372

[+] Dependent variable: $P3$; Robust standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 8. QMLE parameter estimates of a fractional Probit for $P3$ (Participation) with IV[+]

Variable	MENA	OECD
$P2$ (Provision)	-2.42^{***}	3.06^{***}
	(0.51)	(0.48)
$P1$ (Protection)	2.64^{***}	3.62^{***}
	(0.27)	(0.25)
rs_rp	-0.64^{***}	-0.84^{***}
	(0.12)	(0.08)
rs_un	0.64^{***}	-0.19^{**}
	(0.19)	(0.08)
rs_hdi	-0.93^{***}	-1.85^{***}
	(0.31)	(0.31)
$\hat{v}_{21}$	1.69^{*}	-4.24^{***}
	(0.89)	(0.47)
$\hat{v}_{22}$	-2.21^{***}	-0.84^{***}
	(0.32)	(0.28)
Constant	-0.87^{***}	-1.07^{***}
	(0.30)	(0.14)
Wald statistic	210.52^{***}	3503.65^{***}
Obs.	122	350

[+] Dependent variable: $P3$; Standard errors in parentheses obtained using 500 bootstrap replications; Instruments for MENA data: Domestic credit to private sector (% of GDP), Exports of goods and services (% of GDP), Imports of goods and services (annual growth rate), FDI (net outflows, % of GDP), and real GDP; Instruments for OECD data: Tax revenues (% of GDP), Military expenditures (% of total government expenditures), and Real GDP per capita; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 9. Test of validity and weakness of instruments[+]

H_0	Statistic	MENA	OECD
Instruments are valid	OIDR	2.82	0.54
	p-value	0.42	0.46
Instruments are weak	CDME	9.60	27.27
	Critical value	4.32	5.44

[+] OIDR: Overidentifying restrictions test statistic (Anderson and Rubin, 1950); CDME: Cragg and Donald (1993) minimum eigenvalue statistic (Stock and Yogo, 2005); Critical value is the highest critical value relating to the LIML size of nominal 5% Wald test (Stock and Yogo, 2005).

PSM robustness check

Let us now go one step further in the investigation of the effects of Provision and Protection on Participation by performing a propensity score matching (PSM) analysis (Rosenbaum and Rubin, 1983; Abadie and Imbens, 2006, 2011, 2016; Dehejia and Wahba, 2002, Imbens and Wooldridge, 2009), which is known to be an alternative approach to IV for handling endogeneity. PSM is also known as efficient in solving self-selection problems.[46]

PSM allows one to analyze the impact of a treatment on an outcome by reconstructing the original dataset within the framework of a quasi-experiment. Indeed, two groups of individuals are defined, namely, a treated group and a control group. Then, a matched sample is constructed based on "propensity scores," that is, the probabilities that the individuals receive the treatment given a set of observed covariates. As stressed by Rosenbaum and Rubin (1983), propensity scores are balancing scores in the sense that they allow both treated and control groups to exhibit on average no significant differences in their characteristics. These characteristics are materialized by a set of explanatory variables used in the estimation of the propensity scores.

In our case, the outcome variable is Participation ($P3$). We define two treatment variables, that is, one for Provision and another for Protection. The Provision ($P2$) treatment variable named $Prov\_dummy\_1$ is equal to 1 if $P2 > 0.5$ and 0 otherwise. Similarly, for Protection ($P1$) the treatment variable, namely $Protec\_dummy$, takes value 1 if $P1 > 0.5$ and 0 otherwise. The treatments are $P2 > 0.5$ and $P1 > 0.5$, respectively. We are interested in the impact of each of these treatments on Participation. For Provision, the treated group includes the countries for which $P2 > 0.5$ and the control group contains countries that exhibit $P2 \leq$

[46] For a discussion on the advantages of PSM over regression, see Grier and Grier (2021) and Ichino et al. (2008).

0.5. Similarly, for Protection, the treated group comprises the countries for which $P1 > 0.5$ whilst the control group consists of countries having $P1 \leq 0.5$.

The treatments are set as $P\# > 0.5$, $\# = 1,2$, for two main reasons. First, the higher $P\#$, the better the dimension P# it measures. Second, and relatedly, 0.5 is a value of $P\#$ that represents a somewhat intermediate level of the corresponding dimension P# that it measures. Indeed, countries with $P\# > 0.5$ can be considered as having good levels of P#. On the contrary, countries for which $P\# \leq 0.5$ might be thought as having poor P# levels. Against this backdrop, setting the treatments as $P\# > 0.5$, $\# = 1,2$, makes sense as it implies having levels of Provision and Protection that are equal to more than 50% of the maximum levels that can be achieved.[47]

Besides, note that in the PSM framework, the propensity scores are obtained by estimating a probabilistic model where the dependent variable is the treatment variable. Hence, we estimate a Probit model.[48] The independent variables are the controls variables.[49] In the same line as Ichino et al. (2008), we use the nearest neighbor algorithm to identify the best match of each treated unit for its simplicity and intuitiveness.[50] The algorithm matches each treated unit with the control unit whose propensity score is the closest. After matching based on propensity scores, the effects of Provision and Protection on Participation are analyzed by estimating the Average Treatment Effects on the Treated (ATTs). In each case, the ATT is defined as follows:[51]

$$\begin{aligned} ATT \equiv E(P3_1 - P3_0|T = 1) &= E\big(E(P3_1 - P3_0|p(W), T = 1)\big) \\ &= E(E(P3_1|p(W), T = 1) - E(P3_0|p(W), T = 0)|T = 1) \end{aligned} \tag{5}$$

with,

$$p(W) \equiv P(T = 1|W)$$

[47] Achieving $P\# > 0.5$ may be of interest to public authorities as it can be seen as a reasonable target to set as to the provision of public goods and services and the protection of citizens when designing development strategies.
[48] As stressed by Ichino et al. (2008), any probabilistic model can actually be estimated to obtain the propensity scores provided that it allows to satisfy the balancing property. The Probit model we estimate makes it possible to satisfy this property indeed.
[49] In the same vein as Grier and Grier (2021), the independent variables in the Probit models are lagged to avoid simultaneity bias, among others.
[50] This is actually the algorithm traditionally used in PSM. For details on the other matching algorithms, interested readers may refer to Caliendo and Kopeinig (2008), Dehejia and Wahba (2002), and Smith and Todd (2005).
[51] For more details on the ATT, see Ichino et al. (2008).

(6)

where $P3_1$ and $P3_0$ are the outcomes ($P3$) that would be obtained by a country if it is exposed to treatments $T = 1$ and $T = 0$ respectively, $T = 1$ corresponds to $P\# > 0.5$ while $T = 0$ is $P\# \leq 0.5$, $\# = 1,2$, W is a set of covariates, and $p(W)$ denotes the propensity scores. The outer expectation is over the distribution of $(p(W)|T = 1)$. Table 10 presents the values of the ATTs. For the sake of brevity, the results of the estimation of the Probit models used to obtain propensity scores are given in Tables A.4 and A.5 in the appendix.

We see from Table 10 that Provision has a negative and significant effect on Participation in MENA, whilst the effect is positive and significant in OECD. As to Protection, it has a positive and significant effect on Participation both in MENA and OECD. Thus, the treatment effect estimation confirms results obtained with the IV fractional Probit. This demonstrates the robustness of the results obtained previously as to the effects of Provision and Protection on Participation.[52] Moreover, an important step in the PSM approach is the analysis of whether or not the covariates are balanced after the matching. To do this, in the same line as D'Agostino (1998) and Grier and Grier (2021), we rely on the t-test on the mean of each independent variable after the matching. The results are reported in Tables 11, 12, and 13.

Table 10. PSM treatment effect estimation[+]

Treatment	MENA	MENA	OECD	OECD
$P2 > 0.5$[++]	-0.03^{***}		0.06^{**}	
			$[0.15^{***}]$[+++]	
$P1 > 0.5$		0.04^{***}		0.40^{***}
Obs.	187	187	382	382

[+] ATTs reported; [*]: $p < 0.10$, [**]: $p < 0.05$, [***]: $p < 0.01$.
[++] For MENA, as the maximum of $P2$ in the data is less than 0.5, we take as a treatment $P2 > 0.25$. As can be seen, using this treatment for OECD as well does not change the conclusion.
[+++] Value of the ATT with $P2 > 0.25$

The t-tests for covariate balance show that after the matching, there is no significant difference in the means of the covariates between the control and treated groups. This holds for both the OECD and MENA samples, and for all the treatment effects estimations. Hence, in

[52] Note that a competing approach to PSM commonly discussed in the literature is the pure Nearest Neighbor Matching (NNM). See Abadie and Imbens (2006, 2011), among others. In NNM, the nearest neighbor algorithm is applied based on a weighted function of the covariates for each observation, and not on propensity score as in PSM. We estimated the ATTs using NNM and found similar results. These results are available from the authors upon request.

each case, after the matching the covariates are balanced, and this is the expected result indeed (D'Agostino, 1998; Grier and Grier, 2021; Rosenbaum and Rubin, 1983).

Table 11. t-test on the mean of each independent variable: $Prov\_dummy\_1^{+}$ as the dependent variable^{++}

Lagged control variable	Outcome	OECD
Lagged rs_rp	Unmatched	-3.15^{***}
	Matched	-1.06
Lagged rs_un	Unmatched	-1.64
	Matched	1.14
Lagged rs_hdi	Unmatched	1.19
	Matched	-0.18

t-statistics reported; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
$^{+}$ $Prov\_dummy\_1 = 1$ if $P2 > 0.5$ and 0 otherwise.
$^{++}$ Recall that for MENA, we take as a treatment $P2 > 0.25$ as the maximum of $P2$ is less than 0.5 and using this treatment for OECD as well does not change the conclusion. The corresponding balancing tests for both MENA and OECD are presented in Table 12.

Table 12. t-test on the mean of each independent variable: $Prov\_dummy\_2^{+}$ as the dependent variable^{++}

Lagged control variable	Outcome	MENA	OECD
Lagged rs_rp	Unmatched	-8.36^{***}	-2.20^{**}
	Matched	-0.56	0.99
Lagged rs_un	Unmatched	-8.70^{***}	-1.08
	Matched	-0.68	0.15
Lagged rs_hdi	Unmatched	9.34^{***}	21.09^{***}
	Matched	0.47	0.78

$^{+}$ $Prov\_dummy\_2 = 1$ if $P2 > 0.25$ and 0 otherwise; t-statistics reported; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 13. t-test on the mean of each independent variable: $Protec\_dummy^{+}$ as the dependent variable^{++}

Lagged control variable	Outcome	MENA	OECD
Lagged rs_rp	Unmatched	-9.23^{***}	-0.19
	Matched	-0.37	-1.34
Lagged rs_un	Unmatched	-9.41^{***}	-2.19^{**}
	Matched	-0.33	1.34
Lagged rs_hdi	Unmatched	6.95^{***}	8.09^{***}
	Matched	1.50	1.14

$^{+}$ $Protec\_dummy = 1$ if $P1 > 0.5$ and 0 otherwise; t-statistics reported; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

5. The role of digitalization

How does digitalization affect Participation in MENA? Does it strengthen it? Do the effects of Provision and Protection on Participation in the region change when we control for

digitalization? This section aims at answering these questions.[53] Table 14 shows the results of the estimation of the IV fractional Probit when we introduce the variable Digitalization, labeled $Digital$, as a control and Table 15 those of the tests of validity and strength of the instruments used after having included this variable in the analysis. As can be seen from the latter table, the null hypothesis of validity of the instruments cannot be rejected and the null hypothesis that these instruments are weak is rejected. The results presented in Table 14 allow us to draw three main lessons which we discuss in turn.

First, the effect of Digitalization on Participation in MENA is time-lagged, i.e., it takes time before the effect of Digitalization on Participation is observed. This may be due to the time necessary for the diffusion of digital innovations and their adoption by citizens. These delays are more likely to be greater in developing countries, in particular in MENA, due to various factors, including culture, education, and technological diffusion in the region.[54] The results show that the effect of an improvement of the current level of Digitalization on Participation is observed three years later.[55]

Second, the results show that in MENA the relationship between Digitalization and Participation is inversely U-shaped. Digitalization has a positive incremental effect on Participation up to the threshold level of 0.57, i.e., 57% of the maximum level of Digitalization across the MENA countries and the 2007-2020 period. Beyond this threshold a negative effect prevails. We found that, over this period, more than half of the countries in the MENA sample have recorded a three-year lagged level of Digitalization that is less than the threshold.[56] This

[53] Data on digitalization was collected from the UN E-Government Knowledgebase (available at https://publicadministration.un.org/egovkb/en-us/Data-Center). The variable is the sum of two variables, namely, the Online Service Index (OSI) and the Telecommunication Infrastructure Index (TII). The first variable measures the scope and quality of online services, while the second measures telecommunication connectivity. This information is published at country level every two years since 2008 (also for the years 2001, 2003, 2004, and 2005). Note that the database reports the variables E-Government Development Index (EGDI) and Human Capital Index (HCI), the latter measuring human capacity. OSI, TII, and HCI are composite indices that are normalized to lie in the unit interval, and then EGDI is calculated by taking their arithmetic average. The formula is as follows:

$$EGDI = \frac{1}{3}(OSI_{normalized} + TII_{normalized} + HCI_{normalized})$$

We recover our digitalization variable as follows:

$$Digital = OSI_{normalized} + TII_{normalized} = 3\,EGDI - HCI_{normalized}$$

As all the other variables, $Digital$ is standardized by using the min-max scaling.

[54] For instance, 4G coverage exceeds 93% of the territory in Morocco whereas the majority of rural consumers are equipped only with 2G and 3G handsets.

[55] The null hypotheses of existence of any instantaneous, first lag, and second lag effects of Digitalization were rejected.

[56] These countries are Algeria, Djibouti, Islamic Republic of Iran, Iraq, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, and Yemen.

says that the majority of the MENA countries, with still relatively low levels of Digitalization, are expected to gain much in terms of Participation by intensifying the digitalization of their economies. However, although Digitalization has a number of benefits, notably in terms of improving citizens' political awareness, reaching a significant level of Participation in MENA takes more than simply intensively digitalizing the economy. Indeed, beyond the threshold level of Digitalization (0.57), its investment return in terms of improving Participation diminishes.

In contrast, in OECD countries with more mature economies and democratic regimes that have already enjoyed most of the beneficial digitalization-driven effects on participation, the results rather show a U-shaped relationship. This could have been expected as this organization mostly includes developed countries with such high levels of Digitalization that for it to significantly improve Participation it has to go beyond the threshold level of 0.78.[57] In the OECD data we found that, over the 2007-2020 period, a significant fraction of 47% of the countries included in the sample has reached a three-year lagged level of Digitalization less than this threshold.[58] These results suggest that 18 out of 38 OECD countries need to step up their effort to further digitalize their economies so that digitalization becomes participation-beneficial.

Third, Table 14 shows that the effect of Provision on Participation in MENA remains negative and significant even when one controls for digitalization. Similarly, the effect of Protection is still positive and significant. Against this backdrop, a point that is worth examining is whether, when we control for digitalization, the negative influence of Provision on Participation in MENA is lower than that obtained when digitalization is not controlled for. Table 16 helps to answer this question by comparing the estimations without and with $Digital$ as a control variable. For a better interpretation of the results, this table reports elasticities.

We see that when digitalization is not controlled for, a 1% increase in Provision in MENA reduces Participation by 0.54%. However, when digitalization is included, the reduction of Participation reduces to 0.44%. Both elasticities are significant at the 1% level.

[57] A few words of caution are warranted before drawing conclusions from the tempting comparison that the reader might rightly do between the 0.78 threshold of the U-shaped effect of Digitalization found in the OECD data and the 0.57 threshold of the inversely U-shaped effect found in the MENA data. Indeed, while in the OECD data, the minimum level of Digitalization is equal to 0.48, in the MENA data it is equal to only 0.03. Thus, the threshold levels represent 163% and 1900% of these minimum levels in respectively OECD and MENA. Hence, despite the fact that the threshold level beyond which digitalization becomes participation-beneficial in OECD is higher than the threshold level beyond which it becomes participation-detrimental in MENA, it takes much more time, effort, and investment for a MENA country than for an OECD country to reach the respective threshold. This suggests that digitalization has bright days ahead of it in terms of being an effective instrument to enhance participation in MENA.

[58] These countries are Belgium, Chile, Colombia, Costa Rica, Czech Republic, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Mexico, Poland, Portugal, Slovak Republic, Slovenia, Spain, and Türkiye.

This suggests that digitalization reduces the negative effects of Provision on Participation as it improves transparency of governance as discussed in the institutional literature. Hence, digital transformation of MENA economies is a policy instrument that could help to improve the SC in MENA.

In order to examine the influence of digitalization and Protection on the effect of Provision on Participation, Table 17 presents the results of estimations in which the variable $Digital$ is crossed with $P2$ and $P1$. Compared with the situation where digitalization is not included in the analysis, these results allow us to assess the extent to which digitalization influences the quality of the SC in MENA in terms of the use of telecommunication and Internet services to control citizens' participation in the political life. This is done by calculating the overall effect of $P2$ on $P3$ given the (average) levels of $P1$ and $Digital$.

At the MENA sample mean, the overall effect of Provision on Participation is given by:

$$\overline{OE}_{P2\rightarrow P3} = 3.07 - 11.95 \times \overline{P1} \times \overline{Lag\ 3\_Digital} \tag{4}$$

where $\overline{P1}$ and $\overline{Lag\ 3\_Digital}$ are the sample mean values of the Protection and the lagged 3 Digitalization indices. The sign as well as the magnitude of $\overline{OE}_{P2\rightarrow P3}$ are of interest. We have $\overline{P1} = 0.49$ and $\overline{Lag\ 3\_Digital} = 0.54$, which yields $\overline{OE}_{P2\rightarrow P3} = -0.09$. Thus, the effect of Provision on Participation is negative even when we account for its association with digitalization and Protection. Note, however, that the absolute value of $\overline{OE}_{P2\rightarrow P3}$, $|\overline{OE}_{P2\rightarrow P3}| = 0.09$ is lower than that of the estimate obtained when digitalization was not taken into account, which was equal to 2.42 (see Table 8). This suggests that ceteris paribus digitalization contributes to making the provision of telecommunication and Internet services less "SC-costly" in MENA although, as we found, there are reasons to believe that this effect weakens over time.

Table 14. QMLE parameter estimates of a fractional Probit for $P3$ (Participation) with IV and inclusion of $Digital^{+}$

Variable	MENA	OECD
$P2$ (Provision)	-1.95^{***}	2.95^{***}
	(0.47)	(0.45)
$P1$ (Protection)	2.45^{***}	3.67^{***}
	(0.24)	(0.24)
rs_rp	-0.69^{***}	-0.84^{***}
	(0.12)	(0.09)
rs_un	0.79^{***}	-0.19^{***}
	(0.19)	(0.07)
rs_hdi	-0.97^{***}	-1.61^{***}
	(0.30)	(0.31)
$Lag\ 3\_Digital$	2.55^{**}	-4.97^{***}
	(1.20)	(1.05)
$(Lag\ 3\_Digital)^2$	-2.24^{**}	3.20^{***}
	(1.04)	(0.69)
$\hat{v}_{21}$	1.13	-4.18^{***}
	(0.99)	(0.43)
$\hat{v}_{22}$	-2.11^{***}	-1.00^{***}
	(0.28)	(0.26)
Constant	-1.58^{***}	0.60
	(0.40)	(0.39)
Wald statistic	242.76^{***}	3538.62^{***}
Obs.	112	350

$^{+}$ Dependent variable: $P3$; Standard errors in parentheses obtained using 500 bootstrap replications; Instruments for MENA data: Domestic credit to private sector (% of GDP), Exports of goods and services (% of GDP), Imports of goods and services (annual growth rate), FDI (net outflows, % of GDP), and real GDP; Instruments for OECD data: Tax revenues (% of GDP), Military expenditures (% of total government expenditures), and Real GDP per capita; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 15. Test of validity and weakness of instruments when $Digital$ is included^{+}

H_0	Statistic	MENA	OECD
Instruments are valid	OIDR	6.05	0.82
	p-value	0.11	0.37
Instruments are weak	CDME	8.54	28.92
	Critical value	4.32	5.44

$^{+}$ OIDR: Overidentifying restrictions test statistic (Anderson and Rubin, 1950); CDME: Cragg and Donald (1993) minimum eigenvalue statistic (Stock and Yogo, 2005); Critical value is the highest critical value relating to LIML size of nominal 5% Wald test (Stock and Yogo, 2005).

Table 16. QMLE elasticities estimates of a fractional Probit for $P3$ (Participation) with IV without and with inclusion of $Digital^{+}$

Variable	MENA	OECD	MENA	OECD
$P2$ (Provision)	-0.54^{***}	0.36^{***}	-0.44^{***}	0.34^{***}
	(0.12)	(0.06)	(0.11)	(0.05)
$P1$ (Protection)	1.41^{***}	1.01^{***}	1.34^{***}	1.03^{***}
	(0.15)	(0.07)	(0.14)	(0.07)
rs_rp	-0.21^{***}	-0.09^{***}	-0.23^{***}	-0.09^{***}
	(0.04)	(0.01)	(0.04)	(0.01)
rs_un	0.19^{***}	-0.02^{***}	0.21^{***}	-0.02^{**}
	(0.06)	(0.01)	(0.05)	(0.01)
rs_hdi	-0.71^{***}	-0.60^{***}	-0.75^{***}	-0.53^{***}
	(0.22)	(0.10)	(0.22)	(0.10)
$Lag\ 3\_Digital$			1.53^{**}	-1.37^{***}
			(0.63)	(0.28)
$(Lag\ 3\_Digital)^2$			-0.76^{**}	0.65^{***}
			(0.32)	(0.14)
$\hat{v}_{21}$	0.00	-0.00^{***}	0.00^{*}	-0.00^{***}
	(0.00)	(0.00)	(0.00)	(0.00)
$\hat{v}_{22}$	-0.01^{***}	0.01^{***}	-0.01^{***}	0.01^{***}
	(0.00)	(0.00)	(0.00)	(0.00)
Wald statistic	210.52^{***}	3503.65^{***}	242.76^{***}	3538.62^{***}
Obs.	122	350	112	350

$^{+}$Dependent variable: $P3$; Standard errors in parentheses obtained using 500 bootstrap replications; Instruments for MENA data: Domestic credit to private sector (% of GDP), Exports of goods and services (% of GDP), Imports of goods and services (annual growth rate), FDI (net outflows, % of GDP), and real GDP; Instruments for OECD data: Tax revenues (% of GDP), Military expenditures (% of total government expenditures), and Real GDP per capita; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Table 17. QMLE parameter estimates of a fractional Probit for $P3$ (Participation) with IV and inclusion of $Digital$ and its interaction with $P2$ and $P1$[+]

Variable	MENA	OECD
$P2$ (Provision)	3.07^{**}	-11.37^{***}
	(1.55)	(1.03)
$P1$ (Protection)	3.34^{***}	-1.13^{*}
	(0.46)	(0.58)
rs_rp	-0.57^{***}	-0.63^{***}
	(0.13)	(0.10)
rs_un	0.39^{*}	0.51^{***}
	(0.21)	(0.08)
rs_hdi	-1.60^{***}	3.82^{***}
	(0.39)	(0.49)
$Lag\ 3\_Digital$	1.87^{***}	-4.31^{***}
	(0.42)	(0.45)
$Lag\ 3\_Digital \times P2 \times P1$	-11.95^{***}	16.88^{***}
	(3.25)	(1.67)
$\hat{v}_{21}$	-3.59^{*}	8.64^{***}
	(1.86)	(1.27)
$\hat{v}_{22}$	-2.93^{***}	3.26^{***}
	(0.53)	(0.65)
Constant	-1.95^{***}	1.99^{***}
	(0.40)	(0.39)
Wald statistic	192.75^{***}	3357.26^{***}
Obs.	112	350

[+] Dependent variable: $P3$; Standard errors in parentheses obtained using 500 bootstrap replications; Instruments for MENA data: Domestic credit to private sector (% of GDP), Exports of goods and services (% of GDP), Imports of goods and services (annual growth rate), FDI (net outflows, % of GDP), and real GDP; Instruments for OECD data: Tax revenues (% of GDP), Military expenditures (% of total government expenditures), and Real GDP per capita; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

6. Conclusion

The objective of this paper was threefold. The first was to suggest a way to translate a conceptual framework recently proposed by Loewe et al. (2021) to analyze the social contract in the MENA region into one that lends itself to data-fitting and regression analysis. In the same spirit as these authors, we focused on the extent to which a government protects its citizens, provides them with social benefits, and allows them to participate in the country's decision-making process. Given the economic, social, and political pathways of the countries in the region since WWII, in particular, at the turn of the century (Heydemann, 2020), we opted to employ an econometric modeling approach built on a potential causal connection from provision and protection to participation.

After specifying the hypothesized relationship to be econometrically tested, our second goal was to construct a MENA database on variables to be used as proxies for the 3Ps and estimate it. While some indices that could reasonably be used as proxies were readily available for protection and participation, this was not the case for provision, which is supposed to represent a set of a meaningfully broad basket of economic and social benefits to citizens, including infrastructure, health, and education services. Faced with the difficulty of getting hold of these data and testing our methodology, we used telecommunication and Internet services as a "proxy basket" for these benefits. We introduced control variables to mitigate any potential omitted variable bias. We also built a similar database for OECD countries that we use as a benchmark, in particular, to evaluate the relative "quality" of the social contract in MENA countries.

Our third objective was to propose a method for evaluating the quality of the social contract in MENA countries and analyze how digitalization impacts it. To do so, we focused on the relationship between provision and participation and found that it is negative, significant, and robust suggesting that the benefits provided to citizens in the form of improved delivery of telecommunication and Internet services came at the (social) cost of impaired participation.[59] This characteristic of the social contract could be seen as one of the root causes of the social unrest that MENA countries have experienced in history, in particular, over the past two decades. We found that digitalization had a three-year lagged positive effect on the (participation) quality of the social contract and that this effect is inversely U-shaped. This relationship suggests that in-depth structural institutional improvements in MENA countries are called for before the quality of their social contract can reach levels comparable to those of OECD countries.

In a recent Economic Research Forum column, Arezki et Ghanem (2018) advocate for a digital moonshot for the MENA region as a new groundwork upon which a new economy will likely emerge. Their idea is to unite people/governments in the region behind a common goal (digital transformation) and transform how governments, firms, financial institutions and civil societies interact or conduct business and help to ensure that millions of the region's young people can find the good jobs they deserve. According to these authors, the digital moonshot would involve a collective commitment to achieve parity with advanced economies in information and communication technology - meaning that MENA could seek to match or even

[59] This result is in line with Desai et al.'s (2009) "authoritarian bargain" view of the social contract documented in section 2 and the "populist" view discussed by Hinnebusch (2020).

exceed OECD countries in terms of their level of access to the Internet, their capacity to transmit data (bandwidth), and their ability to undertake financial transactions electronically.

The results found in this paper show that the aspirational visionary approach of Arezki and Ghanem (2018) has a robust empirical grounding. Our research shows that MENA countries can significantly improve their social contracts through increased digitalization, as the latter increases transparency and accountability, and more importantly through increased participation and empowerment of citizens. However, while digitalization and technology have the potential to promote transparency and participation, they may also be used as a tool to strengthen oppressive practices and authoritarian regimes. This may partly explain the inverse U-shaped relationship between digitalization and participation, and further supports the point that changes to the underlying architecture of government are necessary to improve the quality of the social contract.

Since our proxy basket for social benefits is limited to the provision of telecommunication and Internet services, future research should cover at least five directions of improvement/extension of the work undertaken in this article. First, as pointed out, the basket we used to proxy provision must be expanded. In addition to integrating essential services such as electricity and transport, it is also necessary for the MENA region, which comprises several oil-rich countries, to investigate whether the revenue from oil and hydrocarbons has affected the formation of the social contract, particularly as it relates to participation.[60] Second, an attractive feature of the 3-P modeling framework is that it can be customized to capture essential features of interest in a given country's social contract. Applying our econometric methodology to data on any World Bank region will allow us to highlight the specific fundamental characteristics of the social contract of that region. This endeavor is included in our near future research agenda.

Third, we have analyzed in this paper the direct effects of provision and protection on participation, however, these effects may also be indirect. Hence, another avenue for future research is investigating the potential threshold effects of provision and protection on participation. This can be done within the Panel Threshold Modeling (PTM) framework.[61] Of course, the nonlinearity of these relationships ought to be tested. Such an analysis would allow us to identify potential transition variables, i.e., variables through which provision and protection influence participation. Moreover, within the 3-P modeling framework, PTM enables

[60] For a discussion of this factor in the context of the creation of regulatory agencies by MENA countries, see Mathieu and Jordana (2022).
[61] For a recent contribution on panel threshold models, see Seo and Shin (2016).

the identification of potential regime switching points and thresholds for the levels of provision and protection, which indicate when one moves from a lower regime to a higher one. It would then be possible to determine whether the effects of provision and protection on participation vary in both direction and magnitude, depending on the regime being considered.

Fourth, we have analyzed the 3-P social contract model from the supply side. The analysis could also be extended to the demand side by investigating citizens' preferences and expectations of their governments (Loewe and Albrecht, 2022). By integrating threshold effects in these preference-based tradeoffs within the PTM framework, we can determine the threshold level of provision at which citizens prioritize it over participation and protection. Fifth, this paper focuses primarily on provision and its causal relationship with participation. However, extending the scope of analysis to also focus on the protection dimension can yield valuable insights. Loewe and Zintl (2021) recently suggested that social protection programs could help to decrease state fragility and promote a more robust social contract. To further investigate this prediction, econometric testing and exploration of the potential transmission channels through which social protection can impact both state fragility and the social contract are necessary.

Appendix

Table A.1 Data and sources

Variable	Definition	Source[+]
Political stability	Index of political stability and absence of violence/terrorism that ranges from -2.5 (weak performance) to 2.5 (strong performance).	WGI
Regulatory quality	Index of quality of regulation that ranges from -2.5 (weak performance) to 2.5 (strong performance).	WGI
Rule of law	Index of quality of enforcement of rule of law that ranges from -2.5 (weak performance) to 2.5 (strong performance).	WGI
Fixed phone	Fixed-telephone subscriptions per 100 inhabitants.	ITU
Mobile phone	Mobile-cellular subscriptions per 100 inhabitants.	ITU
Fixed broadband	Fixed broadband subscriptions per 100 inhabitants.	ITU
Internet bandwidth	International bandwidth per Internet user (bits/s).	ITU
Voice and accountability	Index of citizens' political participation, free media, freedom of expression, and association that ranges from -2.5 (weak performance) to 2.5 (strong performance).	WGI
Control of corruption	Index of level of corruption control that ranges from -2.5 (weak performance) to 2.5 (strong performance).	WGI
Democracy index	Index of overall democracy that ranges from 0 (poor performance) to 10 (good performance).	EIU
Rural vs. urban population	Rural population (% of total population)	WDI
Unemployment	Unemployment (% of total labor force)	WDI
Human development index	Index of human development that ranges from 0 (lowest level of human development) to 1 (highest level of human development).	UNDP

[+] WGI: Worldwide Governance Indicators; ITU: International Telecommunication Union; EIU: Economist Intelligence Unit; WDI: World Development Indicators; UNDP: United Nations Development Programme.

Table A.2 Correlation coefficients between the rescaled variables for the MENA sample

	rs_pve	rs_rqe	rs_rle	rs_fts	rs_mcs	rs_fbs	rs_ibpiu	rs_vae	rs_cce	rs_di	rs_rp	rs_un	rs_hdi
rs_pve	1												
rs_rqe	0.70	1											
rs_rle	0.82	0.91	1										
rs_fts	0.11	−0.03	0.12	1									
rs_mcs	0.45	0.45	0.56	0.28	1								
rs_fbs	0.17	0.40	0.36	0.36	0.50	1							
rs_ibpiu	0.25	0.36	0.36	0.14	0.38	0.63	1						
rs_vae	0.16	0.33	0.32	−0.25	0.07	−0.05	−0.06	1					
rs_cce	0.82	0.87	0.93	0.13	0.51	0.44	0.37	0.29	1				
rs_di	−0.06	0.16	0.11	−0.36	−0.05	−0.13	−0.14	0.89	0.07	1			
rs_rp	−0.55	−0.51	−0.56	−0.27	−0.44	−0.34	−0.30	−0.27	−0.57	−0.10	1		
rs_un	−0.41	−0.50	−0.55	−0.38	−0.57	−0.37	−0.25	−0.04	−0.49	0.17	0.31	1	
rs_hdi	0.50	0.50	0.65	0.53	0.72	0.53	0.39	0.18	0.61	0.03	−0.67	−0.68	1

Table A.3 Correlation coefficients between the 3-P indices and the controls for the MENA sample

	$P1$	$P2$	$P3$	rs_rp	rs_un	rs_hdi
$P1$	1					
$P2$	0.50	1				
$P3$	0.67	0.29	1			
rs_rp	-0.58	-0.49	-0.47	1		
rs_un	-0.51	-0.59	-0.23	0.31	1	
rs_hdi	0.59	0.79	0.46	-0.67	-0.68	1

Table A.4 Probit regressions in the PSM - MENA[+]

Lagged control variable	$Prov\_dummy\_1^{++}$	$Protec\_dummy^{+++}$
Lagged rs_rp	-3.07^{*}	-5.36^{***}
	(1.79)	(1.05)
Lagged rs_un	5.03^{***}	-4.84^{***}
	(1.82)	(0.89)
Lagged rs_hdi	28.66^{**}	-3.11^{**}
	(4.31)	(1.29)
Constant	-22.61^{***}	5.03^{***}
	(3.44)	(1.29)
Wald statistic	62.83^{***}	69.03^{***}
Pseudo R^2	0.61	0.38
Obs.	187	187

[+] Robust standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
[++] $Prov\_dummy\_1 = 1$ if $P2 > 0.25$ and 0 otherwise.
[+++] $Protec\_dummy = 1$ if $P1 > 0.50$ and 0 otherwise.

Table A.5 Probit regressions in the PSM - OECD[+]

Lagged control variable	$Prov\_dummy\_1^{++}$	$Prov\_dummy\_2^{+++}$	$Protec\_dummy^{++++}$
Lagged rs_rp	-8.60^{***}	-5.43^{*}	4.00^{*}
	(1.16)	(3.23)	(2.32)
Lagged rs_un	-5.49^{**}	-0.59	-4.28^{***}
	(2.17)	(1.55)	(1.19)
Lagged rs_hdi	-1.72^{**}	32.25^{***}	16.09^{***}
	(0.87)	(5.44)	(3.27)
Constant	1.79	-22.90^{***}	-10.60^{***}
	(1.16)	(3.62)	(2.41)
Wald statistic	56.45^{***}	49.49^{***}	27.91^{***}
Pseudo R^2	0.23	0.77	0.52
Obs.	382	382	382

[+] Robust standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
[++] $Prov\_dummy\_1 = 1$ if $P2 > 0.5$ and 0 otherwise.
[++] $Prov\_dummy\_1 = 1$ if $P2 > 0.25$ and 0 otherwise.
[+++] $Protec\_dummy = 1$ if $P1 > 0.50$ and 0 otherwise.

Table A.6 Lists of the MENA and OECD countries

MENA countries	Algeria, Bahrain, Djibouti, Egypt, Arab Rep., Iran. Islamic Rep., Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, West Bank and Gaza, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen, Rep.
OECD countries	Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Korea, Rep., Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States

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