Estimating Potential Growth in the Middle East and Central Asia*

Pritha Mitra, Amr Hosny, Gohar Abajyan, Mark Fisher†

Abstract – The Middle East and Central Asia's economic growth potential is slowing faster than in other emerging and developing regions, dampening hopes for reducing persistent unemployment and improving the region's generally low living standards. Why? And is it possible to alter this course? This paper addresses these questions by estimating potential growth, examining its supply-side drivers, and assessing which of them could be most effective in raising potential growth. The analysis reveals that the region's potential growth is expected to slow by ¾ of a percentage point more than the emerging and developing countries (EMDC) average over the next five years. The reasons behind this slowdown differ across the region. Lower productivity growth drives the slowdown in the Caucasus and Central Asia and is also weighing on growth across the Middle East (MENAP); while a lower labor contribution to potential growth is the main driver in MENAP. Moving forward, given some natural constraints on labor, total factor productivity growth is key to unlocking the region's higher growth potential. For oil importers, raising physical capital accumulation through greater investment will also play an important role.

Keywords: potential growth, productivity, output gap, production function, Middle East and Central Asia
JEL: E32, F43, O47

1. Introduction

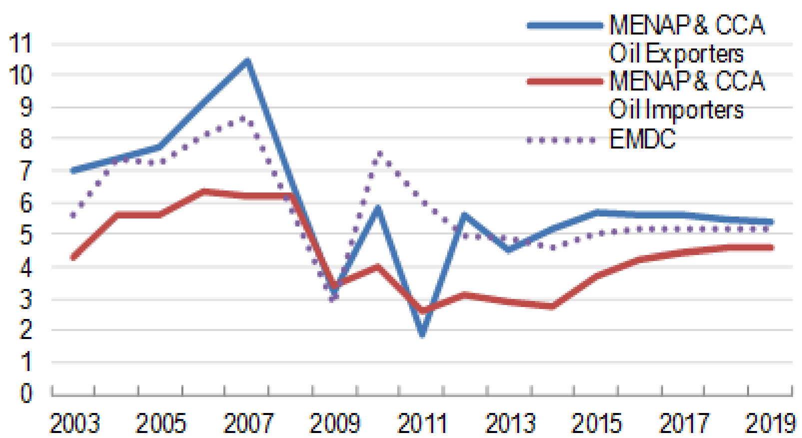
The Middle East and Central Asia's (MENAP and CCA) strong growth has weakened since the global financial crisis.[1] Oil exporters' non-oil growth – historically driven by oil revenues – averaged over 8 percent during 2003-07, buoyed by high and growing oil prices. Since the crisis (2008-14), it has almost halved to 4½ percent and is expected to pick

*We are grateful to Gohar Minasyan, Harald Finger, Natalia Tamirisa, Abdul Abiad, David Furceri, Tamim Bayoumi, and Christina Kolerus for their useful comments and feedback. All errors and omissions are our own. The views expressed in this paper are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

†International Monetary Fund

[1] For the purposes of this paper, the Gulf Cooperation Council (GCC) represents Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates; non-GCC oil exporters are Algeria, Iran, Iraq, Libya, and Yemen; Arab Countries in Transition (ACTs) are Egypt, Jordan, Morocco, and Tunisia (Libya and Yemen are excluded); other oil importers represents Afghanistan, Djibouti, Lebanon, Mauritania, Pakistan, and Sudan (Syria is excluded); the Caucasus and Central Asia (CCA) oil exporters are Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan; CCA oil importers are Armenia, Georgia, the Kyrgyz Republic, and Tajikistan; Middle East and North Africa (MENAP) represents the GCC, non-GCC oil exporters, ACTs, and other oil importers

FIGURE 1. Regional Non-Oil Real GDP Growth Rates (percent)



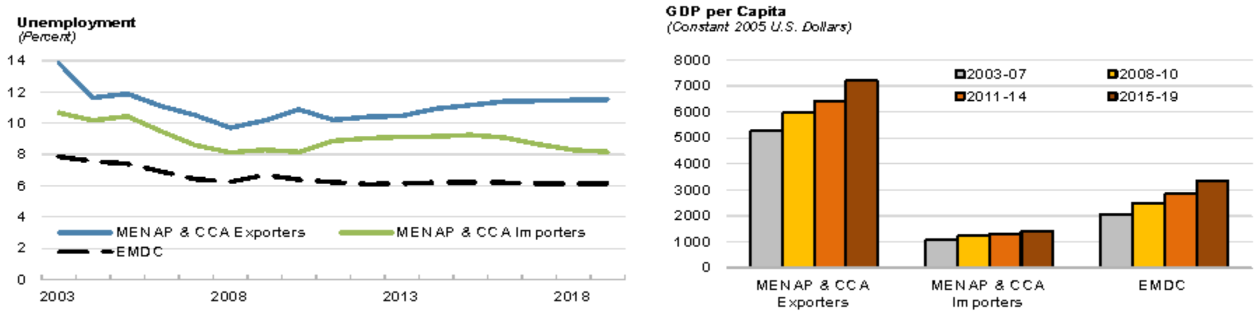
Sources: World Economic Outlook; and IMF staff calculations.

up by only 1 percentage point over the medium-term (Figure 1). This trend is broadly in line with the average for emerging and developing countries (EMDC). Highly favorable external conditions also supported oil importers' pre-crisis growth of 5½ percent. The global financial crisis compounded by the aftermath of the Arab Spring and spillovers from regional conflicts weighed growth down to 3½ percent during 2008-14 with expectations of a modest 1 percentage point increase over the next five years.

At the same time, MENAP and CCA unemployment is persistently high and, in many cases, living standards are amongst the poorest in the world. The global financial crisis reversed the region's gradually declining unemployment trend (Figure 2). In the Middle East and North Africa (MENAP), growing populations elevate social and labor market pressures. For example, the number of unemployed nationals in the Gulf Cooperation Council (GCC) is projected to exceed 1 million over the next five years (IMF 2013a). High population growth coupled with weak job creation also raises concerns over living standards in the oil importers. Absent job-creating economic growth outpacing population growth, standards of living, measured as per capita GDP, will drop from half to one third of the EMDC average over the next five years (Figure 2).

Elevating the region's medium-term economic prospects – in terms of growth, jobs, and living standards – hinges on raising potential growth. High global growth which spurred

FIGURE 2. Living Standards and Unemployment



Sources: World Economic Outlook, Global Employment Trends; and IMF staff calculations.

MENAP and CCA economic activity prior to the global financial crisis is not projected to return over the next few years (IMF 2014). Raising medium-term economic prospects requires policymakers to focus inward, on the region's ability to expand its growth potential through supply-side measures. In particular, what drives potential growth in the MENAP and CCA countries? Labor, physical capital, or total factor productivity (TFP)? How much can these drivers boost growth potential?

Despite its importance, little work has been done in this area for MENAP and CCA economies. One of the challenges in measuring growth potential for oil exporting economies is their dependence on oil. A substantial portion of their overall growth reflects global oil demand and prices as opposed to the economy's actual growth potential. For this reason, we study the non-oil growth potential. Estimates for Saudi Arabia in IMF (2013b) point to decelerating non-oil potential growth since the global financial crisis, likely driven by a slowdown in TFP possibly reflecting spillovers from slower post-crisis oil price growth. In oil importers, a lack of sufficiently long and consistent time series poses a challenge for measuring potential growth. Since the global financial crisis, Armenia's potential output is also found to be declining (El-Ganainy and Weber 2010, and IMF 2013c), again largely owing to falling TFP.

The literature on advanced and emerging economies is more developed. Barrera and others (2009) find that potential output in the United States is expected to be about 5¾ percent below the counterfactual level produced by average growth rates before the global financial crisis. Furceri and Mourougane (2009) find that the crisis lowered potential output by around 1.5–2.4 percent on average in OECD countries. In both cases, the loss in potential output was driven by a decline in physical capital and TFP growth. In a study on potential growth in Latin American during 2003-2012, Sosa and others (2013) find that growth of capital and labor, rather than TFP, remains the main driver of GDP growth, despite recent improvements in TFP performance. Anand and others (2014) attribute a decline in trend TFP growth for India and China's recent slowdown, while physical capital accumulation is driving growth in most of the ASEAN countries.

To the best of our knowledge, this is the first paper to shed light on potential growth developments across MENAP and CCA economies. Specifically, this paper (i) estimates past and future potential growth for a broad group of emerging market and low income countries applying a consistent methodology across countries based on statistical filters and standard (Solow-style) growth accounting methodologies; (ii) examines the supply-side drivers of potential growth in the MENAP and CCA; and (iii) assesses which drivers could be most effective in raising potential growth for the region.

The main findings of the paper suggest that potential growth rates vary greatly across the MENAP and CCA. At one extreme, the oil importers' growth potential is substantially below the EMDC average. At the other extreme, oil exporters – particularly in the GCC and the Caucasus and Central Asia (CCA) – have among the world's highest non-oil potential growth. In addition, and since the global financial crisis, MENAP and CCA potential growth rates are slowing by more than in other EMDCs. The declines are projected to exceed EMDC averages by ¾ of a percentage point over the next five years. Furthermore, the reasons behind the slowdown in potential growth differ. Lower TFP growth has driven the decline in the CCA. It has also contributed to the slowdown across the MENAP region, especially the GCC. However, lower labor contributions to potential growth have been the main driver of the slowdown in MENAP. This reflects lower public spending resulting in lower employment across the region and, in the oil importers, the discouraging effect of high unemployment and large remittance inflows on workforce participation in the oil importers. Lower investment-to-GDP ratios across the ACTs and the CCA oil importers, following weak investor confidence and strained public finances, also reduced physical capital's contribution to their potential growth. And lastly, looking ahead, boosting potential growth will depend on raising TFP across the region and, in the oil importers, raising physical capital accumulation. Both before and after the global financial crisis, MENAP and CCA TFP growth has lagged other EMDCs. Yet, TFP growth carriers fewer constraints than other factors of production – making it critical to raising potential growth in both the region's oil exporters and importers. Given the oil importers' relatively low and eroding physical capital stock, a wide range of plausible annual TFP and investment-to-GDP combinations can raise potential growth. The medium-term contribution of labor is limited since even in countries with high population growth, plausible medium-term workforce growth is slow. These findings are robust to various data challenges as demonstrated by a battery of robustness tests.

The paper is structured as follows. Section II focuses on the estimation of potential growth, elaborating on the methodology and results. Section III explores the drivers of potential growth through a growth decomposition exercise. Having analyzed the drivers of growth, prospects for raising potential growth are assessed in Section IV and Section V concludes.

2. Estimating Potential Growth

Potential or trend growth is defined as the highest level of sustainable real GDP growth during a long period without stoking inflation. In other words, it is a country's ability to expand production of goods and services for domestic and foreign markets. Technically, it is also the difference between actual growth and the change in output gap. Uncertainties surrounding potential growth estimates are significant, especially for MENAP and the CCA where statistics are incomplete and/or produced with a significant lag. To ensure robustness of results, several techniques are applied to estimate potential growth.

2.1. **Methodology and Data.**

Potential growth can be estimated through a variety of methods. This paper applies two of the most common techniques from the literature to estimate potential growth. Statistical Filters are very popular methods decompose or filter raw GDP data into cyclical/noise and trend components applying different statistical specifications. The Hodrick Prescott (HP) linear filter (1997) is often preferred due to its simplicity. It is a univariate filter that can estimate potential output as the series that minimizes the deviation of actual output from its trend, subject to an adjustment of the sensitivity of the trend to short-term fluctuations.[2] Christiano and Fitzgerald (CF) (2003) and Baxter and King (BK) (1999) band-pass filters use a range of business cycle frequencies to compute the cyclical component of output.[3]

Alternatively, the Production Function Approach makes use of the microeconomic links between potential output and its inputs. First, output growth is decomposed into contributions from labor, physical capital and total factor productivity (TFP) in a growth accounting framework following the seminal work of Solow (1957). TFP is calculated as the residual contribution to GDP growth once the contributions of physical capital and labor (adjusted for unemployment) are taken into account.[4] Typically, a simple Cobb-Douglas production function is specified with an assumption on the share of physical capital and labor in output. Second, the trends of these components are calculated applying statistical filters. Third, the trend components are applied to the assumed production function to estimate the trend GDP growth rate.

The main drawback of these approaches is that, as purely statistical techniques, these filters estimate trends in growth or its components without regard to other macroeconomic variables. In particular, the relationship between output gaps and inflation is not

[2]Formally, the HP filter is a two-sided linear filter that computes the smoothed series (s) of output (y), by minimizing the variance of y around s, subject to a penalty that constrains the second difference of s. The penalty parameter λ controls the smoothness of the series s.

[3]The two band-pass filters differ in the weights assigned to the moving average of the data where cycles in a "band" are extracted or "passed" through, and the remaining cycles are "filtered" out.

[4]Human capital is not incorporated as a separate variable in the production function due to data constraints. If it were applied, the number of MENAP and CCA countries for which potential growth could be estimated would be significantly narrowed.

exploited. This can be overcome through macroeconomic model-based methods but this approach cannot be applied to the MENAP and CCA economies due to serious data limitations; namely the availability of high frequency and sufficiently long time series of inflation, unemployment, and capacity utilization.[5] Another challenge of the statistical filter approaches is the end-point problem; i.e. the instability of estimates near the end of the sample period, whereby the end-point-data tend to drive estimates of the trend at the end of the sample. This problem may result in revisions to potential output estimates at or near the end of the sample as new data is released. A common approach to deal with the end-point problem is to extend the sample by using the forecast data, as we do in this paper.[6]

Both the statistical filter and the production function approaches are applied to data for 19 MENAP and CCA countries spanning from 1991-2019.[7] When data was unavailable from 1991, the earliest year of available data was used. Appendix 1 provides details.[8] The statistical filters applied include the HP, BK, and CF filters.[9] The application of the production function approach assumes a physical capital depreciation rate of 0.1, physical capital's share in output of 0.50 for oil exporting countries and 0.35 for oil importing countries. These assumptions are consistent with past research on MENAP and CCA oil exporters (IMF 2012, IMF 2013b, IMF 2013d, and the Total Economy Database (TED) from Chen and others 2010) as well as on oil importers (IMF 2014, TED from Chen and others 2010, and Gollin 2002) which assume physical capital's share of output to range from 0.4

[5]Specifically, multivariate approaches have been used in the literature to overcome some of the shortcomings of univariate filters such as the HP, CF and BK filters. The multivariate approaches relate the output gap to the natural rate of interest and unemployment and use a Kalman filter to estimate these unobserved variables (see Benes and others, 2010; IMF, 2015). It is worth mentioning, however, that multivariate methods have their own shortcomings, including sensitivity to starting values and the judgment on the structure of the process governing the unobserved output gap. Therefore, there is no reason, a priori, to expect that multivariate filters should feature better revision properties than univariate filters (see Andrle 2013).

[6]The fact that the forecast data is smoothed does not impact their effectiveness in countering the end-point problem.

[7]These countries are Algeria, Bahrain, Egypt, Iran, Jordan, Kazakhstan, Kuwait, Kyrgyz Republic, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, United Arab Emirates, and Yemen.

[8]Ideally, an analysis at the sectoral level would have been preferable, but such consistent and long-enough data does not exist for many countries in our sample.

[9]The Beveridge and Nelson (BN) and the unobserved components (UC) decomposition approaches were not applied since their strict assumptions would require a longer time series.

to 0.67 for oil exporters and from 0.25 to 0.4 for oil importers and the physical capital depreciation rate from 0.05 to 0.15.

2.2. **Results.**

The estimates suggest that potential growth varies greatly across MENAP and CCA countries (Figure 3). While estimates vary across techniques, the relative potential growth rates across countries and regions as well as the direction of their change over time are consistent across techniques.[10] The average of estimates across the statistical filters (HP and CF)[11] and production function approaches (described above) indicate that the economically less developed oil importers consistently have the lowest potential growth in the region – well below the EMDC average. In contrast, the oil exporters – particularly in the GCC and CCA – have among the world's highest non-oil potential growth, comparable to emerging and developing Asia. This mainly reflects the strong ties of the non-oil economy to oil revenues (via oil-financed government spending), where oil prices and demand have remained high in recent years.

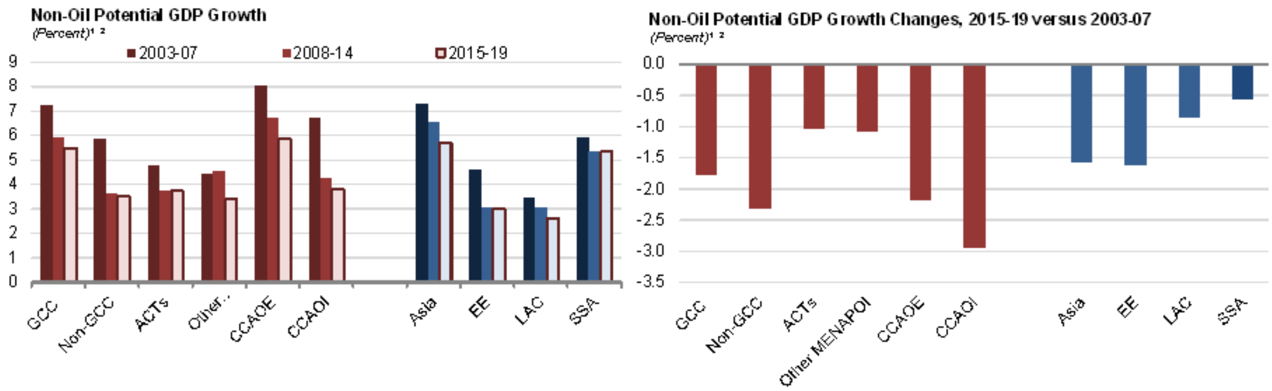
The global financial crisis led to a decline in potential growth in advanced and emerging economies. Prior to the crisis (during 2003-07), strong investor confidence led to the rapid creation of physical capital, innovation, and productivity growth across the world. As a result, EMDCs potential growth strengthened. The GCC and CCA oil exporters' non-oil potential growth exceeded 7 percent. The crisis sharply reversed these trends, and potential growth both in advanced and emerging economies declined after 2008, as is well documented in earlier studies (Cubeddu and others, 2014). However, few MENAP and CCA countries are covered in these studies.

MENAP and CCA potential growth rates are slowing by more than in other EMDCs (Figure 3) – a novel finding of this paper. The slowdown of potential growth is especially strong in the CCA oil importers (by 3 percentage points). This is possibly owing to their

[10]These estimates, applying a consistent approach across countries, are broadly consistent with individual IMF country team estimates.

[11]The BK approach is excluded here because its assumptions require a longer time series, and thus provides estimates over a shorter period than other approaches.

FIGURE 3. Non-Oil Potential GDP Growth

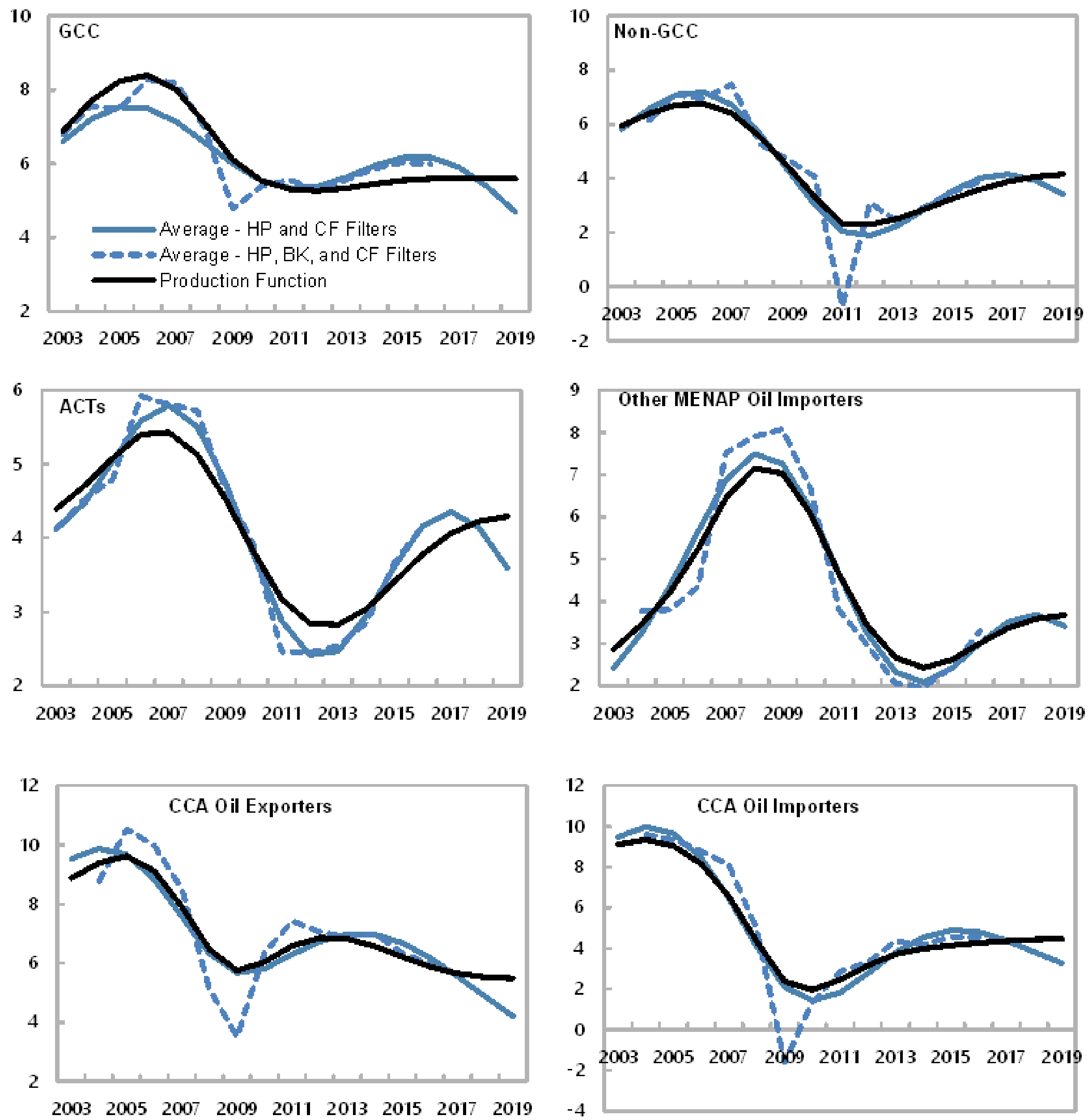


Sources: IMF, World Economic Outlook; Global Employment Trends; and IMF staff estimates.
[1]PPP-weighted GDP used to calculate regional averages.
[2]Average across HP and CF filters and production function estimates.
Note: GCC=Gulf Cooperation Council; ACTs=Arab Countries in Transition; CCAOE=Caucasus and Central Asia oil exporters; CCAOI=Caucasus and Central Asia oil

strong economic links with Russia, where the slowdown in potential growth was more pronounced owing to inadequate physical infrastructure, over reliance on commodities, a weak business climate, and negative demographics (Box 1.2 in the October 2013 World Economic Outlook). In the MENAP region (except the GCC), further loss of confidence in the aftermath of the Arab Spring in 2011 compounded the effect of the global financial crisis – leading to a sharp drop in potential growth just after 2010 (by almost 1 percentage point). In the GCC, non-oil potential growth is also expected to slow by over 1½ percentage points over the next five years – notwithstanding continued physical infrastructure investment financed by savings from past oil booms partially offsetting the erosion of non-oil potential. Overall, potential growth declines in the MENAP and CCA regions exceed the EMDC average by ¾ of a percentage point over the next five years.

These results are reinforced by a closer examination of individual years (Figure 4). On an annual basis, each approach can produce markedly different results. The BK filter provides the most extreme estimates. Results from this filter were not included in Figure 3 (above) because this approach provides estimates over a shorter period than the other statistical filters. At the other extreme, the production function approach provides the least variation in potential growth. Despite their differences, all approaches generally point to a peak in potential growth prior to the global financial crisis, followed by a decline

FIGURE 4. MENAP and CCA Potential Growth Estimates, 2003-19



Sources: IMF World Economic Outlook; Global Employment Trends; and IMF staff estimates.

in recent years. While in some cases potential growth is projected to improve slightly over the next five years, it still remains well below pre-crisis (and pre-Arab Spring) rates. For example, in the GCC, potential growth was at its strongest immediately before the global financial crisis. Since then, it dropped significantly with very limited improvements expected over the medium-term. In the ACTs, potential growth peaked a couple of years before the global financial crisis and remained broadly at that level through 2010. However, it dropped substantially in the wake of the Arab Spring as political instability, conflicts, security and infrastructure (especially electricity) challenges harm firms' production efficiency. And, over the next five years, it is projected to remain well-below its pre-crisis values. The decline in the CCA oil importers is also quite strong, reacting to the global financial crisis, possibly recent declines in Russia's potential growth – related to geopolitical tensions, – and a slowdown in reforms.

2.3. **Robustness Tests.**

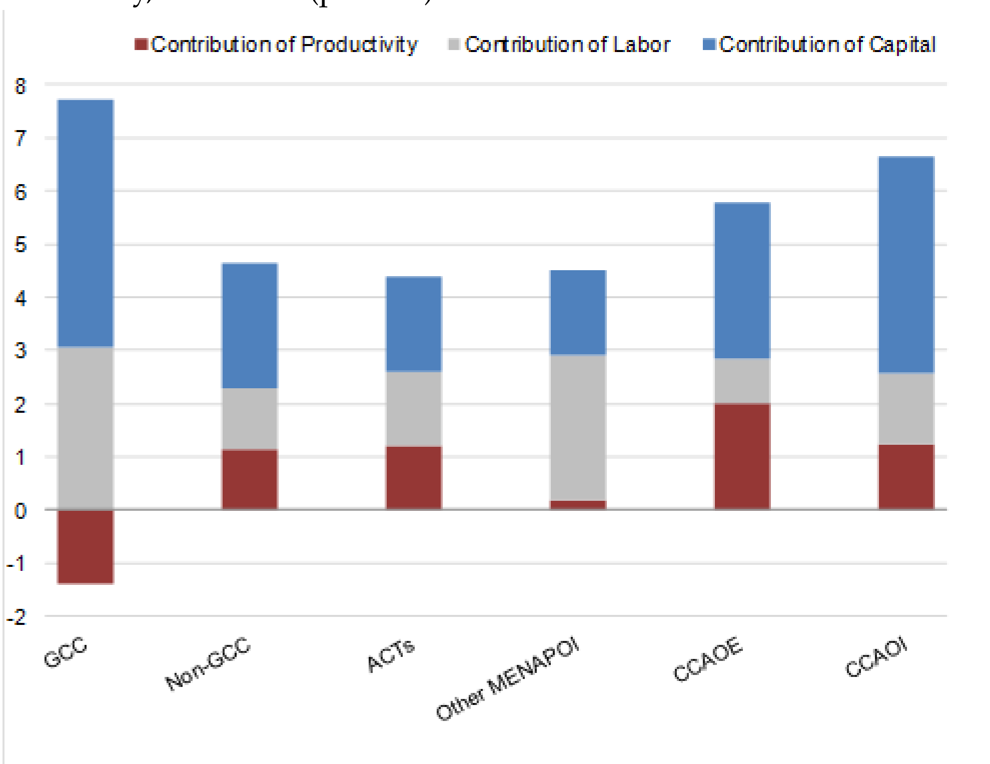
The sensitivity of the results is tested through several robustness checks (Appendix Tables 1 though 4). For the HP filter, different smoothing parameters are applied (baseline of 100 is varied to 200 and 6.25). Similarly, different band lengths are applied for the CF filter (baseline bands of 2 to 8 are varied from 3 to 7). For the production function approach, first, physical capital's share of output is varied from 0.2 to 0.5 for oil importers and 0.3 to 0.8 for oil exporters. Second, , the depreciation rate of physical capital is varied from 0.05 to 0.10. Third, different smoothing parameters and also the CF filter is applied to the variables underlying the production function approach. The main findings do not change significantly in any of the robustness tests performed.

3. Decomposing Potential Growth

A growth accounting exercise decomposes potential growth into its supply-side drivers – labor, physical capital, and TFP. The analysis applies the trend components of these drivers in the production function approach described in Section II above.

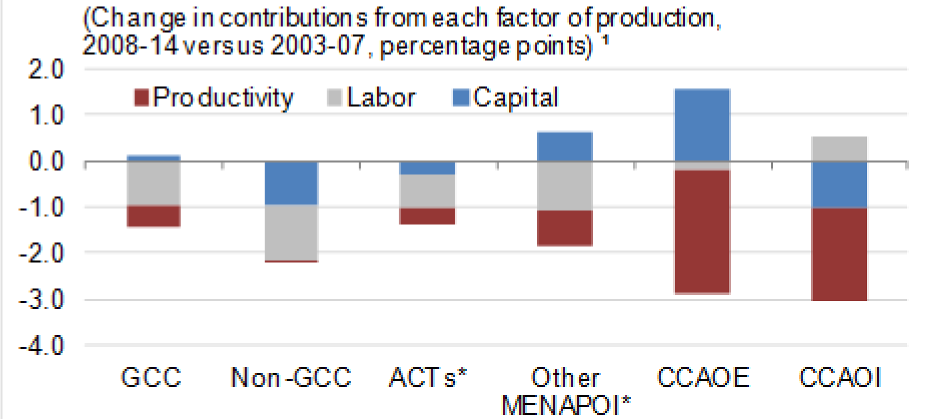
MENAP and CCA oil exporting economies are largely driven by physical capital accumulation (Figure 5). Over the past several years, high global oil prices and oil demand have spurred government spending, largely on new infrastructure – making physical capital the main driver of potential growth. Even during periods of lower oil export revenues, several of the region's oil exporters continued public infrastructure spending – supporting non-oil potential growth – by tapping into substantial savings (from past oil revenue booms). In the GCC, labor also contributes significantly to potential growth. Notably, these countries do not face constraints on low-skilled workers used to build infrastructure since many foreign workers are ready to work temporarily in the GCC. Given the abundance of physical capital and labor, less emphasis has been placed on developing TFP and as a result it negatively contributes to the GCC's potential growth. In contrast, CCA oil exporters' reform implementation has supported strong contributions from TFP to potential growth.

FIGURE 5. Potential Non-Oil GDP: Contributions of Capital, Labor, and Productivity, 2003-2014 (percent)



Oil importers' potential growth is shaped by a broad range of factors. Physical capital has been the major driver of growth in the CCA oil importers and played an important role in the MENAP oil importers – owing largely to high investor confidence prior to the global financial crisis and afterwards, government infrastructure investment. Labor is an equally important driver since these economies have access to many workers owing to fast growing populations – except in CCA economies where an aging population

FIGURE 6. Composition of Recent Non-Oil GDP Growth Slowdown



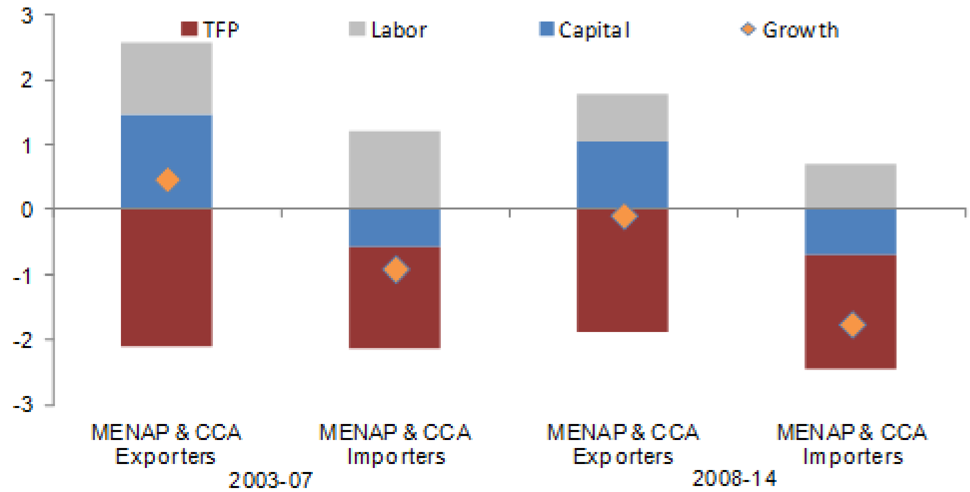
Sources: IMF, World Economic Outlook, UN ILO, national authorities, and IMF staff estimates.
¹Proportions of factors from production function decomposition applied to average potential growth estimates across methods.
*Compares contributions for each factor of production, 2011-14 less 2003-10.

presents a challenge. However, workers are sometimes disincentivized due to reliance on remittances from relatives working in the region's oil exporting economies and are not always equipped with the right skills for private sector jobs. Production of goods and services is also hampered by insufficient physical capital and weak TFP, which has the lowest contribution to potential growth in the MENAP and CCA oil importers.

Reasons behind recent declines in potential growth vary across the region (Figure 6). First, MENAP and CCA oil exporters' continued infrastructure creation drives non-oil potential growth. These benefits are increasingly offset by declining contributions of labor and productivity, in part, due to reliance on abundantly available low-skilled foreign workers, cheap energy, constraints on absorptive capacity, as well as potential weaknesses in the quality of public spending which may limit the growth impact of investment. (IMF 2013a). In some cases, relevant structural reforms have been initiated but will only bear fruit with long lags. In non-GCC MENAP oil exporters, lower public spending (given reduced oil export revenues after the global financial crisis and intensified conflicts) has lowered capital accumulation, employment, and potential growth.

And second, MENAP and CCA oil importers' outdated physical capital, inefficiency in using energy, capital, and talent, as well as weak global ties, inhibiting productivity that

FIGURE 7. Drivers of Differences in Non-Oil Potential Growth in EMDC (percentage points)



Sources: IMF, World Economic Outlook, UN ILO, national authorities, and IMF staff estimates.
[1] Average potential growth of MCD less that of EMDC average.

would result from adoption of the latest technologies, management techniques, and innovation already limit potential growth (see IMF Middle East and Central Asia Regional Economic Outlook, various issues). In the aftermath of the global financial crisis and the Arab Spring, strained public finances, political instability, conflicts, security and infrastructure challenges have lowered investor confidence. As a result, lower investment has led to reduced accumulation of physical capital and its contribution to potential growth. Cumbersome regulations, tax codes, and red tape tend to discourage TFP, whose decline has also weighed on potential growth in these countries. Many countries have recently initiated reforms to address these challenges but their resolution is frequently opposed by vested interests that have benefited from highly concentrated private firm ownership (World Bank, 2009). In MENAP oil importers, the workforce is young and not equipped with the skills needed for private sector jobs. Combined with the weak economic activity of recent years, this skills gap has raised unemployment so high as to discourage worker participation, lowering potential growth.

What has not varied, are the reasons behind MENAP and CCA potential growth lagging other EMDCs (Figure 7). Both before and after the global financial crisis, oil exporters' productivity contributions to non-oil potential growth, which are lower than in

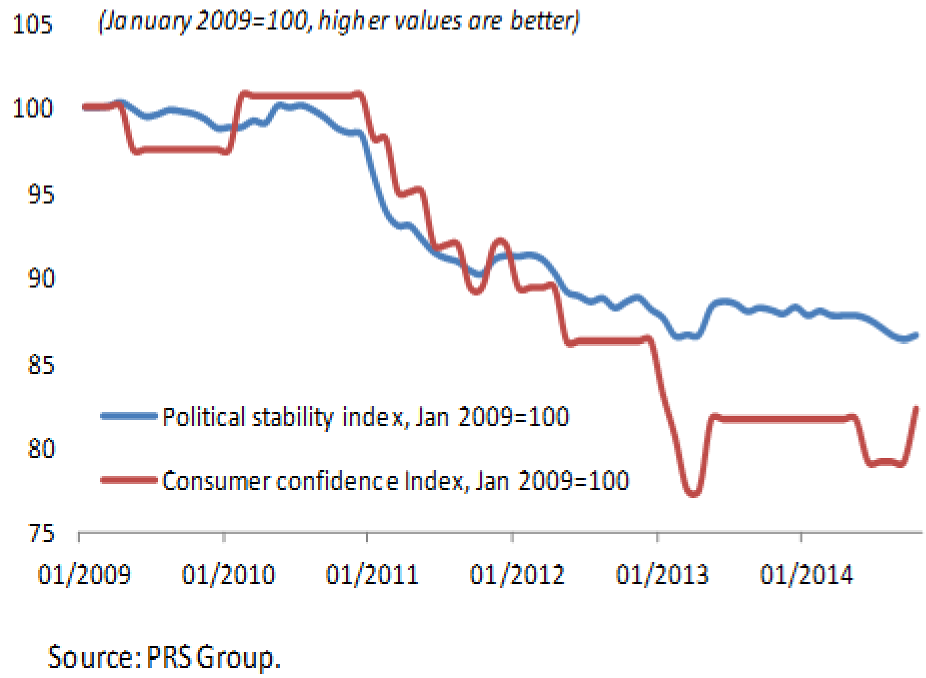
EMDCs, have been offset by larger physical capital and worker contributions. Oil importers' lower productivity has been compounded by lower contributions from physical capital than in EMDCs. These effects offset workers' positive contributions to potential growth, reflecting young populations and, in the GCC, high availability of low-skilled foreign workers.

4. Prospects For Raising Potential Growth

Looking ahead, significant gains in potential growth can be achieved by elevating the region's lagging TFP growth. Both before and after the global financial crisis, MENAP and CCA productivity has lagged other EMDCs. Yet, TFP growth carriers fewer constraints than other factors of production – making it critical to raising potential growth in both the region's oil exporters and importers. While a broad range of factors influence TFP growth, in the MENAP and CCA economies policymakers are likely to achieve the greatest improvements by focusing on worker talent, modernization of production methods, and re-orienting public sector roles to shift towards a more supportive rather than dominant role in the economy. Mitra, Hosny, Minasyan, Fischer, and Abajyan (2016) elaborate on these policies and their empirical derivation. In the MENAP region, achieving and maintaining political stability and security will provide an important backdrop for these reforms by fostering confidence (Figure 8). Similarly, in the CCA these reforms will help reverse the trend of slowing structural reforms (Figure 9) will provide a boost to confidence.

It can also be achieved by accelerating physical capital accumulation in the oil importers. In many of these countries, investment constrains potential growth – with investment-to-GDP ratios substantially lower than in other EMDCs. Addressing the challenge of outdated and insufficient physical capital will require serious investment efforts both by the government (e.g. physical infrastructure such as roads, electricity, etc.) and the private

FIGURE 8. MENAP Oil Importers: Political Stability and Consumer Confidence Indices



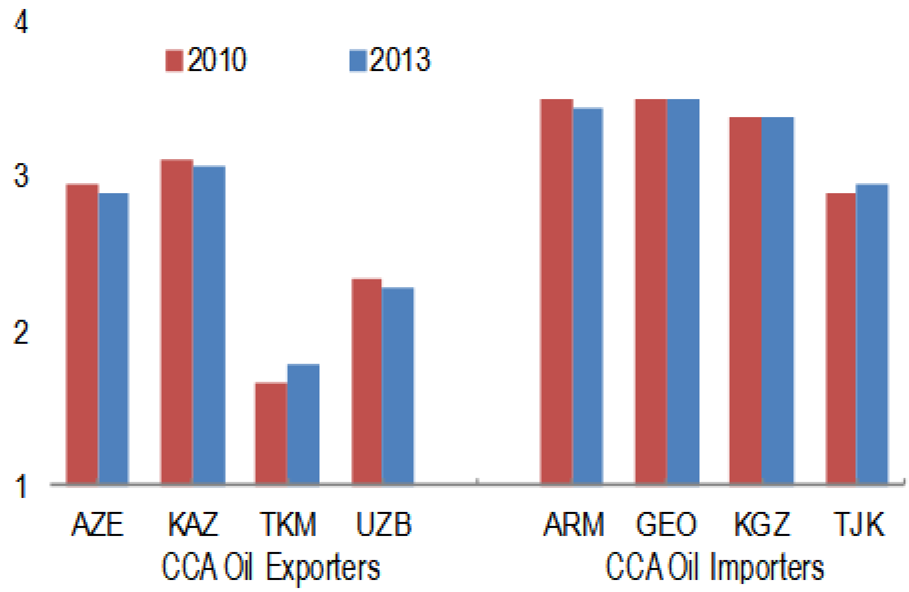
sector. Structural reforms, especially those that improve the business environment and financial market development, will be critical to supporting physical capital accumulation (Mitra, Hosny, Minasyan, Fischer, and Abajyan, 2016).

Prospects for an increase in the labor force sufficient to substantially boost medium-term potential growth are limited. The medium-term contribution of labor is restricted since even in countries with high population growth, plausible medium-term workforce growth is slow. In some CCA economies, this is compounded by an aging population, already low unemployment, and high male and female labor force participation rates. However, in the MENAP economies, over the long run, greater female labor force participation can significantly boost the labor force and its contribution to potential growth.

As an example, higher TFP growth and investment ratios can raise the region's potential growth to EMDC rates over the next five years. A wide range of plausible annual productivity growth and investment-to-GDP combinations – taking into account maximum plausible labor force growth – can accomplish this (Figure 10). For example, ACTs could reach average EMDC potential growth in five years with their current investment-to-GDP

FIGURE 9. CCA: Mixed Progress in Structural Reforms

(1 to 4+ scoring scale; higher is better)



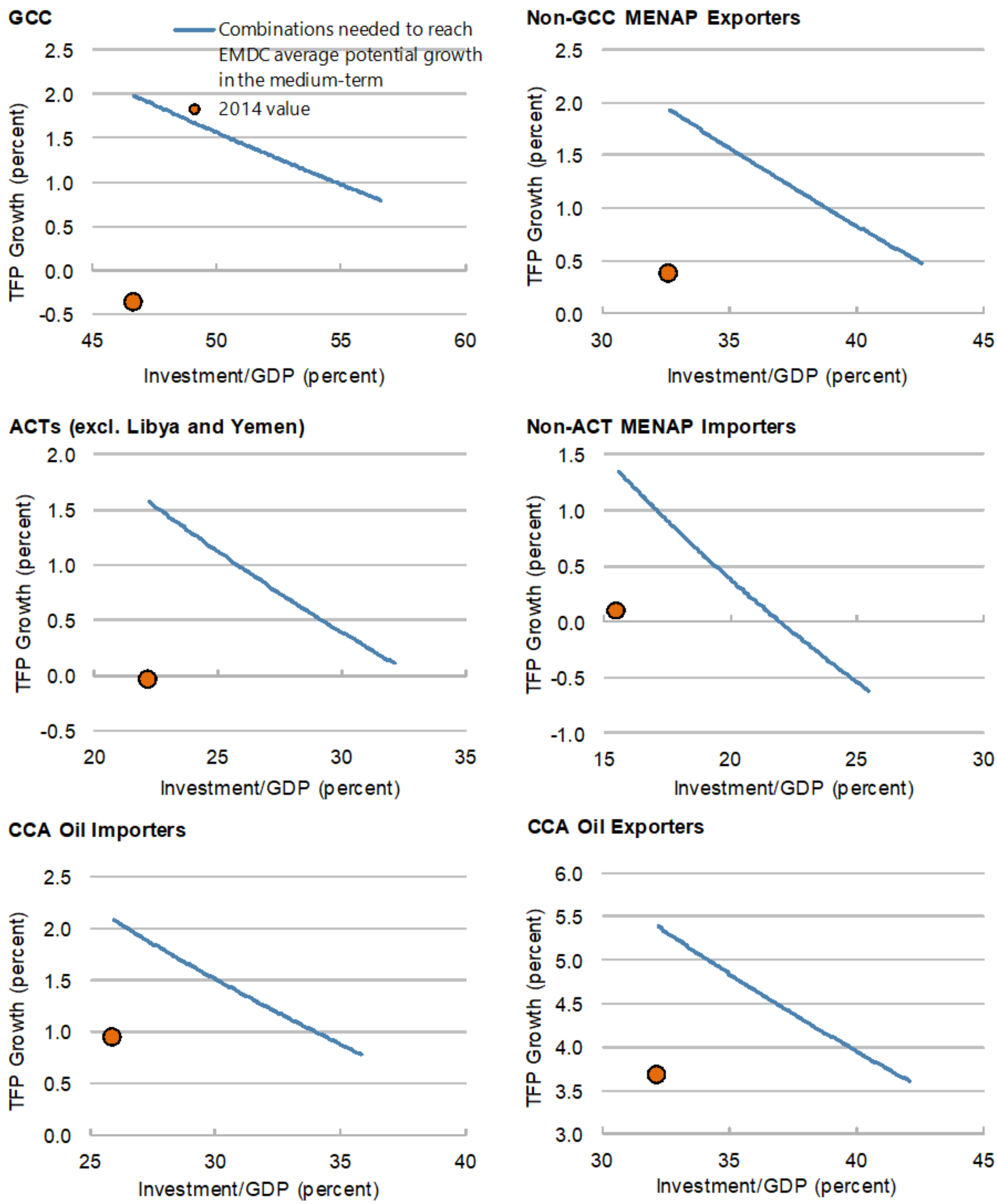
Sources: Calculations based on European Bank for Reconstruction and Development Transition Reports.

ratio (22 percent) combined with increasing annual productivity growth from zero to 1½ percent. However, even with this growth, their standard of living would only rise by one percentage point – remaining at two thirds of EMDC living standards. Over the longer term, much higher potential growth will be needed in the ACTs, as well as the rest of the region to significantly improve the majority of the populations' welfare. Simple estimates indicate that if ACTs sustained growth potential of 8 percent over the next 40 years, they would catch up to projected EMDC living standards.

5. CONCLUSIONS

This paper shows that the recent slowdown of MENAP and CCA potential growth rates exceeds that of most other EMDC regions. Over the next five years, the region's potential growth is estimated to be ¾ of a percentage point lower than in other EMDCs. Reasons behind this slowdown differ across the region. Lower TFP growth has driven the decline in the CCA. It has also contributed to the slowdown across MENAP although lower labor contributions have been the main driver of the slowdown in the rest of the

FIGURE 10. Raising Potential Growth: Annual TFP and Investment Combinations



Source: IMF World Economic Outlook; ILO Global Employment Trends; and IMF staff estimates.

region. Reduced capital contributions have also played an important role in the non-GCC MENAP oil exporters, the ACTs and CCA oil importers.

Possibilities for boosting future potential growth were also assessed and found to depend on raising TFP, and, in the oil importers, raising investment-to GDP ratios. Both before and after the global financial crisis, MENAP and CCA TFP growth has lagged other EMDCs. It explains most of the gap between the region's potential growth and that of EMDCs. Consequently, fostering TFP growth would remain a key challenge and priority for the MENAP and CCA region. Policies that focus on removing constraints to TFP growth could even bring potential growth to EMDC levels over the next several years. Oil importers could also benefit from raising their investment-to-GDP ratios.

References

[1] Anand, R., K. C. Cheng, S. Rehman, and L. Zhang (2014) "Potential Growth in Emerging Asia", IMF Working Paper No. 14/2. (Washington, D.C.: International Monetary Fund).

[2] Andrle, M. (2013) "What is in Your Output Gap? Unified Framework and Decomposition into Observables", IMF Working Paper No. 13/105. (Washington, D.C.: International Monetary Fund).

[3] Baxter, M., and R. G. King (1999) "Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series", Review of Economics and Statistics, 81 (4): pp. 575–593.

[4] Benes, J., K. Clinton, R. Garcia-Saltos, M. Johnson, D. Laxton, P. Manchev and T. Matheson (2010) "Estimating Potential Output with a Multivariate Filter", IMF Working Paper No. 10/285. (Washington, D.C.: International Monetary Fund).

[5] Beveridge, S. and C.R. Nelson (1981) "A New Approach to the Decomposition of Economic Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the Business Cycle", Journal of Monetary Economics 7 (2): pp. 151–174.

[6] Chen, V., A. Gupta, A. Therrien, G. Levanon, and B. V. Ark (2010) "Recent Productivity Developments in the World Economy: An Overview from the Conference Board Total Economy Database," International Productivity Monitor, 19 (Spring), pp. 3–19.

[7] Christiano, L. J. and T. J. Fitzgerald (2003) "The Band Pass Filter", International Economic Review 44 (2): pp. 435–465.

[8] Clark, P. K. (1987) "The Cyclical Component of U.S. Economic Activity", The Quarterly Journal of Economics 102 (4): pp. 797-814.

[9] Cubeddu, L., A. Culiuc, G. Fayad, Y. Gao, K. Kochhar, A. Kyobe, C. Oner, R. Perrelli, S. Sanya, E. Tsounta, and Z. Zhang (2014) "Emerging Markets in Transition: Growth Prospects and Challenges," IMF Staff Discussion Note 14/6. (Washington, D.C.: International Monetary Fund).

[10] El-Ganainy, A. and A. Weber (2010) "Estimates of the Output Gap in Armenia with Applications to Monetary and Fiscal Policy", IMF Working Paper No. 10/197. (Washington, D.C.: International Monetary Fund).

[11] Gollin, D. (2002) "Getting Income Shares Right," Journal of Political Economy, 110 (2): pp. 458–74.

[12] Harvey, A. C. (1985) "Trends and Cycles in Macroeconomic Time Series", Journal of Business and Economic Statistics 3 (3): pp. 216-227.

[13] Hodrick, R.J. and E.C. Prescott (1997) "Postwar U.S. Business Cycles: An Empirical Investigation", Journal of Money, Credit, and Banking 29 (1): pp. 1–16.

[14] IMF (2012) "Saudi Arabia: Selected Issues Paper", IMF Country Report No. 12/272. (Washington, D.C.: International Monetary Fund).

[15] IMF (2013a) "Labor Market Reforms to Boost Employment and Productivity in the GCC," Annual Meeting of the Gulf Cooperation Council Ministers of Finance and Central Bank Governors, Riyadh, October 5 (Washington).

[16] IMF (2013b) "Saudi Arabia: Selected Issues Paper", IMF Country Report No. 13/230. (Washington, D.C.: International Monetary Fund).

[17] IMF (2013c) "Republic of Armenia—Sixth Reviews Under the Extended Fund Facility Arrangement and the Extended Credit Facility Arrangement", EBS/13/75 (Washington, D.C.: International Monetary Fund).

[18] IMF (2013d) "Algeria: Selected Issues Paper", IMF Country Report No. 13/48. (Washington, D.C.: International Monetary Fund).

[19] IMF (2015) "World Economic Outlook, April 2015: A Survey by Staff of the International Monetary Fund", World Economic and Financial Surveys. (Washington, DC: International Monetary Fund).

[20] IMF (various issues) Middle East and Central Asia Regional Economic Outlook, (Washington, DC: International Monetary Fund).

[21] Mitra, P., A. Hosny, G. Minasyan, M. Fischer and G. Abajyan (2016): "Avoiding the New Mediocre? Policies to Strengthen Potential Growth in the Middle East and North Africa," IMF Staff Discussion Note (Washington, D.C.: International Monetary Fund).

[22] Morley, J., C. Nelson and E. Zivot (2003) "Why are the Beveridge-Nelson and Unobserved-Components Decompositions of GDP so Different?", Review of Economics and Statistics 85 (2): pp. 235-243.

[23] Ravn, M. O., and H. Uhlig (2002) "On adjusting the Hodrick–Prescott filter for the frequency of observations", Review of Economics and Statistics 84 (2) pp.: 371–376.

[24] Solow, R. M. (1957) "Technical Change and the Aggregate Production Function", Review of Economics and Statistics 39 (3): pp. 312–320.

[25] Sosa, S., E. Tsounta, and H. S. Kim (2013) "Is the Growth Momentum in Latin America Sustainable?" IMF Working Paper No. 13/109. (Washington, D.C.: International Monetary Fund).

[26] World Bank (2009) "From Privilege to Competition: Unlocking Private-Led Growth in the Middle East and North Africa", MENA Development Report. (Washington, D.C.: World Bank).

Appendix I. Methodology

As discussed earlier, this paper estimates potential growth using both statistical filters and the production function approach. Applying two different approaches increases the robustness of the results. Notably, the statistical filters rely only on the statistical properties of GDP. It does not impose any structural restrictions on potential growth. In contrast, the production function approach estimates the production capacity of an economy given its factor endowment and total productivity level.

A. Statistical Filters

The Hodrick-Prescott (HP) Filter

The HP filter is a simple statistical smoothing technique and is one of the most commonly used methods of estimating the potential output. As a high pass filter, it minimizes the difference between actual and potential output while constraining the rate of change in potential output for the whole sample of T observations. Hence, the HP filter minimizes the following:

$$min\sum_{t=1}^{T}\left(y_t-y_t^*\right)^2+\lambda\sum_{t=2}^{T-1}\left[\left(y_{t+1}^*-y_t^*\right)-\left(y_t^*-y_{t-1}^*\right)\right]^2$$

where y is the logarithm of real GDP and $y*$ is the logarithm of potential real GDP; λ is a weighting factor that determines the degree of smoothness of the trend. A low value of λ will produce potential output that follows actual output more closely. The standard procedure is to set λ equal to 1600 for quarterly data, and 6.25 for annual data, following the Ravn-Uhlig (2002) rule which sets λ to 1600*p^4, where p is the number of periods per quarter. T is the length of the time series.

Band Pass Filters

The band pass (BP) filter is based on the idea that business cycles can be defined as fluctuations of a certain frequency. Specifically, it is a linear filter that takes a two-sided weighted moving average of the data where cycles in a "band", given by a specified lower and upper bound, are passed through, and the remaining cycles are filtered out. Fluctuations with a higher frequency are considered as irregular or seasonal. Those with a lower frequency are associated with the trend. Medium frequency data components are described as the cyclical component or business cycles which are the main focus of this type of filtering. Given a judgment on the true frequency of the business cycle, the filter extracts frequencies within a specified frequency range from the underlying time series.

Two types of BP filters are applied in this paper: Christiano-Fitzgerald (CF) and Baxter-King (BK). Both approximate the ideal infinite BP filter assuming a cycle lasts from 1.5 to 8 years.

The CF filter is a full sample asymmetric filter, where the weights on the leads and lags are allowed to differ and are time-varying. Data have to be made stationary before applying this filter. The linear trend in real GDP is removed and we chose the band for business cycle as 8 to 32 quarters. This filter uses the whole time series for the calculation of each filtered data point and is designed to work better than the BK filter on a larger class of time series.

The BK filter is a fixed length symmetric filter with the advantage of no phase shifts in the resulting filtered series. The weights for lags and leads of the same length are the same and time-invariant. It passes through the components of time series with fluctuations between 6 and 32 quarters, removing higher and lower frequencies. The moving average weights depend on the band specification (not the data), 8 quarters in this case. This shortens the time series but choosing lower leads/lags results in poor approximation of the filter to the ideal high pass filter.

Data for All Statistical Filters

STATA is used to apply all the filters on real GDP in USD for oil importing countries and on non-oil real GDP in USD for oil exporting countries. The data ranges over 1991-2019 and are from the WEO database. Where data was unavailable from 1991, the earliest year of available data was used.

B. Production Function Approach

The production function approach describes the functional relationship between output and its factor inputs. It focuses on the supply potential of the economy and calculates potential output as the level of output given 'normal' rates of capacity utilization. The rate of capacity utilization is said to be normal when the labor and capital input is consistent with non-accelerating wages and inflation, and total factor productivity (TFP) is at its trend level.

The standard Cobb-Douglas form of the production function is applied:

$Y_t = A_t\, K_t^{\alpha}\, L_t^{1-\alpha}$,

where Y represents real GDP, K is the stock of capital, L is the labor force, and A represents TFP, all in time t; α is the share of capital in output.

The capital stock is constructed on the basis of the perpetual inventory method. Initial capital stock is measured as $K_0 = I_0\,(g+\delta)$, where I_0 is the initial investment expenditure, g is the growth rate of capital, and δ is capital's depreciation rate. The rest of the series is constructed as $K_t = (1+\gamma)\,K_{t-1} + I_t$.

The following steps are applied to estimate potential GDP:

(1) Obtain historical TFP with the formula: $A_t = \frac{Y_t}{K_t^{\alpha}\, L_t^{1-\alpha}}$

(2) Apply the HP filter to K, L, and A, which gives the trends of each variable.

(3) Derive potential growth by applying trend K, L, and A to the Cobb-Douglas production function.

(4) Calculate the growth rates of potential output.

Data for Production Function Approach

All variables span 1991-2019. Where data was unavailable from 1991, the earliest year of available data was used:

- Real GDP (for the oil importing countries) and non-oil real GDP (for the oil exporting countries) are converted to U.S. dollars using the period average exchange rate. All three of these variables are from the WEO database.
- The initial investment expenditure is approximated by gross fixed capital formation in 1991. The growth of capital is the average growth rate of gross fixed capital formation during 1991-2019. The capital depreciation rate is assumed to be 0.1.
- The employed labor force is used to represent the labor force (instead of the entire stock of labor available) to ensure that changes in the unemployment rate are

not reflected into changes in TFP. Employment series are sourced from the WEO database. When this data is not available (Lebanon, Qatar, and Yemen), ILO Global Employment Trends (GIT) databases were used for 1991-2018 and a 3-year moving average for 2019. Initial investment expenditure and gross fixed capital formation are from the WEO database. The share of capital is assumed to equal 0.50 for oil exporting countries, and 0.35 for oil importing countries.

TABLE 1. Robustness of Potential Growth Estimates (in percent): varying HP filter Assumptions

	Averages		
	2003-07	2008-14	2015-19
GCC			
HP filter baseline, lambda=100	7.8	5.7	5.6
HP filter, lambda=200	6.5	6.2	5.7
HP filter, lambda=6.25	7.8	5.7	5.6
Non-GCC			
HP filter baseline, lambda=100	6.4	3.3	3.8
HP filter, lambda=200	5.0	4.1	3.5
HP filter, lambda=6.25	6.4	3.3	3.8
ACTs			
HP filter baseline, lambda=100	5.0	3.6	4.0
HP filter, lambda=200	4.6	4.0	3.7
HP filter, lambda=6.25	5.0	3.6	4.0
Other MENAPOI (Code: NAMCDOI)			
HP filter baseline, lambda=100	4.4	4.8	3.2
HP filter, lambda=200	4.4	4.4	3.7
HP filter, lambda=6.25	4.4	4.8	3.2
CCAOE			
HP filter baseline, lambda=100	9.0	6.4	5.8
HP filter, lambda=200	7.0	6.9	6.4
HP filter, lambda=6.25	9.0	6.4	5.8
CCAOI			
HP filter baseline, lambda=100	8.4	3.1	4.3
HP filter, lambda=200	6.4	4.5	3.9
HP filter, lambda=6.25	8.4	3.1	4.3
Asia (Code: DEA)			
HP filter baseline, lambda=100	7.5	6.6	5.7
HP filter, lambda=200	6.9	6.6	6.1
HP filter, lambda=6.25	7.5	6.6	5.7
EE (Code: EME)			
HP filter baseline, lambda=100	4.9	2.9	3.2
HP filter, lambda=200	4.1	3.3	3.1
HP filter, lambda=6.25	4.9	2.9	3.2
LAC			
HP filter baseline, lambda=100	3.8	3.1	2.6
HP filter, lambda=200	3.1	3.1	2.8
HP filter, lambda=6.25	3.8	3.1	2.6
SSA			
HP filter baseline, lambda=100	6.3	5.2	5.6
HP filter, lambda=200	5.4	5.5	5.5
HP filter, lambda=6.25	6.3	5.2	5.6

TABLE 2. Robustness of Potential Growth Estimates (in percent): Varying CF filter Assumptions

	Averages		
	2003-07	2008-14	2015-19
GCC			
Baseline, CF band varies from 2 to 8	8.4	5.5	5.3
CF band varies from 3 to 7	8.1	5.6	5.4
Non-GCC			
Baseline, CF band varies from 2 to 8	6.9	3.0	3.8
CF band varies from 3 to 7	7.0	2.8	4.0
ACTs			
Baseline, CF band varies from 2 to 8	5.0	3.4	4.0
CF band varies from 3 to 7	5.0	3.4	4.1
Other MENAPOI			
Baseline, CF band varies from 2 to 8	4.6	4.7	3.2
CF band varies from 3 to 7	4.3	4.6	3.6
CCAOE			
Baseline, CF band varies from 2 to 8	9.2	6.4	5.2
CF band varies from 3 to 7	9.6	6.4	5.2
CCAOI			
Baseline, CF band varies from 2 to 8	9.2	2.7	4.1
CF band varies from 3 to 7	9.3	2.9	4.1
Asia			
Baseline, CF band varies from 2 to 8	7.9	6.5	5.2
CF band varies from 3 to 7	7.6	6.5	5.6
EE			
Baseline, CF band varies from 2 to 8	5.4	2.7	2.9
CF band varies from 3 to 7	5.3	2.8	3.0
LAC			
Baseline, CF band varies from 2 to 8	3.9	3.0	2.4
CF band varies from 3 to 7	4.0	3.1	2.5
SSA			
Baseline, CF band varies from 2 to 8	6.6	5.0	5.2
CF band varies from 3 to 7	6.3	5.0	5.4

TABLE 3. Robustness of Potential Growth Estimates (in percent): Varying Production Function Assumptions on Capital's Share of Output and its Depreciation Rate

	Averages		
	2003-07	2008-14	2015-19
GCC			
Baseline, alpha=0.50, delta=0.1	7.8	5.7	5.6
Alpha=0.3, delta=0.1	7.4	4.9	4.6
Alpha=0.8, delta=0.1	8.6	7.0	7.0
Alpha=0.5, delta=0.05	7.5	5.7	5.9
Alpha=0.5, delta=0.15	7.5	5.7	5.9
Non-GCC			
Baseline, alpha=0.50, delta=0.1	6.4	3.3	3.8
Alpha=0.3, delta=0.1	6.0	2.8	3.7
Alpha=0.8, delta=0.1	7.1	4.1	3.9
Alpha=0.5, delta=0.05	6.1	3.3	4.2
Alpha=0.5, delta=0.15	6.1	3.3	4.2
ACTs			
Baseline, alpha=0.35, delta=0.1	5.0	3.6	4.0
Alpha=0.2, delta=0.1	4.7	3.1	3.7
Alpha=0.5, delta=0.1	5.3	4.1	4.3
Alpha=0.35, delta=0.05	5.0	3.6	4.0
Alpha=0.35, delta=0.15	5.0	3.6	4.0
Other MENAPOI			
Baseline, alpha=0.35, delta=0.1	4.4	4.8	3.2
Alpha=0.2, delta=0.1	4.6	4.5	2.8
Alpha=0.5, delta=0.1	4.3	5.0	3.7
Alpha=0.35, delta=0.05	4.7	4.5	3.4
Alpha=0.35, delta=0.15	4.7	4.5	3.4
CCAOE			
Baseline, alpha=0.50, delta=0.1	9.0	6.4	5.8
Alpha=0.3, delta=0.1	8.0	5.3	4.9
Alpha=0.8, delta=0.1	10.5	8.1	7.0
Alpha=0.5, delta=0.05	8.3	6.4	6.2
Alpha=0.5, delta=0.15	8.3	6.4	6.2
CCAOI			
Baseline, alpha=0.35, delta=0.1	8.4	3.1	4.3
Alpha=0.2, delta=0.1	6.7	2.4	3.9
Alpha=0.5, delta=0.1	10.2	3.9	4.8
Alpha=0.35, delta=0.05	7.7	3.4	4.4
Alpha=0.35, delta=0.15	7.7	3.4	4.4
Asia			
Baseline, alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.1	7.5	6.6	5.7
Alpha is 0.2 for oil importers and 0.3 for oil exporters, delta=0.1	6.6	5.4	4.7
Alpha is 0.5 for oil importers and 0.8 for oil exporters, delta=0.1	8.5	7.7	6.7
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.05	7.5	6.5	5.8
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.15	7.5	6.5	5.8
EE			
Baseline, alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.1	4.9	2.9	3.2
Alpha is 0.2 for oil importers and 0.3 for oil exporters, delta=0.1	4.1	2.3	2.8
Alpha is 0.5 for oil importers and 0.8 for oil exporters, delta=0.1	5.8	3.4	3.6
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.05	4.8	2.9	3.3
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.15	4.8	2.9	3.3
LAC			
Baseline, alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.1	3.8	3.1	2.6
Alpha is 0.2 for oil importers and 0.3 for oil exporters, delta=0.1	3.5	2.7	2.1
Alpha is 0.5 for oil importers and 0.8 for oil exporters, delta=0.1	4.0	3.5	3.0
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.05	3.8	3.0	2.7
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.15	3.8	3.0	2.7
SSA			
Baseline, alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.1	6.3	5.2	5.6
Alpha is 0.2 for oil importers and 0.3 for oil exporters, delta=0.1	5.6	4.3	4.9
Alpha is 0.5 for oil importers and 0.8 for oil exporters, delta=0.1	7.1	6.3	6.4
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.05	6.1	5.1	5.8
Alpha is 0.35 for oil importers and 0.5 for oil exporters, delta=0.15	6.1	5.1	5.8

TABLE 4. Robustness of Potential Growth Estimates (in percent): Various Production Function Filters

	Averages		
	2003-07	2008-14	2015-19
GCC			
Baseline, HP λ=100	7.8	5.7	5.6
HP λ=200	6.5	6.2	5.7
HP λ=6.25	7.8	5.7	5.6
CF	0.0	0.0	0.0
Non-GCC			
Baseline, HP λ=100	6.4	3.3	3.8
HP λ=200	5.0	4.1	3.5
HP λ=6.25	6.4	3.3	3.8
CF	0.0	0.0	0.0
ACTs			
Baseline, HP λ=100	5.0	3.6	4.0
HP λ=200	4.6	4.0	3.7
HP λ=6.25	5.0	3.6	4.0
CF	0.0	0.0	0.0
Other MENAPOI			
Baseline, HP λ=100	4.4	4.8	3.2
HP λ=200	4.4	4.4	3.7
HP λ=6.25	4.4	4.8	3.2
CF	0.0	0.0	0.0
CCAOE			
Baseline, HP λ=100	9.0	6.4	5.8
HP λ=200	7.0	6.9	6.4
HP λ=6.25	9.0	6.4	5.8
CF	0.0	0.0	0.0
CCAOI			
Baseline, HP λ=100	8.4	3.1	4.3
HP λ=200	6.4	4.5	3.9
HP λ=6.25	8.4	3.1	4.3
CF	0.0	0.0	0.0
Asia			
Baseline, HP λ=100	7.5	6.6	5.7
HP λ=200	6.9	6.6	6.1
HP λ=6.25	7.5	6.6	5.7
CF	0.0	0.0	0.0
EE			
Baseline, HP λ=100	4.9	2.9	3.2
HP λ=200	4.1	3.3	3.1
HP λ=6.25	4.9	2.9	3.2
CF	0.0	0.0	0.0
LAC			
Baseline, HP λ=100	3.8	3.1	2.6
HP λ=200	3.1	3.1	2.8
HP λ=6.25	3.8	3.1	2.6
CF	0.0	0.0	0.0
SSA			
Baseline, HP λ=100	6.3	5.2	5.6
HP λ=200	5.4	5.5	5.5
HP λ=6.25	6.3	5.2	5.6
CF	0.0	0.0	0.0

1/ Alpha=0.50 for oil exporters, alpha =0.35 for oil importers, delta=0.1.