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POLITICAL AMBIGUITY AND ECONOMIC DEVELOPMENT: THE MENA COUNTRIES

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Political Ambiguity and Economic Development: The MENA Countries*

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Abstract
In this paper we provide a coherent framework for analyzing the impact of incalculable political risk, i.e. political ambiguity, on economic development and the choice of development strategy.

Using indicators for the levels of internal and external political ambiguity, we analyze the growth paths of MENA countries based on annual data for the period from 1980 to 2008. Succession rules for governments are our indicator for *internal* political ambiguity, the potential for becoming involved in disruptive international conflicts serves as an indicator for *external* political ambiguity.

Our results show that political ambiguity has a negative impact on both the level of per capita GDP and its growth. Our theoretical model suggests that political ambiguity biases development strategies, leading to an underinvestment in intensive sources of growth.

JEL classification codes: O14, O33, O53, D81

Keywords*: economic development, decision making, ambiguity, development strategy, political economy, Middle East and North Africa*

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1 Introduction

Economic development in the countries of the Middle East and North Africa (MENA) fails to reach its full potential. Across the region countries face similar key economic challenges: job creation, improving trade integration, extending and upgrading technological capacities, and re-inventing political economic structures (Brach 2010).

Population growth in the region is among the highest in the world, but structural adjustment and efforts to strengthen the private sector and to develop new sources of growth and job creation have been pursued only halfheartedly. Today, the region is characterized by an underperforming private sector, an inefficient public sector and high unemployment. Millions of new jobs are needed to ensure sustainable development and to secure living standards for the young.

In this paper we test the hypothesis that the speed of economic development as measured by growth of per capita GDP crucially depends on the ambiguity that originates from the prevailing political and political economic structures.

Our theoretical analysis suggests that the exposure of policy makers to ambiguity biases their decisions. Aversion to ambiguity, i.e. caution or pessimism, favours low technology development strategies, having major implications for countries' development paths.

An original new data set on the rules of political succession in the Middle East is compiled. It is combined with both standard and non-standard indicators of technological capabilities and economic development to test the above hypothesis in an innovative way.

The remainder of the paper is organized as follows. Sections 2 and 3 review the link between technology and development, and between ambiguity and development, respectively. Section 4 presents the theoretical model. The methodology and data for the empirical analysis are discussed in Section 5. The results of this analysis are summarized in Section 6. Section 7 discusses the results and Section 8 concludes by linking our findings to recent developments in the region and by outlining their policy implications.

2 Technology and Development Strategies

Traditionally, growth theory focused on physical and human capital accumulation as the ultimate sources of growth. Nowadays both economists and policy makers acknowledge innovation to be a key driver of economic development and growth (OECD 2009). The body of literature on innovation is vast and covers a broad variety of subjects. Drawing on Schumpeter's seminal contribution from 1950, theoretical advances were made in the 1990s (by authors such as Romer, Aghion and Howitt, Grossman and Helpman), followed by a substantial increase in empirical studies. These studies focus almost exclusively on the analysis of research and development (R&D) intensive activities and sectors in OECD countries, where over 90 percent of recent technologies have been developed. Innovation in developing countries has rarely been an explicit research subject.

Early exceptions are Basu and Weil (1998) and Hausman and Rodrik (2003), who argue that developing countries face a technology bias and need to appropriate existing technologies. They point out that the process of technology adaption is not cost-free and is as uncertain as the innovation process in OECD countries. Most of the literature on economic development in developing countries focuses on access to technologies through international trade, rather than on their innovative and creative capacities (e.g. Sachs and Warner 1999, Dollar and Kraay 2004). More recently, interest in "incremental" or "inside-frontier" innovation and technological capacity as important drivers of development in developing countries has increased. The need for further theoretical and empirical research in this area is underscored and its conduct is being encouraged by leading researchers (e.g. Fagerberg et al. 2009, Freeman and Soete 2009) and research institutions (e.g. OECD–UNESCO 2009).

In countries that undertake little innovative research and development (R&D) and in which the productive sectors are largely depending on foreign technologies, national policy choices are of utmost importance for the overall development success. Such policies provide the framework, the incentives, the reward system and, last but not least, the prioritization of economic development. National innovation policy and technology strategy choices become the ultimate determinant of economic development (Rodrik 2007).

We distinguish between three technology based development strategies: the first emphasizes the use of low technology, the second the use of medium technology, and the third the use of high technology production technologies. The low technology strategy focuses on traditional,

low growth, low value adding sectors. It is based on extensive sources of growth, with the extreme case that growth is driven by the extraction and sell-out of natural resources only. Examples are sectors such as simple agriculture, manual manufacturing and some forms of resource extraction, all of which are characterized by decreasing returns to scale.

In contrast, both the medium and the high-tech strategy are based on intensive sources of growth, i.e. growth through innovation and human capital formation. These are characterized by external increasing returns to scale, resulting from synergies as in cluster and agglomeration effects. The high-tech strategy focuses on the development of new technologies and research based innovation, while the medium technology builds on diffusion based innovation and the modification and refinement of existing technologies.

For most developing countries, the high technology strategy remains a visionary option for a long term development path. By and large they currently lack technological and human capacities, as much as the access to and experience with high technology industries. Developing countries in general, and the countries of the Middle East and North African (MENA) region in particular, host scarcely any firms operating in the high technology sector. Therefore, we restrict our attention to two prototypical economic development strategies: the low technology strategy on the one hand, and the medium technology strategy on the other.

These development strategies differ in a number of aspects, including internal and external economies to scale, financial requirements, governmental policies, and vulnerability to calculable and incalculable risks. Governments encourage and support their preferred strategies with the policy tools at their disposal, whereas international organizations, national investors and international investors decide on the intensity of their engagement in the different sectors of the countries' economies.

2.1 The Low Technology Strategy

The low technology development strategy encourages the use of robust, stand-alone production technologies. They typically have roots in local tradition and are embedded in the local economic environment. The technologies normally exhibit internal and external decreasing returns to scale, resulting in small optimal sizes. Being relatively independent of the physical and non-physical infrastructure, low-tech firms can perform well in the presence of poorly maintained roads, unreliable public utilities and restricted communication. They

also tend to be robust against weak judicial and educational systems.

But the robustness of low-tech firms with regard to the civil service is not restricted to the judiciary and the educational systems. It extends to other areas, including those relating to the process of globalization, affecting international trade, direct foreign investment and technology transfer. Low-tech firms tend to make only modest requirements on the financial infrastructure, reducing the need for financial liberalization and leaving them relatively unaffected by swings in the moods of financial markets.

Another area of public policy to which they are relatively robust is economic geography and regional development. The decreasing returns to scale create a natural tendency towards a geographically even distribution of economic activity, due to the inefficiency of clustering. Even in the absence of deliberate government policies, this reduces disparities in regional economic growth and alleviates internal migration pressures.

As a result, the low technology development strategy is relatively robust against poorly performing political governance structures. It often does not involve foreign investment, so it neither requires a commitment to integration in the international community, nor a regard for the sensitivities of (international) investors with respect to various forms of calculable and incalculable political risk.

2.2 The Medium Technology Strategy

The properties of the medium technology strategy contrast with those of the low-tech development strategy. Production technologies tend to be relatively complex, fragile and interdependent with their environment. Although mature rather than innovative, they often are modern and outward reaching. Normally they exhibit internal and external increasing returns to scale, due to their dependence on a well-developed physical and non-physical infrastructure.

The dependence of medium-tech firms on public policy is not restricted to the infrastructure and the educational systems. It also requires public administration to protect property rights and to embrace the process of globalization, facilitating international trade, direct foreign investment and international technology transfer. The technologies tend to make significant requirements on the financial infrastructure, creating the need for financial liberalization and thus enhancing the vulnerability to swings in the moods of (international) financial markets.

The internal and external increasing returns to scale encourage the geographical clustering of medium technology firms. This favors the development of competence centers and may create disparities between regions within the country. In the absence of a clear cut development strategy and a sound policy mix, these may lead to a dual economy with an urban/rural technology divide (Brach 2012). The divide may relate to income, to local infrastructure and to access to employment, health services and education. But it may also be with respect to moral attitudes and effective individual freedoms.

As a consequence, the medium-tech development strategy requires a well-functioning public governance structure. The government should counteract tendencies towards divisions within the country and provide a functioning physical and non-physical infrastructure. It should secure integration in the international community and take account of the nervousness of investors with respect to various forms of calculable and incalculable political risk.

2.3 Economic Development and Technological Capacities in the MENA region

Compared to other developing regions, the Arab countries of the MENA face a range of constraints to economic development that are closely related to a lack of technology absorbing capacity. Economic performance, which is summarized in Table 1, is divers. Despite strong capital accumulation and increases in GDP in the region since 1980, per capita GDP varies significantly, ranging from 1,330 USD in Syria to 29,251 USD in Qatar. Due to high population growth and limited diversification, the regional average is strongly influence by energy exports and oil prices. On average GDP per capita has increased by 44 percent since 1980, with an average annual growth of 1.7 percent over the past 28 years.[1] This is well below the 2-digit growth in other developing parts of the world. Only Tunisia, Oman and Egypt managed to double per capita GDP, while a reduction by almost half occurred in the United Arab Emirates and by over one third in Saudi Arabia.

Keeping in mind the historically high in oil prices in the years 2007 and 2008, as well as the economic boom in Dubai, these numbers may seem counter intuitive. And yet, they are not.

[1] Note that the MENA average only includes the non-OECD member countries in the MENA region. Turkey and Israel are thus not included. Due to data limitations Iraq, Libya and the Palestinian Territories also had to be excluded from the analysis.

Oil exporting countries have profited from high prices during the 1980s but then "suffered" a sustained period of cheap oil until the middle of 2000. Furthermore, oil importing Arab countries have recently suffered as much from high oil prices as the rest of the global economy. Some oil importing countries, however, also reaped benefits through intra regional foreign direct investments and remittances (Brach and Loewe 2010).

The combination of a low degree of economic diversification with high rates of population growth (3 percent average annual population growth), has resulted in most oil exporting countries experiencing a decline of GDP per capita since 1980. Table 1 shows the development of GDP and population in the MENA countries. More detailed documentation is provided in the Appendix.

Table 1: Economic output and population growth in the MENA region in 2008

Country	GDP constant 2000 USD (mil dollars)	GDP per capita, constant 2000 USD	GDP per capita average, annual growth rate 1980-2008, %	Population (thousands)	Population annual growth, %	Population growth Average annual growth rate 1980-2008, %
ALG	75,300	2,190	0.59	34,400	2.18	82.73
ARE	114,000	26,071	1.85	4,485	5.46	341.78
BHR	13,200	16,968	1.52	776	2.92	123.51
EGY	146,000	1,786	2.63	81,500	2.19	83.48
IRN	152,000	2,137	1.58	72,000	2.20	83.92
JOR	14,600	2,476	1.03	5,906	3.64	170.80
KWT	61,400	23,072	1.75	2,728	2.12	98.40
LBN	24,400	5,814	2.62	4,194	1.48	50.60
MAR	55,200	1,745	2.02	31,600	1.73	61.53
OMN	27,200	9,978	3.08	2,785	3.10	134.57
QAT	29,300	29,251	0.39	1,281	6.39	458.25
SAU	253,000	10,250	1.42	24,600	3.43	156.61
SYR	27,400	1,330	0.94	20,600	3.01	129.41
TUN	28,300	2,744	2.60	10,300	1.74	61.78
ØMENA	72,950	9,701	1.71	21,225	2.97	145.53

The MENA region has seen rapid population growth. On average the population has increased by 145 per cent since 1980. Only Lebanon, Morocco and Tunisia have not doubled their populations in this period. Two thirds of the population are below 40 years old, young men and women between 16 and 25 accounting for more than one third. Historically large cohorts of young people are seeking jobs, and yet these are scarcely available. The public sector, which used to be the guarantor of jobs, has reached its limits and has become a highly inefficient provider of services. In the absence of 1 or 2-child policies, the population trend is not reversed; on the contrary.

In the light of the demographic challenge, there is a clear need for job creation. Brach (2009) points out that the individual MENA countries are all confronted with a similar situation: a dependence on non-sustainable (capital) accumulation based on extensive sources of growth such as capital transfers (remittances, official development aid) accumulation and resource extraction. And yet, with respect to technological capacities there again is a significant degree of heterogeneity within the region, which is briefly summarized in Table 2.

Table 2: Technological Capacities in the MENA region

Technology stages	Access (recent technologies are generally available)	Adoption (available technologies are applied efficiently)	Development (development of new-to-country technologies)
Standard measures and available indicators:	**Trade Openness, WTO membership, number of free trade agreements, average tariff**	**total fac**tor productivity, int. **competitiveness, technological readiness, business sophistication**	**R&D expenditures, patents, number of researchers**
Developer: Israel, Iran, Turkey	Very good ++	Very good **++**	satisfactory +/-
Consumer: Bahrain, Qatar, Kuwait, Oman, Saudi Arabia, United Arab Emirates	Very good ++	Very good ++	poor -
Integrated User: Tunisia, Jordan**, Lebanon**	Good **+**	satisfactory +/-	poor -
Egypt **Morocco,**	Good +	poor -	poor -
Isolated User: Algeria, Syria, Palestinian Territories, Yemen, Libya, Iraq	Poor -	poor -	Very poor --

Technology Developers are technologically well advanced and are characterized by excellent access to, mastering of and development of new technologies, both through research and through technology adaption. Still, all countries in the region depend on foreign technologies, because they are lacking capacities to develop and improve technologies according to their needs. Within the technology developers, three subgroups can be differentiated: consumers, integrated users and isolated users. *Technology consumers* are highly integrated into the global market and have access to internationally state-of-the-art technologies. In the case of the oil-rich countries, however, international competitive products are almost exclusively restricted to the resource extraction industry (and partially tourism). Thus, the classification is not reflecting the state of the economies as a whole. The *integrated technology users*, such as Tunisia or Jordan are also well integrated in the global commodity markets, but do not have

the financial means to equip themselves with medium technologies. Nor do they have sufficient experts to run sectors based on such technologies. Finally, the *isolated technology users* face the most difficult situation. Their integration into the world market is fairly recent, limited and selective. Some of these countries are the most war and conflict-ridden countries in the MENA region that don't have the capacities, the funds and most of the basic infrastructure.

Obviously, there is significant variation in both the level and the speed of economic development, as well as in the choice and prioritization of technology development strategies. The analysis performed in this article will help to shed light on whether the low outcome/performance is related to internal and external political ambiguity, and if so, to what extent.

3 Political Ambiguity and Development

3.1 Uncertainty, Risk and Ambiguity

The term uncertainty is mostly used referring to calculable risk. The underlying assumption is that both the relevant outcomes are known and a (subjective) probability distribution over these outcomes can be formed. In economic reality, however, there are many important situations for which this assumption fails to apply.here may be no clear perception of the plausible potential outcomes, and/or a reasonable estimate of an applicable probability distribution fails to be available. In such cases the basic prerequisites for the risk to be calculable are missing and uncertainty takes the form incalculable risk, also known as *ambiguity*. As early as in the late 1930s Keynes provides the perhaps clearest description according to which ambiguity is observed when there "is no scientific basis on which to form any calculable probability whatever." (Keynes 1937). For an extensive introduction to decision making under ambiguity see Spanjers (1999/2008, Part 3).

3.2 Political Ambiguity in the MENA region

Economies are regularly confronted with the political uncertainty associated with a change of government. This is true for all types of governments and political systems, democratic or autocratic as well as for all stages of economic development (developed, emerging, and developing). To different degrees, all countries are exposed to uncertainty in the form of the calculable risk or incalculable ambiguities of succession.

Political ambiguity is most relevant in developing and emerging countries, as political ambiguity is directly related to the transparency and reliability of political structures, not just to the "stability of governments" as such. Indeed, the most successful economies are democracies with a build in mechanism of regular change government. In contrast, Arab states have witnessed governments that have been in power for several decades. Furthermore, international investors are not the only ones subject to ambiguity; local economic and political actors are exposed to it too. The reason is that the level of ambiguity is much higher in developing countries due to the importance of the transparency and stability of political structures. Still, high degrees of transparency and stability are not only found in modern democratic societies, but at times also in traditional autocratically ruled states.

In democratic political systems the procedures governing the end of a legislation period or after a government has stepped down are clear cut. Although there may be a degree of risk and ambiguity regarding the *outcome* of the process, there is no ambiguity regarding the *procedure*.

In contrast, economic actors in non-democratic systems may face a much higher level of ambiguity originating from the incalculable risk embedded in the prevailing form of political rule. Such ambiguity arises because a) succession rules are not clear cut, binding and transparent and b) changes in government may not occur routinely, which refrain the people, the economic actors, as well as the political actors, from gaining experience with political change.

According to the Polity IV classification, not a single country in the region qualifies as a full democracy. On the contrary, the countries are governed by strong autocratic rule (with an average score of -5 on a range from 10 (full democracy) to -10 (full autocracy)). The evaluation is summarized in Table 3.

Only two countries in the region display a substantial amount of democratic features in their polity systems: Lebanon and Algeria. However, in both cases the value is only slightly positive (0 in Lebanon, and 2 in Algeria) not implying substantial democratic features in the Polity 4 sense, yet. Waves of democratization in recent history have significantly changed polity structures in some parts of the developing world, especially in Latin America. But they have – until very recently – not affected the MENA region much. The authoritarian nature of the regimes in the MENA region persistently prevailed. Therefore, the political situation is

often characterized by continuity or even stagnation. And yet, Table 3 shows that in all but two countries (Qatar and Saudi Arabia) polity structures have changed. In all countries except Iran, these developments have led to a relaxation of authoritarian rule. On average, the evaluation increased from -8 to -5.

Table 3: Persistent but lightning authoritarian rule in the MENA region

Polity IV	1980	2008	Change
ALG	-9	2	+
ARE	.	.	.
BHR	-10	-7	(+)
EGY	-6	-3	(+)
IRN	-2	-6	-
JOR	-10	-3	(+)
KWT	-10	-7	(+)
LBN	0	7	+
MAR	-8	-6	(+)
OMN	-10	-8	(+)
QAT	-10	-10	=
SAU	-10	-10	=
SYR	-9	-7	(+)
TUN	-9	-4	(+)
Ø MENA	***-7.9***	***-4.8***	***(+)***

Source: Polity 4 Database

In the region republics and monarchies (including emirates and sultanates) appear in almost equal numbers. While the traditional monarchies, where hereditary succession from father to son are the rule, leave little room for political uncertainty, all but two republics qualify as authoritarian systems and are thus most likely to be exposed to a high amount of political ambiguity. Despite the prevalence of non-democratic regimes, there is significant heterogeneity across the political systems and their exposure to ambiguity and political risk.

4 The Model

4.1 The Decision Model

Drawing on Schmeidler (1989), using the E(llsberg)-capacities described in Eichberger and Kelsey (1999) and the extension proposed in Chateauneuf et al. (2007), the utility function for decision makers under ambiguity can be described as in Equation (1):

$$\begin{aligned} U(x_1,\ldots,x_S;\, \pi_1,\ldots \pi_S\,;\, \gamma;\, \beta) := \;& \gamma\, \mathbb{E}\{u(x)\} \\ & + (1-\gamma)\cdot\beta\cdot \max\nolimits_{s\in\{1,\ldots,S\}} u(x_s) \\ & + (1-\gamma)\cdot(1-\beta)\cdot \min\nolimits_{s\in\{1,\ldots,S\}} u(x_s) \end{aligned} \qquad (1)$$

Here (π_1,… π_S) denote the probability estimates, $\gamma \in [0,1]$ is the level of confidence in the probability estimates and $\beta \in [0,1]$ represents the level of optimism/pessimism of the decision maker. This model specification closely follows the design and argumentation presented in Spanjers (2009).

4.2 The Economic Model

The economic model assumes that a given amount of resources can be divided over three economic development strategies, viz. low technology excluding resource extraction, resource extraction/oil and medium technology. The low-tech strategy is based on extensive sources of growth and is relatively robust with respect to political ambiguity. The medium-tech strategy is based on intensive sources of growth, yields higher expected growth rates, but involves a higher vulnerability to ambiguity. Finally, we also include the resource extraction/oil strategy, as many countries on the MENA region are energy exporters with poorly diversified economies. The oil/resource extraction strategy is based on extensive sources of growth, but operates independently and is not affected by the exposure to ambiguity.

The sectors on which the strategies focus differ with respect to their returns to scale. We assume that the low-tech sectors have decreasing returns to scale. For the resource extraction/oil sectors we assume constant returns to scale. Medium technology sectors are assumed to have increasing internal and external returns to scale up to their absorbing capacity for investments. Once the absorbing capacity of a sector is reached, its contribution to growth rapidly declines and comes to a standstill.

The strategies' expected contributions to the growth of per capita GDP are denoted by $f(x) = \mathbb{E}_s\{F(x, s)\}$ for the low-tech strategy, $g(x) = \mathbb{E}_s\{G(x, s)\}$ for the medium technology strategy and $h(x) = \mathbb{E}_s\{H(x, s)\}$ for investment in the oil sector. Here F, G and H denote the growth in per capita GDP for financial resources x and state of the world $s \in \{1,\ldots,S\}$. For positive rates of population growth f, g and h may take negative values. We may assume, however, that their first derivatives are non-negative, as an increase in investments increases per capita output and therefore leads to higher per capita GDP growth.

For an increased investment in the low-tech strategy, the rate of increase in GDP per capita growth will fall due to the decreasing returns to scale in these sectors. Therefore $f''(x) < 0$.

Individual medium-tech sectors exhibit increasing external returns to scale up to their absorbing capacity due to agglomeration and cluster effects. But growth in each of these sectors rapidly declines and when its absorbing capacity is reached. We assume that investment in the medium-tech strategy self directs towards maximum overall growth contributions, starting in the sector with the highest contribution toward per capita GDP growth. Once the absorbing capacity of the sector with highest contribution is reached, additional funding soon shifts to the sector with the second highest contribution etc. As a result, for the medium technology development strategy the marginal contribution of investments to per capita GDP growth will be falling, even though agglomeration and cluster effects exist at the level of individual sectors. Therefore $g''(y) < 0$.

Finally, considering investments in the oil sector we assume constant returns to scale until the absorbing capacity is reached, i.e. $h''(z) = 0$.

The three types of strategies all obtain their worst payout in the same state of of the world. Effectively, this assumes that it is impossible to hedge against the incalculable political risks. The only way investors can avoid the country specific political risk is by investing in the oil sector (or investing in ambiguity free assets abroad).

The optimization problem of the “representative investor” is as presented in Equation (2):

$$\max_{(x,y,z)} \ \gamma\cdot[f(x) + g(y)] + (1-\gamma)\cdot[f^{\min}(x) + g^{\min}(y)] + h(z) \qquad (2)$$
$$\text{s.t.} \qquad x + y + z = c$$

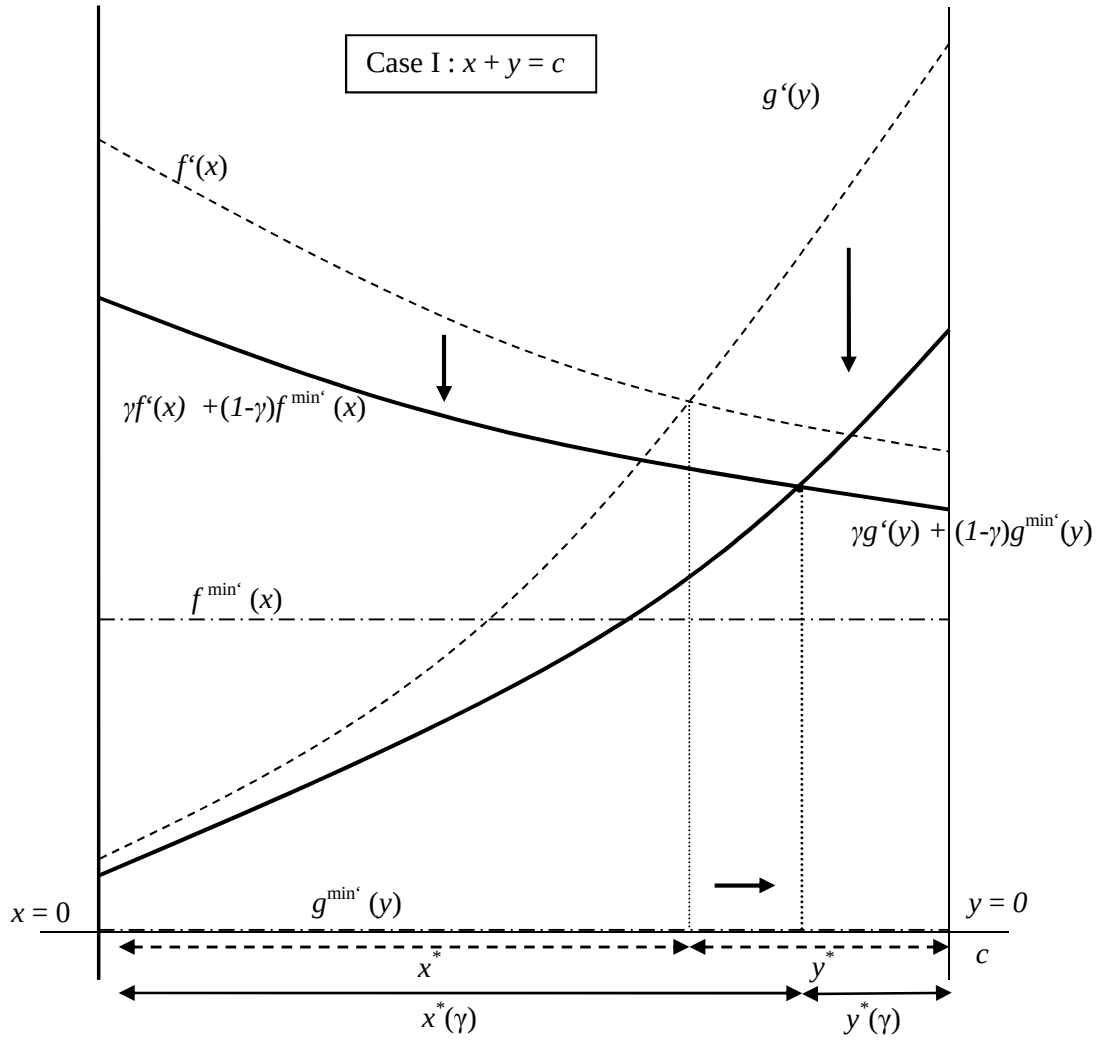
In the absence of significant possibilities to invest in the domestic oil sector, the terms relating to h and to z disappear from the decision problem. In this case, the relevant optimization problem is obtain by deleting $h(z)$ and z from Equation (2).

Figure 1 visualizes the case where only the low and the medium technology strategies are considered. For this situation, the first order conditions result in $f'(x) = g'(y)$, where $x + y = c$. The case in which there is no ambiguity, i.e. $\gamma = 1$ is depicted in dotted lines.

The marginal contributions of the low-tech strategy and the medium-tech strategy in the absence of ambiguity are $f'(x)$ and $g'(x)$, respectively. The marginal contributions of worst case/fall back positions are $f^{min}'(x)$ and $g^{min}'(x)$. To simplify exposition, in Figure 1 the marginal contribution of worst case scenario for the medium-tech strategy is assumed to be zero. For the low-tech strategy it is assumed to be positive, reflecting its higher robustness in the event of adverse realizations of risk and ambiguity.

The marginal returns of the medium-tech and the low-tech strategies in the presence of ambiguity is represented by the solid lines $\gamma f'(x) + (1-\gamma) f^{min'}(x)$ and $\gamma g'(y) + (1-\gamma) g^{min'}(y)$, respectively.

Figure 1*: Intensities of the low-technology and medium technology strategies with and without ambiguity*



Although the total amount of resources is constant at the given level c, the allocation of these resources over the two strategies may vary. The optimal policy mix can be seen at the bottom of the figure as the relation of x^* and y^* for the case where decision makers are not exposed to ambiguity and as the relation of $x^*(\gamma)$ and $y^*(\gamma)$ for the case they are.

Since $x^*$and $x^*(\gamma)$ are not equal, the exposure to ambiguity has an effect on the choice of technology, creating a bias towards the low technology strategy. The result of this discussion can be summarized as follows

Proposition 1

Suppose the possibilities for investments in the oil sector are negligible. Then the presence of political ambiguity ($\gamma < 1$) leads to over investment in the low technology sector and to underinvestment in the medium technology sector:

$$x(\gamma) > x^* \text{ and } y(\gamma) < y^*.$$

Figure 2 depicts the case in which all three strategies are available: low technology (x), medium technology (y) and the constant returns to scale technology (z). This third option can be interpreted as an investment into ambiguity resistant sectors, e.g. the oil sector. In the absence of ambiguity the first order conditions of the decision problem of the representative investor is given as Equation (3)

$$f'(x) = g'(y) = h'(z), \text{ with } x + y + z = c. \qquad (3)$$

In contrast, consider the case of exposure to ambiguity (i.e. $\gamma < 1$). Solving the first order conditions yield Equation (4):

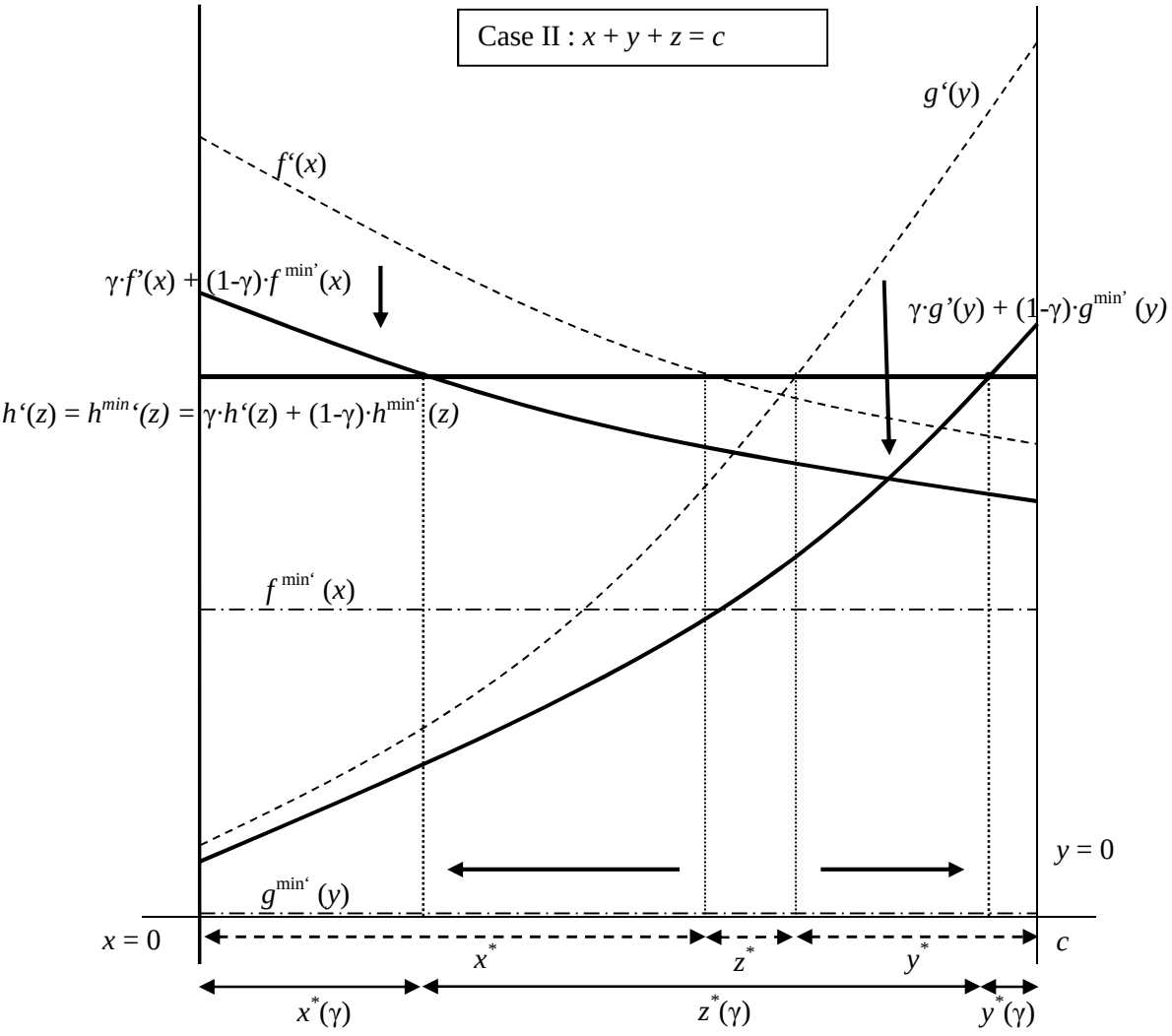
$$\gamma \cdot f'(x) + (1-\gamma) \cdot f^{\min}{}'(x) = \gamma \cdot g'(y) + (1-\gamma) \cdot g^{\min}{}'(y) = h'(z), \text{ with } x + y + z = c. \qquad (4)$$

Given the presence of ambiguity, investments in the constant return technology sector offer the opportunity to avoid worst case losses related to $g^{\min'}$ or $f^{\min'}$ altogether. As a consequence of ambiguity, investments in both the low-techn sector and the medium-tech sectors decline. The results of this discussion are summarized in Proposition 2.

Proposition 2

Suppose that there are significant possibilities to invest either in the domestic oil sector. In this case political ambiguity ($\gamma < 1$) leads to underinvestment in the low and medium technology sectors, $x^*(\gamma) < x^*$, $y^*(\gamma) < y^*$, and excessive investments in the oil sector, $z^*(\gamma) > z^*$ and $z^*(\gamma) > x^*(\gamma) > y^*(\gamma)$.

Figure 2: ***Intensities of the low-technology, medium-technology and constant return-technology strategies with and without ambiguity***



Both in the context of Proposition 1 and of Proposition 2, the presence of political ambiguity reduces the expected growth rate of per capita GDP below what it would have been in its absence. This leads to the hypothesis to be tested in the paper.

Hypothesis to be tested:

The presence of political ambiguity reduces the growth rate of per capita GDP below what it would have been in the absence of political ambiguity.

5 Methodology and Data

In the first step, we have compiled an innovative and unique database on succession in the Middle East and North Africa from the early 1960s until very recently. It comprises information on both the *de jure* and *de facto* rules of political succession. More details are provided in Appendix A.1. In the second step, we have linked this information with standard and non standard indicators of the general economic performance. In this way, we created a panel of annual data covering 14 non OECD MENA countries over the period of 28 years (1980-2008). The sample includes the following countries Bahrain, Algeria, Egypt, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, and the United Arab Emirates.

Our theoretical model suggests that political ambiguity has an impact on the composition of production in the economy. We are not sure about the time structure of the impact of political ambiguity on growth, nor can we be certain that we haven't missed important proxy variables for the amount of political ambiguity. We include variables relating to the composition of production in our regressions as indicators of the potential cumulative effects of political ambiguity that are not covered by the political variables in the regressions.

5.1 Data and Variables

We use two different approaches. In the first, we use per capita GDP as a static measure of economic performance. In the second, we use per capita growth as the corresponding dynamic measure. The variables included in our analysis are listed in Table 4.

6 Empirical Findings

6.1 Ambiguity

In the MENA region republics and monarchies (including emirates and sultanates) are spread almost evenly, 49 and 51 percent, respectively. These numbers are somewhat open to debate, because e.g. the United Arab Emirates are formally considered to be a republic. The power, however, does not lie with the president of the federation, but with the monarchic rulers in each of the 6 emirates.

Table 4: List of variables

	variable name	variable label
General	c_code	Country code
	year	Year, 1960-2008
	id	Country id
Polity	country	Name of country
	Foundation	year of foundation/or independence
	title	Official title of head of government/ruler
	polity2	Indicator:10 (full democracy) to -10 (full autocracy)
***De jure* succession**	r_period	Official legislature period in years
	succession	Official rule for succession, in years
	renewals	Number of possible renewals
	lifetime	lifetime tenure
***De facto* succession**	r_inaug	Year of inauguration of ruler/head
	r_birth	Year of birth of ruler/head
	r_ties	Family ties to predecssor
	r_resign	year of resignment
	r_reason	Reason to resign
	power	How the ruler took over power
	age_inaug	Age of ruler/head at inauguration
	age_resign	Age of ruler/head at resignation
	years_power	Number of years in power
	change_gov	Total changes in government
	Reign	Duration of reign per rules in years
Economy	population	Total population
	gdp	GDP constant 2000 USD
	lngdp	log og GDP
	cap_gdp	Per capita gdp
	gva_fc	Gross value added at factor cost, constant 2000 prices
	Pop_gr	Annual population growth
	Pop_g	Total population growth
	Cap_gdp_gr	Annual per capita GDP growth
	Cap_gdp_g	Total per capita GDP growth
	va_ind_growth	Industry value added, % annual growth
Strategy	va_agri	Agriculture value added, % GDP
	fuel_export	Fuel export, % of merchandise exports
	va_ind_gdp	Industry value added, % GDP
	va_manu	Manufacturing value added, % GDP
	va_ser	Services value added, % GDP
	machinery	Machinery and transport equipment, % value added
	ht_export_manu	High-technology export, % manufacturing
	ht_export	High-technology export, current
Conflict	conflict	Conflict dummy
	conf_type	Type of conflict
	conf_int	Intensity of conflict

In each country the constitution provides for a succession mechanism, there is no country where political transition is not covered. Key elements to reduce ambiguity in the process of power transitions such as the duration of the legislature term, the number of possible extensions and the specification rules of succession are explicitly settled in the constitutions. Since there generally was very little change of these rules between 1980 and 2008, we reduce

the descriptive profile to a snap-shot of the current situation in the region in 2008. Table 5 shows that there is some variation between the monarchies (incl. emirate and sultanates) with a lifelong tenure and a hereditary succession (mostly farther to son) on the one hand, and the republics with fixed-term tenure between four and seven years with possible extension (either once or unlimited) and a succession by election or nomination on the other.

At first sight, the rigor of *de jure* regulation seems to be similar in both the monarchies and the republics. And yet, the reliability and predictability of political succession in the republics is weak, since all regimes classify as autocracies. Even within the republics there tend to be family ties between the predecessor and the next ruler. In 2008, 37 percent of the rulers had family ties to their predecessors. Barely three years later, in 2011, almost all republics were governed by rulers who have family ties with their predecessors. And only the uprising of the Arab people against their leaders that caused the Arab Spring early 2012 has prevented this percentage to increase even further. In Egypt, Algeria, and Tunisia, the sons of the current presidents were already stepwise installed as potential successors by their fathers. Yet, this is a fairly new phenomenon, because over the whole period from 1980 to 2008 family ties could only be observed in 10 per cent of the republics. In all cases close relatives, and especially the sons, had the best chances to succeed the president, second most important where the president's nephews.

Table 5: *De jure* profile of the countries in the MENA Region, 2008

Country 2008	Official title of head of government/ Ruler	Official legislature period in years	Number of possible renewals (terms)	Official mode for succession
ARE	President	5	unlimited	election
BHR	King	Lifetime	-	hereditary
DZA	President	5	Once	election
EGY	President	6	Unlimited	election
IRN	President	4	Once	direct election
JOR	King	Lifetime	-	hereditary
KWT	Emir	Lifetime	-	hereditary
LBN	President	4	Unlimited	nomination
MAR	King	Lifetime	-	hereditary
OMN	Sultan	Lifetime	-	hereditary
QAT	Emir	Lifetime	-	hereditary
SAU	King	Lifetime	-	hereditary
SYR	President	7	unlimited	nomination
TUN	President	5	unlimited	direct election

Sources: Own calculations (WDI, Polity4, Historical yearbooks/GIGA Database)

These observations provide a first indicator that the Arab republics in the MENA region are exposed to ambiguity, in the sense that political succession is not necessarily based on free and fair elections. In general, except for Lebanon, there are not very frequently changes in government: neither in the monarchies (which is to be expected) nor in the republics.

On average, rulers remained in power for 13 years, the average age of the ruler/head of state at the inauguration was 48 years and on average the rulers resigned at the age of 72. However, the standard deviation is significant (see Appendix A.1). While only one president did not survive his first year in power, many lasted for several decades. And the oldest ruler resigned at the age of 89. Table 6 summarizes the *de facto* circumstances and frequency of changes in government, and displays the heterogeneity that is hidden in the calculation of averages:

Table 6: Reasons to resign

Reason to resign	Percent	Cum.
Disputes	1.15	39.77
Interim	0.92	40.69
Constitutional	3.68	44.37
Coup	5.52	49.89
Death	37.93	87.82
Defeated	0.46	88.28
Deselection	0.92	89.2
Failed	0.23	89.43
Military coup	2.76	92.18
Resignation	2.76	94.94
Retirement	4.37	99.31
Self nomination	0.69	100

The most common reason for a change in government is the death of the ruler (37.9 percent). Given the high age of the rulers at their resignation, it is safe to assume that the majority died of natural causes. In a period of almost 30 years, barely two per cent of heads of governments stepped down because they lost the next election; 7.5 percent were forced out of office with violence and only 6.9 percent retired voluntarily.

Despite the fact that the MENA region is often associated with war and conflict, only half of the countries has been exposed to war or conflict in the period between 1980-2008. Iran and Algeria were affected the most part of the years covered, 21 and 18, respectively. Lebanon and Egypt registered conflict in nine and seven years, respectively. Reducing the low economic performance of the Middle East to the unsettled Israeli-Palestinian conflict alone, however, is not convincing.

6.2 Economic Profile

Before we concentrate on developments since 1980, Table 7 provides a brief look at the economic situation at the end of our sample period, in 2008. Against the background of negative growth almost everywhere around the globe, a modest positive growth of one percent on average is quite remarkable. This observation is in line with the evaluation of Brach and Loewe (2010) who argue that despite severe losses, the MENA region as a whole has not been hit as hard by the economic and financial crisis as most other regions of the world.

The share of agriculture (9,4) is very small, but this can easily be explained by the fact that the countries have very little arable land despite sometimes covering vast areas of land. Therefore, the low share of agriculture cannot be taken as an indicator for the choice away from a low technology strategy on face value. High-technology exports are very low, ranging from 0 to almost 5 percent. With only 13 percent of value added stemming from manufacturing, MENA countries have a long way to go before reaching a high- or even medium-high-technology profile. For machinery and transport equipment no data was available. The average shares of value added by industry and by services are 40 and 50 per cent, respectively. The share of fuel exports in percent of merchandise exports is very high on average, but extremely diverse, ranging from 0.01 to as much as 93.78 percent.

Table 7: Economical and technological profile 2008

Variable, 2008	Mean	Std.dev.	Min	Max
GDP 2008, constant 2000 USD (millions)	63,700	78,600	719	253,000
GDP per capita 2008, constant 2000 USD	4,615	5,174	847	16,968
GDP per capita average annual growth rate, %	1	2	-2	3
Value added agriculture, % GDP	9.38	6.21	2.30	19.98
Value added industry, % GDP	40.22	16.56	21.25	69.29
Value added service, % GDP	50.41	15.42	28.41	73.47
Value added manufacturing, % GDP	12.93	5.20	4.63	20.49
Machinery and transport equipment, % value added	.	.	.	.
Fuel exports (% of merchandise exports)	46.90	36.00	0.15	93.78
Industry value added, % annual growth	3.91	4.01	-2.27	10.31
High-technology export, current dollar	171,000,000	257,000,000	282,670	674,000,000
High-technology export, % manufacturing	1.77	1.87	0.01	4.88
High-technology export, average annual growth, %	0.81	0.76	-0.01	2.29

The economic profile for 2008 tells much about the output consequences of the development strategies followed, but little about the dynamics or the type of strategy that was pursued.

Table 8 presents the descriptive statistics of economic dynamics between 1980 and 2008.

Table 8: Economic dynamics 1980-2008

Variable, 1980-2008	Mean	Std.dev.	Min	Max
GDP, constant 2000 USD (millions)	44,500	48,400	537	253,000
GDP per capita 2008, constant 2000 USD	6,465	8,097	753	46,606
GDP per capita average annual growth rate, %	1	2	-2	3
Gross value added at factor cost, constant 2000 prices (millions)	37,600	32,400	462	150,000
Gross value added at factor cost, average annual growth rate, %	4	1	0	5
Value added agriculture, % GDP	9.52	7.85	0.18	34.44
Value added industry, % GDP	38.95	14.08	14.15	77.23
Value added service, % GDP	51.53	12.35	22.03	82.26
Value added manufacturing, % GDP	11.57	5.08	0.65	23.31
Machinery and transport equipment, % value added	8.51	7.99	0.04	28.40
Fuel exports (% of merchandise exports)	43.36	38.02	0.00	99.27
Industry value added, % annual growth	3.51	8.34	-38.40	45.55
High-technology export, current USD	68,800,000	158,000,000	0	858,000,000
High-technology export, % manufacturing	2.11	2.89	0.00	20.05
High-technology export, average annual growth, %	0.81	0.73	-0.01	2.29

The per capita GDP growth rate is very low with an average average growth rate of only 1 percent for a period of 30 years. By the same token, the growth rates of gross value added (4 percent), the share of industry value added (3.5 percent) and high-technology exports (0.8 per cent) are too low to boost economic development and international competitiveness outside the oil sector.

6.3 Regression Results

We use two different settings of panel data analysis for an initial quantitative analysis and to test the main predictions of the theoretical model. The results of the regressions are summarized in Table 9 below. They are the first preliminary results and additional robustness tests. More sophisticated regression analysis is currently being undertaken.

We discussed two types of ambiguity in the model: *external* political ambiguity such as war and conflict, and *internal* political ambiguity. The effect of ambiguity has been tested in different ways, on the *level* of per capita GDP (income) and on its *growth*. While conflict has no effect on the income level, it has some impact on growth. We find that a non-democratic polity system has no significant negative effect. In fact, it even has a slight positive effect on income, but this effect is not robust. In contrast the form of government matters significantly. Non-lifetime tenured political rule has a significant negative effect on income, but a highly significant and economically relevant positive effect on growth. It is the possible perpetuation of political power which is detrimental for economic growth.

Table 9: Regression Results

Per capita GDP		**Income**		**Growth**	
		(1)	**(2)**	**(3)**	**(4)**
Strategy	va_ind	**-.0793113*** (-2.87)**	**-.0957101*** (-3.09)**	**.500412*** (8.63)**	**.5900566*** (8.75)**
	va_agri	-.3387757*** (-6.91)	-.2114904*** (-2.78)	.0320796 (0.31)	-.0859207 (-0.51)
	fuel_export	**.1881699*** (3.92)**	**.7018754*** (5.38)**	**.028038 (0.28)**	**.211741 (0.75)**
Ambiguity	pol_form1	.0639532* (1.82)	.2648771 (0.85)	-.0969512 (-1.31)	-.5726505 (-0.85)
	gov_form1	**-5.139163*** (-3.17)**	**-1.697777 (-0.54)**	**7.182676** (2.11)**	**16.20361** (2.39)**
	r_period	**4.90625*** (3.04)**	**1.846913 (0.58)**	**-7.0987** (-2.09)**	**-16.32464** (-2.36)**
	change_gov	-.0223954 (-0.77)	-.0156121 (-0.56)	-.0693565 (-1.13)	-.0679774 (-1.12)
	years_power	-.0597008 (-1.64)	-.0636388* (-1.69)	-.0288447 (-0.38)	.0182075 (0.22)
	fam_ties2	**-.8867868*** (-8.59)**	**-.6370831*** (-4.82)**	**.7158332*** (3.34)**	**.9447704*** (3.29)**
	fam_ties1	**-.6732949*** (-7.69)**	**-.7264198*** (-8.30)**	**.6467916*** (3.55)**	**.6842837*** (3.59)**
Control	conf_type	-.036547 (-1.23)	-.0442554 (-1.55)	-.1275188** (-2.04)	-.1107502* (-1.78)
	population	.0201545 (0.31)	.3270665*** (3.37)	-.3400585*** (-2.51)	-.2161327 (-1.02)
	lngdp	-.2360516*** (-2.94)	-.5493997*** (-4.82)	.6368997*** (3.78)	.6364358*** (2.55)
Interaction	int_pol_per		-.1678636 (-0.56)		.4564155 (0.70)
	int_ind_gov		.0826791** (2.15)		-.2002137** (-2.42)
	int_fuel_gov		-.6236737*** (-4.12)		-.3168741 (-0.96)
	int_agri_gov		.000847 (0.00)		.7373199 (1.55)
	Adj.R-squared	0.85	0.86	0.36	0.37
	No. of obs	206	206	201	201

Source: own calculations

In columns (1) and (2) of Table 9, per capita GDP is the predicted variable, while in columns (3) and (4) per capita GDP growth is the depended variable. The analysis shows that factors that are strong and good for explaining the level of GDP, are weaker in supporting economic growth. The fact that both specifications do not yield similar results, contradicting what one would expect according to standard growth regressions, highlights two aspects. Firstly, it indicates that the drivers of growth are not necessarily the factors that caused the relatively high levels of GDP in the region. Intuitively these match the observation that the level of GDP is highly correlated to the (windfall)profits related to energy extraction and export activities in combination with a substantial redistribution of the petro dollars in both oil

exporting and non-oil exporting countries, e.g. through job creation and remittances. Yet, more recent growth patterns are to a much lesser extent related to energy exports, especially in non-oil exporting countries. Rather, they relate to other factors such as a higher degree of diversification of the economy, e.g. through investment in human capital.

Secondly, the difference in the results indicates that further analysis is necessary in order to rule out misspecification and endogeneity problems. This analysis is currently being performed. Still, the results reported here – even though they are preliminary in this respect – do render important insights.

The regression analysis clearly supports the hypothesis that political ambiguity is an economically constraining factor. This is especially true for the speed of development. However, whether the negative impact is caused by an inappropriate choice of the development strategy (low technology instead of medium technology), or an unsuccessfully pursued strategy (e.g. a high growth strategy that resulted in a low growth development) is beyond the scope of this paper. It would, however, be a fruitful area for future research.

7 Discussion

The hypothesis to be tested in this paper is that political ambiguity has a negative impact on economic growth, as suggested by our theoretical model. Our empirical analysis supports this hypothesis.

Regarding the assumed choices of development strategies, the values added in agriculture and in industry, as well as fuel exports, may reflect cumulative lagged effects of political ambiguity. Similarly, the level of per capita GDP may be interpreted as partially representing the cumulative effects of past GDP per capita growth. The combination of negative signs for value added in agriculture and in industry, and the positive sign for fuel exports on the level of per capita GDP, are therefore consistent with the mechanism summarized in Proposition 2. It states that other things being equal, ambiguity leads to an overinvestment in the resource extraction/oil sector combined with underinvestment in the (remaining) low and medium technology parts of the economy.

Our theoretical analysis predicts that when policy makers and investors that are exposed to ambiguity, this tends to bias their decisions. Aversion to ambiguity, i.e. a cautious or pessimistic inclination, introduces a bias against the medium technology strategy towards

extensive sources of growth. Facing the exposure to political ambiguity, policy makers and investors will only have a bias in favor of medium technology sectors if they have a strong taste for political ambiguity, i.e. an exuberant and optimistic inclination regarding its outcomes. Clearly the direction of the bias has major implications for countries' development paths.

From an economic point, ambiguity is often related to external shocks only, especially natural catastrophes or war and conflict. We, however, find that economic actors in the MENA countries face a significant amount of internal political ambiguity that is related to the incalculable risk embedded in the prevailing form of political rule.

Political stability and clear rules are important for all countries and economies. Economies are regularly confronted with the political uncertainty associated with a change of government. This is true for all types of governments and political systems, democratic, non-democratic, republican, monarchic, or dictatorial. To different degrees, all countries are exposed to uncertainty in the form of the calculable risk or incalculable ambiguities of succession.

In mature democratic political systems the procedures ruling the situation at the end of the legislation period or after a government has stepped down are clear cut. Although there may be a degree of risk and ambiguity regarding the outcome of the process, there is no ambiguity regarding the procedure. Something similar holds for (semi-)absolute monarchies and other authoritarian regimes, provided succession rules are clear cut, transparent and straightforward. Rulers can suddenly and unexpectedly pass away and in times of political tension, the risk of assassination may be higher than in others. But as long as the succession is settled, no political vacuum arises. There may be (calculable) risk regarding the future government, but the amount of (incalculable) ambiguity is limited.

Internal and international armed conflicts pose another severe risk to economic development, as does the imposition of serious international sanctions. The mere potential for such situations to occur casts a shadow on the affected countries by discouraging and inefficiently distorting investments. In the absence of possibilities for capital to flee from incalculable ambiguity by moving abroad or in the resource extraction/oil sector, ambiguity enhances the perceived attractiveness of investment in robust low technology sectors at the expense of the more vulnerable medium technology sectors (with the possible exception of the arms

industry). This may have sizable negative repercussions on both the development strategy and the development path, even if the calculable risk is negligible.

It should be noted that not a single country in the MENA region qualifies as a full democracy. Within non-democratic polity systems the succession rules that organize and regulate the transition from one head of state to the next become vitally important. The clearer cut, transparent, and straightforward the rules of succession, the lower the ambiguity. Accordingly, we use the way succession is governed as an indicator for political ambiguity. All countries in the MENA region are non-democratic political systems, and depending on the form of government exposed to more (republics) or less (monarchies) ambiguity of this type.

The sustainable improvement of living standards is a central issue and a major challenge in developing countries. We are aware that an appropriate index for the level of development requires the combination of a broad range of indicators. Still, for the usual reasons we focus on per capita GDP and its growth as indicators for economic development, But even economic development in this stricter sense depends on a variety of determinants among which macroeconomic stability and factor endowment are necessary, but not sufficient conditions. In the long run, innovation is the key driver of growth. Especially in developing countries that display little research and development (R&D) and where the productive sectors are mostly depending on foreign technologies, national policy choices are of utmost importance for the overall development success. Such policies provide the framework, the incentives, the reward system and, last but not least, the prioritization of economic development. Therefore, national innovation policy and technology strategy choices become the ultimate determinant of economic development (Rodrik 2007).

8 Conclusion

A considerable body of existing theoretical and empirical literature focuses on technology, innovation, innovation systems and their determinants. A special emphasis is placed on the most innovative economies and sectors. This literature analyses developed economies, especially OECD members. In contrast, little research was undertaken to study these issues in developing countries. Only recently this part of the literature has started to expand noticeably. The coverage of Middle Eastern countries, however, is still very limited. A common feature

of all the contributions is that the development strategy is considered to be determined by the endowment with natural resources.

In contrast to these studies and contributions, we account for the fact that the choice of development strategy is endogenously determined and closely related to political economic decision making structures.

Drawing on modern developments in decision theory, we present a model of the choice of development strategy in developing countries, incorporating uncertainty both in the form of (calculable) risk and of (incalculable) ambiguity.

The model differentiates three strategies: a low technology, a medium technology, and high technology strategy. The low technology strategy focuses on traditional, low growth, low value adding sectors and extensive sources of growth, driven by increasing the amount of inputs. In contrast, both the medium and the high-tech strategy focus on intensive growth source, i.e. growth through innovation and human capital formation. The high-tech strategy focuses on the development of new technologies and research based innovation, while the medium technology builds on diffusion based innovation and the modification and refinement of existing technologies.

For the empirical analysis of the MENA region, where countries have no or only marginal high technology sectors, we restrict our attention to the low and the medium technology strategies.

In order to bring the model to the data, we used the value added by agriculture (as percent of GDP) and the share of fuel export (as percent of merchandise export) as proxies for a low technology strategy versus value added by industry (as percent of GDP). We included the value of services, machinery and transport equipment, as well as high technology exports as alternative indicators.

With respect to external ambiguity, we used the occurrence of conflict and conflict intensity which are relatively well monitored and documented indicators. In contrast, there is no existing database that can quantify internal political ambiguity. Therefore, we developed and constructed a original, new database that uses the discrepancy between the *de jure* and the *de facto* legislation and power structures and extensively covers the ambiguity that arises from

unclear and ambiguous rules for political succession. To the best of our knowledge our database for the first time allows to observe and quantify political ambiguity.

Our analysis reveals two important results. First, half of the Arab MENA countries are exposed to a significant degree of internal, political ambiguity. Second, this exposure has a significant negative impact on economic development, because exposure to political ambiguity has in the period from 1980-2008 lead to a systematic underinvestment in medium-technology and other intensive sources of growth, combined with an overinvestment in extensive sources of growth, such as resource extraction and low-technology manufacturing.

Thus, reducing (political) ambiguity in these countries is an important step towards better and more sustainable economic development in future as a reduced exposure yields potentially high returns on investments for both national and international commitment.

In the light of the Arab Spring movement and with respect to shaping policies that foster, support and sustain economic development in the Arab countries of the Middle East and North Africa, our analyzes yields four main policy implications. First, the need for clear cut (procedural) rules; second, the need for an economic concept; third, the need to rapidly build up more economic competence in these countries; and fourth, the need to make economic development a top priority.

The application of this general framework reflects differences between developed and developing countries and its application is not restricted to the MENA region. In fact, cross-regional comparisons would be a very fruitful direction for further research.

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APPENDIX

A.1: GIGA/IMES Database on political succession in the MENA Region

The database has been designed and constructed by Dr. Juliane Brach and compiled in cooperation with the GIGA Institute of Middle East Studies, Hamburg, Germany. The database comprises the following variables for all years from 1960 to 2010:

Table 10: Available Variables: Names and short description

Variable	Description
country	Abbreviation of full country name
c_name	name of country
c_year	year of foundation (or independence, if applicable)
c_type	type of external dominance (protectorate (League of Nations mandate) or colony)
o_title	official title of head of government/ruler
o_period	offical legilature period in years
o_multi	number of possible renewals (if applicable)
o_sucession	official rule for succession, in years
r_family	Family Name (Nachname)
r_name	full name of ruler/head of governernment
r_birth	year of brirth of ruler/head of governernment
r_inaug	year of inauguration of ruler/head of governernment
r_power	mode how the ruler took over power (election, appointment, military coup, ...)
r_resign	year of resignment from power of ruler/head of governernment
r_reason	reason to resign of ruler/head of governernment
r_ties	family ties of ruler/head of governernment to predecessor

In a first step, a variety of first and secondary literature such as the constitutions and especially the historical dictionaries which are available for almost all MENA countries were consulted and proved to be rich sources of information. In a second step, the descriptive data was labeled and codified.

During the process of writing, the database has been extended in size and scope, it now covers all years from 1918 until 2010. The database is available upon request.

Table 11: Available Variables: Overview of official succession rules 1980-2008

Country	**Official title**	**Legislature period (years)**	**Possible renewal**	**Rule of Succession**
People's Democratic Republic of **Algeria**	President	5	once	*direct election by people*
Kingdom of **Bahrain**	King	Lifetime		*hereditary (father to son)*
Arab Republic of **Egypt**	President	6	unlimited	*direct election by people* - nomination of candidates of presidency by People's Assembly - Since 1981: Mubarak won as the only candidate for presidency the referendums - 2005:after constitutional reform more candidates allowed; Mubarak wins again the referendum
Islamic Republic of **Iran**	President	4	once	*direct election by people* - "Guardian Council of the Constitution" approves candidates for presidential elections (conformity with Islam and constitution)
Republic of **Iraq**	Prime Minister	4	once	*election by parliament* - President names nominees for prime minister and cabinet nominees from the largest bloc of the Council of Representatives (main electoral body)
State of **Israel**	Prime Minister	4	unlimited	*election by parliament* - President appoints Prime Minister out of the Knesset - President appoints candidate, who could likely form a government
Hashemite Kingdom of **Jordan**	King	Lifetime		hereditary (by appointment)
State of **Kuwait**	Emir	Lifetime		hereditary (by appointment)
Republic of **Lebanon**	Prime Minister	4	unlimited	*election by parliamen*t - President names nominees for prime minister and cabinet nominees from the largest bloc of the parliament. The constitution follows the principle of confessional equality. the government has to represent the confessional plurality of the country - the Prime Minister has to be Sunni Muslim
Great Socialist People's **Libyan** Arab Jamahiriya	Leader and Guide of the Revolution	Lifetime		None head of state (de jure): General Secretary of the General People's Congress head of state (de facto): Leader and Guide of the Revolution
Kingdom of **Morocco**	King	Lifetime		hereditary (father to son)

Sultanate of **Oman**	Sultan	Lifetime		hereditary (by appointment) "The system of government is an hereditary Sultanate in which succession passes to a male descendant of Sayyid Turki bin Said bin Sultan. It is a condition that the male who is chosen to rule should be an adult Muslim of sound mind and a legitimate son of Omani Muslim parents." (Constitution, 1996) -Sultan Qaboos has no male offspring
Palestinian National Authority	President	4	unlimited	direct election by people -there were just two elections in the PNA since foundation (1996, 2005) all other elections were suspended because of inner and external reasons 2005: Mahmud Abbas wins the presidential election -Abbas extended his term for another year and holds his office even after this deadline
State of **Qatar**	Emir	Lifetime		hereditary (by appointment within the Al-Thani-Dynasty)
Kingdom of **Saudi Arabia**	King	Lifetime		hereditary (by appointment) "The King of Saudi Arabia must be a son or grandson of Ibn Saud" (Saudi Basic law, 1992)
Republic of the **Sudan**	President	5	once	direct election by people al-Bashir gained power by military coup in 1989; he led a military government as Chairman of the Revolutionary Command Council for National Salvation 1993: al-Bashir appoints himself as president 1996: reelection (only candidate)
Syrian Arab Republic	President	7	unlimited	election by parliament -nomination by parliament - after death of Hafiz al-Assad (father): changes in constitution - decrease of minimum age for presidential nomination from 40 to 34 to enable the election of Bashar in 2000
Tunisian Republic	President	5	unlimited	direct election by people Ben Ali gained power after Coup d'état 1987; reelection in 2004 and 2009 no free election (autocratic regime)
United Arab Emirates	President	5	unlimited	Presidential election by the Federal Supreme Court Candidates are the Emirs of the seven Emirates; election of the Emir of the mightiest Emirate likely since independence/foundation: Abu Dhabi succession to the throne within Emirates: hereditary

Republic of **Yemen**	President	7	once	direct election by people 2001: extension of presidential tenure from 5 to 7 years Salih is first directly elected President (1999) 2006: reelection no free election (autocratic regime)

A.2 Armed Conflict Dataset

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Type of Conflict

1. Extra systemic armed conflict occurs between a state and a non-state group outside its own territory. (In the COW project, extra systemic war is subdivided into colonial war and imperial war, but this distinction is not used here.) These conflicts are by definition territorial, since the government side is fighting to retain control of a territory outside the state system.
2. Interstate armed conflict occurs between two or more states.
3. Internal armed conflict occurs between the government of a state and one or more internal opposition group(s) without intervention from other states.
4. Internationalized internal armed conflict occurs between the government of a state and one or more internal opposition group(s) with intervention from other states (secondary parties) on one or both sides.

Conflict intensity

The intensity variable is coded in two categories:8

1. Minor: between 25 and 999 battle-related deaths in a given year.
2. War: at least 1,000 battle-related deaths in a given year.

A.3 General Profile

Table 12: General Profile of the countries in the MENA Region

Country	Population (tsd)	Population annual growth, %	Population growth 1980-2008, %	Number of changes in government	PolityIV Index	Year of foundation /or independence	Ever conflict dummy	Number of years with conflict
ARE	4,485	5.46	341.78	1	.	1971	0	0
BHR	776	2.92	123.51	1	-7	1971	0	0
DZA	34,400	2.18	82.73	3	2	1962	1	18
EGY	81,500	2.19	83.48	1	-3	1953	1	7
IRN	72,000	2.20	83.92	4	-6	1979	1	21
JOR	5,906	3.64	170.80	1	-3	1946	0	0
KWT	2,728	2.12	98.40	1	-7	1961	1	2
LBN	4,194	1.48	50.60	11	7	1943	1	7
MAR	31,600	1.73	61.53	1	-6	1956	1	9
OMN	2,785	3.10	134.57	0	-8	1970	0	0
QAT	1,281	6.39	458.25	1	-10	1971	0	0
SAU	24,600	3.43	156.61	2	-10	1932	0	0
SYR	20,600	3.01	129.41	1	-7	1946	1	2
TUN	10,300	1.74	61.78	1	-4	1956	0	0

A.4 Economic overview and profile

Table 13: Economic Profile

Country	GDP 2008, constant 2000 USD (mil)	GDP per capita 2008, constant 2000 USD (tds)	GDP per capita average annual growth rate, %	GDP per capita growth 1980-2008, %	Gross value added at factor cost, average annual growth rate, %	Gross value added at factor cost, growth 1980-2008, %	Value added agriculture, % GDP	Value added industry, % GDP	Value added service, % GDP	Value added manufacturing, % GDP	Machinery and transport equipment, % value added	Fuel exports (% of merchandise exports)	Industry value added, % annual growth	High-technology export, current mil dollar	High-technology export, % manufacturing	High-technology export, average annual growth, %	High-technology export, growth 1980-2008, %
ARE	114,000[b]	26[b]	1.85	-44.06[b]	3.86[d]	149.92[c]	1.80[b]	60.60[b]	37.60[b]	12.40[b]	.	64.81	10.30[c]	207	3.24	130.68[d]	.
BHR	13,200	17	1.52[d]	47.81	.	.	.	.	.	.	.	80.83[b]	.	0.486[b]	0.05[b]	229.11[d]	.
DZA	75,300	2	0.59[d]	16.73	2.87[d]	119.47	6.92	62.12	30.96	4.63	.	21.81	1.37	7[b]	0.71[b]	35.64[d]	.
EGY	146,000	2	2.63[d]	106.07	4.94[d]	283.50	13.22	37.53	49.25	15.73	.	44.04	10.31	85	0.89	42.07[d]	.
IRN	152,000[b]	2[b]	1.58[d]	45.98[b]	3.86[d]	168.14[b]	10.22[b]	44.47[b]	45.31[b]	10.55[b]	.	82.79[c]	7.86[b]	375[c]	5.87[c]	97.51[d]	.
JOR	14,600	2	1.03[d]	28.19	4.44[d]	229.36	2.89	34.07	63.04	20.49	6.24[d]	0.15	8.46	41	0.89	50.91[d]	.
KWT	61,400[b]	23[b]	1.75[d]	.	.	.	.	.	.	.	.	96.31[b]	.	9[b]	0.46[b]	47.05[d]	.
LBN	24,400	6	2.62[d]	.	2.74[d]	.	5.27	21.25	73.47	9.96	.	0.18[b]	2.00	4[b]	0.22[b]	-0.81[d]	.
MAR	55,200	2	2.02[d]	70.00	3.76[d]	172.53	14.64	30.32	55.04	14.04	8.42[d]	2.27[b]	2.62	858[b]	8.81[b]	157.55[d]	.
OMN	27,200[b]	10[b]	3.08[d]	121.13[b]	.	.	.	.	.	.	2.10[d]	86.39	.	18	0.73	23.20[d]	.
QAT	29,300[c]	29[c]	0.39[d]	.	.	.	.	.	.	.	0.18[d]	93.78	.	0.282	0.01	223.38[d]	.
SAU	253,000	10	1.42	-35.96	.	.	2.30	69.29	28.41	8.15	13.35[d]	90.11[b]	4.81	121[b]	0.60[b]	62.91[d]	.
SYR	27,400	1	0.94[d]	25.83	4.36[d]	.	19.98	35.03	45.00	12.82	.	41.11[b]	-2.27	51[b]	1.27[b]	26.12[d]	.
TUN	28,300	3	2.60[d]	103.17	4.46[d]	236.76	9.78	32.14	58.08	17.65	.	17.32	3.97	674	4.88	8.13[d]	.

Note:WDI (2011), 2008 data when nothing else noted, (b) 2007, (c) 2006, (d) 2005.

A.5 Availability of economic and technological indicators

Table 14: Science and Technology Indicators

	ST indicators							Education				
	WDI 2010					WEF 2010/11	WDI 2010	HDI 2010		WDI 2010		
Country/Region	High-tech exports (% of manufactured exports)	Technicians in R&D (per million people)	Researchers in R&D (per million people)	Patent applications, residents	Research and development expenditure (% of GDP)	Technological readiness, rank (out of 139)	Adult literacy in %	Mean years of schooling	Expected years of schooling	Labor force with primary education (% of total)	Labor force with secondary education (% of total)	Labor force with tertiary education (% of total)
MENA	**19**	**8**	**8**	**13**	**11**	**17**	**20**	**19**	**22**	**14**	**14**	**14**
Algeria	0.7[b]	34.5[d]	170.2[d]	84[b]	0.1[d]	106	72.6[c]	7.2	12.8	50.4[e]	20.6[e]	10[e]
Bahrain	0.0[b]					27	90.8[a]	9.4	14.3	48.4[s]	25[s]	16.7[s]
Djibouti								3.8	4.7			
Egypt	0.9[a]	378.4[b]	616.6[b]	516[b]	0.2 [b]	87	66.4[c]	6.5	11.0			
Iran	5.9[c]		706.1[c]	691[i]	0.7[c]	96	82.3[c]	7.2	14.0	50.4[b]	22[b]	15.4[b]
Iraq	0.1 [b]			68[n]			77.6[a]	5.6	9.7			
Israel	16.4[a]			1528[a]	4.7[b]	26		11.9	15.6	5.9[b]	7.3[b]	84[b]
Jordan	0.9[a]	718.3[l]	1951.9[l]	59[b]	0.3[g]	62	92.2[b]	8.6	13.1			
Kuwait	0.5[b]	33.0[b]	165.5[b]		0.1[b]	77	94.5[b]	6.1	12.5	25.2[f]	26.3[f]	16.7[f]
Lebanon	0.2[b]					92	89.6[b]		13.5			
Libya				12[n]		114	88.4[a]	7.3	16.5			
Morocco	8.8[b]	47.6[c]	647.3[c]	177[a]	0.6[c]	75	56.4[a]	4.4	10.5	39.5[c]	9.9[c]	8.7[c]
Oman	0.7[a]					59	86.7[a]		11.1	34.7[i]	24.9[i]	13.8[i]
Qatar	0.0[a]					36	93.1[b]	7.3	12.7	24.1[e]	18.8[e]	18.6[e]
Saudi Arabia	0.6[b]			128[b]	0.0[b]	42	85.5[a]	7.8	13.5			
Sudan	0.1[a]			3[b]	0.3[d]		69.3[a]	2.9	4.4			
Syria	1.3[b]	124[c]		124[c]		111	83.6[a]	4.9	10.5	65.9[f]	15.9[f]	6.3[f]
Tunisia	4.9[a]	42.9[c]	1587.9[c]	56[d]	1.0[d]	55	78[a]	6.5	14.5	44.2[m]	29.7[m]	7.1[m]
Turkey	1.7[a]	101.6[b]	680.3[b]	2221[a]	0.7[b]	56	88.7[b]	6.5	11.8	56[b]	21.9[b]	13.1[b]
UAE	3.2[a]					14	90[d]	9.2	11.5	29.2[d]	28.8[d]	16.6[d]
WBG							94.1[a]		13.1	51[b]	15.6[b]	22.4[b]
Yemen	0.3[a]			11[b]			60.9[a]	2.5	8.6	12.5[k]	2[k]	14.4[k]

Source: Brach (2011), Notes: [a] 2008,[b] 2007,[c] 2006,[d] 2005,[e] 2004,[f] 2003,[g] 2002[h] 2001[i] 2000[k] 1999[l] 1998[m] 1997[n] 1996[o] 1995[p] 1994[q] 1993[r] 1992[s] 1991[t] 1990