

Reconsidering the Nexus Between Knowledge and Economic Growth in An Unstable Economy: The Case of Türkiye

Fatma M. Utku-İsmihan and Mustafa İsmihan

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Acknowledgments: This paper partly originates and draws from each co-author's previous independent and unpublished studies: İsmihan (2012) and Utku-İsmihan (2016, Essay 2). However, this study is an original contribution to the related literature in terms of its aim, scope, model, and empirical findings. We are grateful to the participants of the ERF Annual Conference held in Rabat, Morocco (21-23 April 2024). We would like to especially thank Klaus Schmidt-Hebbel for his valuable comments.

Send correspondence to:

Mustafa İsmihan

Eastern Mediterranean University

mustafa.ismihan@emu.edu.tr

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Abstract

Building a strong knowledge-based economy is essential for sustained and successful long-run economic growth. However, this presents its own set of challenges, particularly for countries with endemic instability, recurrent crises, and associated low and volatile productivity and growth rates. In this context, this paper draws from the Turkish experience to investigate the role of macroeconomic instability and knowledge on productivity and growth from 1960 to 2022 by developing an augmented production function model. Chronic macroeconomic instability arising from unsound macroeconomic policies has remained a major factor causing persistent inefficiencies in Türkiye, therefore adversely affecting its productivity and output levels. Such economic policies are often associated with weak institutions—such as political institutions that fail to limit the actions of politicians—along with prevalent corruption and a significant level of political instability. The main empirical results indicate that while knowledge accumulation in Türkiye is a critical driver of productivity and growth, the Turkish economy is also persistently and unfavorably affected by chronic macroeconomic instability fueled by recurring unsound policies and deep institutional problems.

Keywords: Knowledge, Total factor productivity, Instability, Economic growth, Political economy, Institutions.

JEL Classifications: E60, O40, O47, O50.

ملخص

يعد بناء اقتصاد قوي قائم على المعرفة أمرًا ضروريًا للنمو الاقتصادي المطرد والناجح على المدى الطويل. ومع ذلك، فإن هذا يمثل مجموعة التحديات الخاصة به، لا سيما بالنسبة للبلدان التي تعاني من عدم الاستقرار المتوطن والأزمات المتكررة وما يرتبط بها من انخفاض وتقلب في الإنتاجية ومعدلات النمو. في هذا السياق، تستند هذه الورقة إلى التجربة التركية لدراسة دور عدم استقرار الاقتصاد الكلي والمعرفة بشأن الإنتاجية والنمو من عام 1960 إلى عام 2022 من خلال تطوير نموذج وظيفة الإنتاج المعزز. ولا يزال عدم استقرار الاقتصاد الكلي المزمن الناجم عن سياسات الاقتصاد الكلي غير السليمة عاملاً رئيسياً يسبب أوجه قصور مستمرة في توريكي، مما يؤثر سلباً على إنتاجيتها ومستويات ناتجها. غالباً ما ترتبط هذه السياسات الاقتصادية بمؤسسات ضعيفة - مثل المؤسسات السياسية التي تفشل في الحد من تصرفات السياسيين - إلى جانب الفساد السائد ومستوى كبير من عدم الاستقرار السياسي. وتشير النتائج التجريبية الرئيسية إلى أنه في حين أن تراكم المعارف في توريكي هو محرك حاسم للإنتاجية والنمو، فإن الاقتصاد التركي يتأثر أيضاً بصورة مستمرة وغير مواتية بعدم استقرار الاقتصاد الكلي المزمن الذي يغذيه تكرار السياسات غير السليمة والمشاكل المؤسسية العميقة.

1. Introduction

Until recently, a widely acknowledged fact in macroeconomics was that actual output fluctuates around a stable and rising level of trend output. However, following the pioneering study of Easterly et al. (1993), several studies on developing countries have found that, in reality, output drops were persistent and volatile (e.g., Hausmann et al., 2005; Berg et al., 2012). Cerra and Saxena (2008), for example, show that output drops tend to be persistent in the aftermath of crises. Moreover, Aguiar and Gopinath (2007) argue that “the cycle is the trend” for emerging market economies and claim that the frequent policy regime shifts, such as dramatic changes in fiscal and monetary policies, are responsible for the substantial volatility in output trends in emerging market economies.

In another strand of literature, particularly within the domain of endogenous growth models, the intensive empirical and theoretical research since the 1980s indicates that various pillars of knowledge (such as human capital, innovation, global linkages, and information and communication technologies (ICT)) have played a key role in the productivity and economic growth of countries (e.g., Lucas, 1988; Romer, 1994; Romer, 2019). The increasing automation in the production process of goods and services has increased the importance of “knowledge,” which has been growing at an accelerating pace compared to capital and labor. Thus, in this new era, the importance of knowledge and building a strong knowledge base for sustainable long-run economic growth performance has become a priority for the majority of countries globally. However, this is a very difficult task since it requires not only a solid base for building the necessary foundations for knowledge accumulation (such as human capital, ICT...etc.) but also necessitates a stable macroeconomic environment, especially in emerging and developing countries.

In the Turkish economy, endemic instability, recurrent crises, and associated low and volatile productivity and growth rates have been the dominant macroeconomic themes since its transition to a multi-party democracy in 1950. Many economists blamed the weaknesses in democracy and the prevalence of inequalities, particularly in the distribution of wealth and income, on the persistence of macroeconomic instabilities and the associated disappointments in growth and productivity performance in Türkiye over the long-term (e.g., Öniş, 1997; İsmihan, 2009, 2012).

Inspired by the Turkish experience, this paper investigates the relationship and the role of macroeconomic instability and knowledge on total factor productivity (TFP) over the period 1960-2022 using a production function approach. By developing an augmented production function model with knowledge accumulation, we also attempt to link short-run policy outcomes to long-run productivity measures by incorporating political economy factors such as sociopolitical and institutional issues.¹ This framework helps explain the substantial volatility in productivity and output trend in Türkiye during the period under consideration.

¹ See İsmihan (2012) for several theoretical arguments on relevant political economy factors.

This paper is organized as follows. Section 2 provides a brief literature review. Section 3 provides information on the common threads in the Turkish economy and the typical instability episodes. Section 4 introduces the model and provides the empirical results. Finally, section 5 concludes.

2. A brief literature review

As previously mentioned, this study investigates the role of macroeconomic instability and knowledge on the TFP and growth performance of Türkiye from 1960 to 2022. In addition to the role of knowledge accumulation, we attempt to incorporate short-run policy outcomes in our model. We do so by using a proper measure of the quality of macroeconomic performance to long-run productivity (TFP) measures by considering political economy factors. Thus, the foundation of our model is based on two different strands of literature: the relevant economic growth models (Section 2.1) and political economy factors (Section 2.2).

2.1. Economic growth models: a condensed overview

After the publication of the seminal study by Solow (1956), a widely held belief in macroeconomics was that actual output fluctuates around a stable and rising level of trend output, which is exogenously determined by technological progress. However, this belief in exogenous technological development was challenged during the 1980s with the emergence of the endogenous growth models led by Romer (1986) and Lucas (1988). For example, Romer (1990) argues that human capital was the most important factor of production in developed countries because it was the main input in research and development (R&D), which accelerated technological progress. Therefore, technological progress is available to countries that can afford to invest in human capital and R&D.² Later, other factors such as trade and public spending on infrastructure (e.g., ICT) were incorporated into the endogenous growth models.³

With the increasing use of advanced technologies during the production process, economists have tried to analyze the impact of knowledge factors (or pillars) on the economic growth performances of economies.⁴ For example, Chen and Dahlman (2004) identify an economic and institutional regime, an educated and skilled population, a dynamic information infrastructure, and an efficient innovation system as the four pillars of knowledge that transformed “knowledge” into an effective engine of growth. They argue that when these four pillars are strengthened, this increases the level of knowledge used in production and would, in turn, increase economic growth through its impact on TFP.

² See Romer (2019) for a recent review of the endogenous growth models and related empirical evidence.

³ See Barro (1990) and Grossman and Helpman (1989).

⁴ See Chen and Dahlman (2004) and Poorfaraj et al. (2011), who provide a comprehensive review of empirical evidence on the role of knowledge on economic growth at the international level.

2.2. The impact of instability on economic growth: reconsidering the political economy factors

Researchers following the seminal study of Easterly et al. (1993) investigate the reasons behind the distinct patterns of growth rates in developing countries and challenge the general view that output fluctuates around a stable and rising level of trend output.⁵ The new political economy literature suggests that the policy environment is the reason behind the persistent productivity and output drops in emerging market economies or developing countries.⁶ More specifically, the main policy-related issues are strategic debt accumulation, inefficient budget deficits and the war of attritions.⁷ Moreover, in related literature, it is argued that the persistence of unsound policies—i.e. myopic and populist macroeconomic policies—and associated macroeconomic instability in developing countries are the result of deeper sociopolitical instabilities and institutional weaknesses.

Some studies have shown that the demand for redistributive public spending, such as public wage and social transfer increases, is higher with increased income and wealth inequality.⁸ In countries with significant income disparities, governments are more motivated to implement populist policies that include redistributing public expenditure (Dornbusch and Edwards, 1990, 1991). Polarization in politics also influences public spending decisions since weaker governments often prioritize reducing public investment rather than current expenditure.⁹ Furthermore, Rodrik (1999) argues that social conflicts and weak political institutions are the main causes of growth collapses.

The presence of electoral uncertainty results in myopic or short-sighted policymakers who prioritize immediate gains above long-term benefits. High levels of political instability and polarization may lead to strategic political behavior and myopic policies, such as excessive debt accumulation, inefficiently high budget deficits, and low public investment (see Roubini and Sachs, 1989b; Persson and Tabellini, 2000). There is some evidence about the impact of political issues on budget deficits and inflation in developing countries (see İsmihan, 2009 for a review).

A related area of research in the new political economics literature examines the persistent nature of high budget deficits that occur following disputes over how the cost of fiscal adjustment should be shared among powerful interest groups or political parties in a coalition. Alesina and Drazen's (1991) "war of attrition" model emphasizes the significance of political fragmentation, which frequently results in higher levels of political instability and polarization that delay fiscal adjustment or stabilization (Veiga, 2000 provides empirical evidence).

⁵ See Hausmann et al. (2005) and Berg et al. (2011).

⁶ See İsmihan (2012) for a review.

⁷ See Drazen (2000), Persson and Tabellini (2000), İsmihan (2009), and Romer (2019) for a review.

⁸ For more details, see Alesina and Rodrik (1994) and Benabou (1996).

⁹ See Roubini and Sachs (1989a) for empirical evidence.

Against this backdrop, the prevalence of unsound policies and resultant macroeconomic instability may act as a “moderating” variable that could affect the strength of the relationship between knowledge capital (as well as physical capital) and growth of output. Macroeconomic instability may affect this relationship through different channels. In other words, it could adversely impact the rate of productivity and investment with uncertainty about the current and future macroeconomic environment. For example, by leading to a rise in the level of macroeconomic uncertainty and distorting information, an increase in inflation and its variability would adversely affect economic growth through various mechanisms (Fischer, 1993) (see İsmihan, 2009 for more details). Nevertheless, it is worth mentioning that “distortionary macroeconomic policies are more likely to be symptoms of underlying institutional problems rather than the main causes of economic volatility” (Acemoglu et al., 2003: 49-50).

3. A typical instability episode and the common threads in the Turkish experience

The economic history of Türkiye has been shaped by policymakers who opted for the easy way out by implementing myopic and populist policies over extended periods of time. As underlined in the new political economy literature, these unsound policies frequently emanate from attempts to alleviate deep sociopolitical instabilities rather than the technical mistakes of policymakers, and Türkiye’s experience is seemingly in line with the main predictions of this literature.¹⁰ Consequently, the chronic instability and recurring crises seem to be the endemic feature in the Turkish economy.

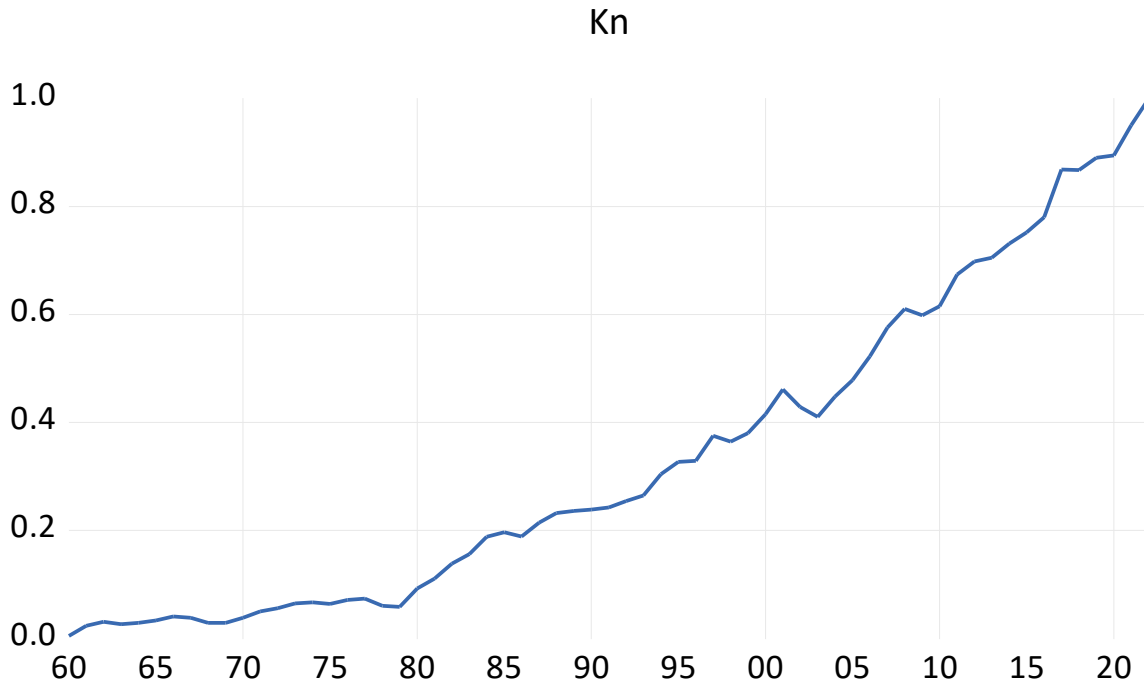
The recurring populist policies in Türkiye started in the 1950s with the Menderes era, which marks the switch to the multi-party democratic regime. In its essence, a multi-party system supposedly prevents a single party from controlling the system without a challenger. However, the ineffective management of the severe distributional conflicts led the political parties to be more interested in obtaining a greater share of the easily accessible state resources when in power. Populist and myopic policies mainly arise from the short-term aim of sustaining political power (via electoral support) and the lack of a powerful institutional system to regulate the actions of the leading parties. This has been the weakness of the Turkish democratic system from then on.

Even though knowledge accumulation in Türkiye is a critical driver of productivity and growth, the economy is persistently and unfavorably affected by chronic macroeconomic instability fueled by recurring unsound policies and the associated weakness of institutions. As evidenced by the upward tendency in the enhancement of knowledge in Figure 1, the advancement of knowledge helped promote economic growth in Türkiye. However, the endemic economic instability (see Figure 2) caused substantial volatility in productivity and output in Türkiye during the last six decades (see Figure 3).

¹⁰ See Öniş (2003) and İsmihan (2009) for a summary of the Turkish experience from the 1950s to the early 2000s.

The recurrent financial and economic crises, mainly arising from these unsound populist policies, have prevented Türkiye from achieving higher potential economic growth rates, especially from the 1970s onwards. Thus, it has become an important setback for the Turkish economy.

Figure 1. Time plot of knowledge accumulation in Türkiye, 1960-2022

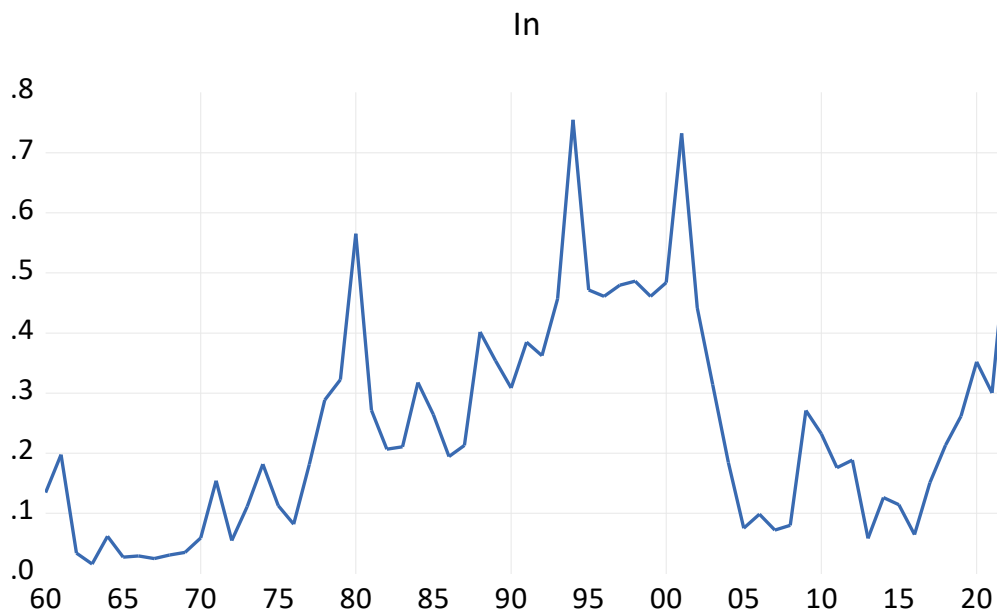


Note: See Section 4.1 for the definition and measurement of the Knowledge Index (Kn).

The fiscally irresponsible actions under myopic and populist macroeconomic policies have led to political instability, polarization, and chronic fiscal imbalances and high inflation, which, in turn, led to volatile and frequently falling trend rates of productivity and economic growth (see Figure 3).

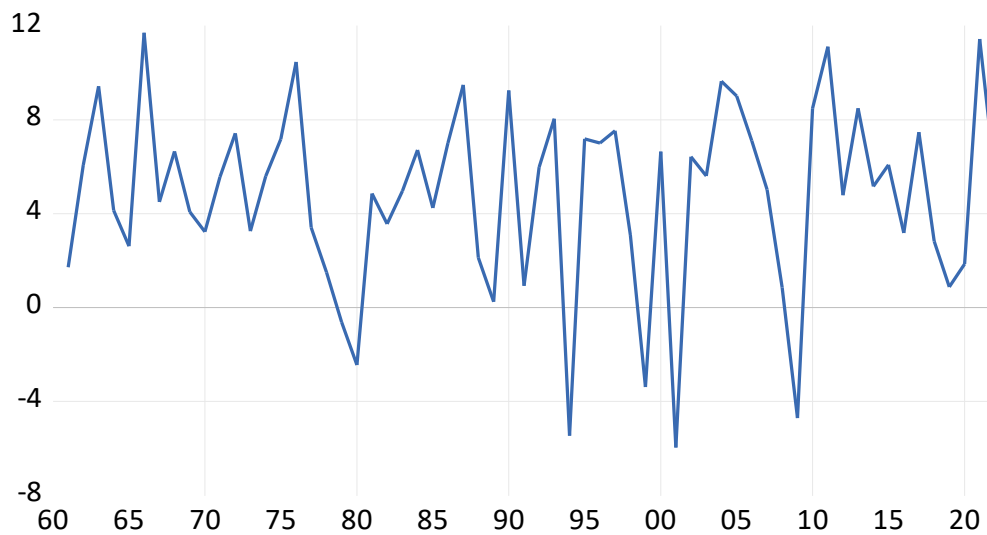
Following the major crises, several stabilization programs were entered into force with the aim of restoring stability in the economy. In general, most of these programs were abandoned or delayed after achieving temporary relief in the economy. This, in turn, led to a highly volatile, low, and frequently falling TFP in Türkiye (İsmihan, 2012).

Figure 2. Time plot of macroeconomic instability in Türkiye, 1960-2022



Note: See Section 4.1 for the definition and measurement of the macroeconomic instability index (In).

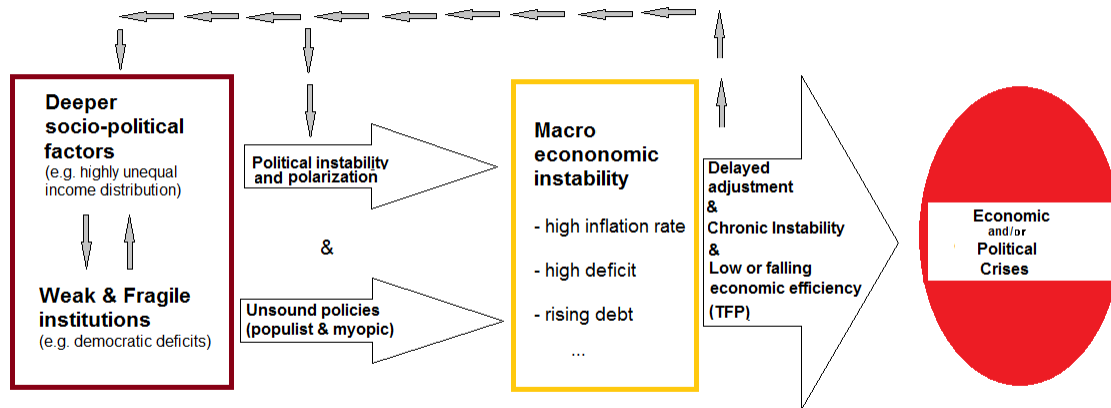
Figure 3. Time plot of growth rate in Türkiye, 1960-2022



To sum up, chronic macroeconomic instability arising from unsound macroeconomic policies has remained a major factor causing sustained inefficiencies in Türkiye (as well as in many developing nations), thereby adversely affecting its productivity and output levels. As succinctly explained by Acemoğlu et al. (2003), countries that adopt inadequate macroeconomic policies often have weak institutions, such as political institutions that fail to limit the actions of politicians and political elites, prevalent corruption, and a significant level of political instability.

Figure 4 illustrates a typical instability episode in many developing countries (including Türkiye) caused by political economy factors (see Section 2.2), especially deep institutional factors.

Figure 4. Visual presentation of a typical instability episode



Source: İsmihan (2012).

However, it is important to note that especially as the post-2001 (specifically 2002-06) period has demonstrated, the Turkish economy is as responsive to committed stabilization periods¹¹ as it is to myopic and populist policies.

4. The model and empirical results

4.1. The model and the data

As noted earlier, we attempt to investigate the impact of macro instability and knowledge on TFP and economic growth over the 1960-2022 period in Türkiye by using a production function approach. Therefore, by following the related literature, we initially consider the following standard Cobb-Douglas production function:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \quad (1)$$

where Y is the level of aggregate output, K is the level of the capital stock, L is the level of employment, A is TFP, and t is time. In line with the literature, constant returns to scale are imposed on Equation 1.

In our model, we closely follow Weil (2013)¹² and specify the TFP as:

¹¹ After committing to the implementation of the 2001 stabilization program (based on fiscal adjustment), the growth rates of productivity and output in Türkiye (see Figure 3) quickly rebounded via efficiency gains obtained from the fall in macro instability (see Figure 2).

$$A_t = \varphi K_n^\theta In_t^\gamma \quad (2)$$

where K_n represents the level of knowledge and In represents the level of macroeconomic instability (both can be measured as a composite variable or index, as explained below).

In line with Weil (2013), two factors determine TFP in our model: technology (proxied with K_n) and efficiency (proxied with In).¹³ In the case of many industrial countries, incorporating a composite knowledge indicator into Equation 2 by itself would be enough to analyze the impact of knowledge on economic growth performances. However, when considering countries with recurring and endemic macroeconomic instability such as Türkiye, we need to include another important factor, which is *inefficiency* that affects *the strength* of the relationship between knowledge (as well as capital) accumulation and economic growth. For instance, as noted earlier, macroeconomic instability may adversely affect the rate of productivity by creating uncertainty about the current and future macroeconomic environment. Therefore, it is not an exaggeration to say that persistent macroeconomic instability continues to be the main contributor to efficiency losses (and, consequently, low TFP) and low output in many emerging countries. Considering all this, we also include the macroeconomic instability index (In) in the formulation of TFP. In doing so, within our simple model of TFP, we link short-run policy outcomes with a measure of the quality of macroeconomic performance (In) to long-run productivity measure (TFP) by considering political economy factors such as sociopolitical and institutional issues, as noted above (see Sections 2.2 and 3). Consequently, we attempt to measure the quality of macroeconomic performance and hence the quality of institutions with a composite macroeconomic instability indicator (In). We are inspired by a remarkable point noted in Acemoglu et al. (2003: 49-50): “Distortionary macroeconomic policies are more likely to be symptoms of underlying institutional problems” in considering (In) the summary measure of the quality of institutions.

There are two reasons for using indices, such as the Knowledge Index (Utku-İsmihan, 2016), for measuring the impact of the variables contained in Equation 2. First, to prevent the potential problem of multi-collinearity in the empirical analyses since the indicators of knowledge (as well as the indicators of macro instability) are highly correlated. Second, an index provides a single and comprehensive measure on (in our case) the “level” of knowledge in the economy, which incorporates multi-dimensional facets, as explained earlier.

¹² According to leading economists such as Hulten (2001) and Bosworth and Collins (2003), TFP is *more than* technological development. Instead, TFP “provides a measure of gains [or losses] in economic efficiency ... which can be thought of as shifts in the production function. But such shifts reflect myriad determinants, in addition to technological innovation, that influence growth but that the measured increases in measured inputs do not account for. Examples include the implications of sustained political turmoil, external shocks, changes in government policy, institutional changes or measurement errors” (Bosworth and Collins, 2003:115). Therefore, our specification is also in line with the views of Hulten (2001) and Bosworth and Collins (2003).

¹³ According to Weil (2013: 289), a “natural way to think about [TFP] relationship in mathematical terms is that technology and efficiency are multiplied to determine productivity [TFP]” and “*technology* ... represents the knowledge about how factors of production can be combined to produce output, and *efficiency* ... measures how effectively given technology and factors of production are actually used.”

The knowledge index (Kn) is composed of four important indicators of knowledge: human capital, R&D, ICTs, and trade (see Utku-İsmihan, 2016 for more details). The macroeconomic instability index (In) is based on four macroeconomic instability indicators: public deficit to GDP ratio, inflation rate, change in the current account balance to GDP ratio, and change in exchange rate.¹⁴

When we insert Equation 2 into Equation 1 and take the natural log (ln) after re-arrangement, we obtain:

$$\ln\left(\frac{Y}{L}\right)_t = \phi^* + \theta \ln Kn_t + \gamma \ln In_t + \alpha \ln\left(\frac{K}{L}\right)_t \quad (3)$$

where Y/L (=y) is the output per labor, K/L (=k) is the physical capital per labor and the remaining variables are defined as earlier [$\phi^* = \ln \phi$].

In our simple framework, this equation can be considered an augmented Cobb-Douglas production function; hence, it represents the determinants of the long-run path of Lny. In other words, Equation 3 represents the long-run relationship between Lny, Lnk, LnIn, and LnKn. Thus, the following empirical (stochastic) log-linear model (as well as its dynamic version) will be used in empirical applications:

$$\ln\left(\frac{Y}{L}\right)_t = \phi^* + \theta \ln Kn_t + \gamma \ln In_t + \alpha \ln\left(\frac{K}{L}\right)_t + \varepsilon_t \quad (4)$$

ε is the disturbance term and all other variables are as defined earlier.

In sum, the two main variables of interest are *LnKn* and *LnIn*. In line with the aforementioned theoretical arguments, a positive sign for the parameter of *LnKn* ($\theta > 0$) is expected since an increase in the level of knowledge induces growth in TFP. Similarly, considering the detrimental effect of macroeconomic instability (via creating uncertainty) on TFP and economic growth, we expect a negative sign for the parameter of *LnIn* ($\gamma < 0$). As noted earlier, the macroeconomic instability index (In) measures the quality of macroeconomic performance as well as the quality of institutions. Therefore, in our model, *LnIn* acts as a moderating variable, which influences the strength of the relationship between economic growth, knowledge, and capital accumulation in our framework. In doing so, this framework sheds light on the dynamics behind the substantial volatility in productivity (and, hence, output) in Türkiye during the last six decades.

In the following subsection, we use a cointegration analysis for investigating the long-run dynamic empirical relationship between knowledge, macroeconomic instability, and output

¹⁴ The macroeconomic instability index (In) was developed by İsmihan (2009, 2012). This index (and Kn) is calculated by using human development index (HDI) methodology and is based on four macroeconomic instability indicators: public deficit to GDP ratio, inflation rate, change in the current account balance to GDP ratio, and change in exchange rate. For more details, see İsmihan (2012).

per worker. Considering the possibility of the mix of I(0) and I(1) variables, we estimate the dynamic version of the above model (equation (4)) with the ARDL technique.

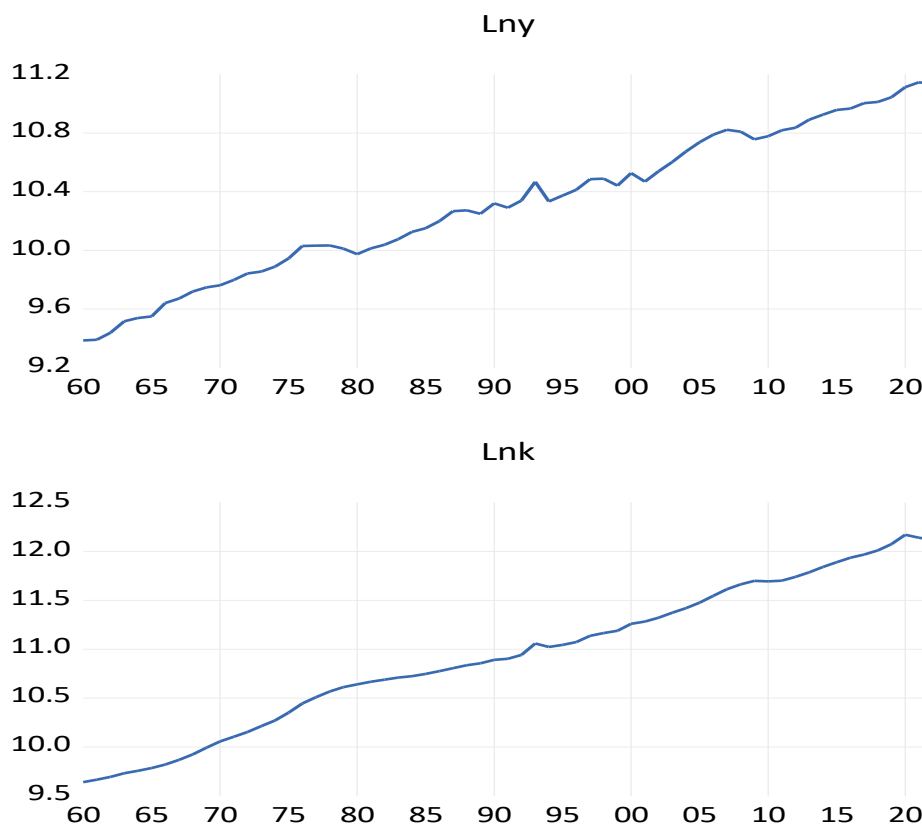
Finally, it should be noted that the data availability determined the source of data used in the analysis¹⁵ and we updated the series of Y (output, real GDP, in constant TL), K (physical capital in constant TL), and L (employment) from İsmihan (2012) by using recent data from the Turkish Statistical Institute (TurkStat). Similarly, we update In and Kn using relevant data from the World Development Indicators (WDI) and TurkStat.¹⁶

4.2. Empirical results

Before proceeding with the estimation of our model with the yearly time series data from 1960 to 2022, it is essential to check for the presence of a unit root.

Figure 5 provides the time plots of $\text{Ln}y$ [$=\ln(Y/L)$] and $\text{Ln}k$ [$=\ln(K/L)$] (see Figures 1 and 3 for the time plots of Kn and In), and there is some visual evidence of non-stationarity in each series. Nevertheless, the formal results of the ADF tests indicate a mix case: some variables ($\text{Ln}k$ and LnIn) contain a unit root [I(1)] and others ($\text{Ln}y$ and LnKn) are I(0) (see Table 1).

Figure 5. Time Plot of $\text{Ln}y$ and $\text{Ln}k$, 1960-2022



¹⁵ We initially planned to use PWT data in our analysis but since the latest version of PWT ended in 2019, we used other data sources to have a more comprehensive data set.

¹⁶ See İsmihan (2012) and Utku-İsmihan (2016) and the references and procedures cited therein for more detail.

Table 1. ADF Tests

Variables	ADF Tests		
	Without Trend	Level	First Difference
		With Trend	Without Trend
Ln y_t	-0.880544 (0) ^a [0.7881] ^b	-3.809060 (0) [0.0225]	-9.242929 (0) [0.0000]
Ln k_t	-1.006189 (0) [0.7460]	-1.481732 (0) [0.8254]	-5.819385 (0) [0.0000]
Ln Kn_t	-3.509883 (0) [0.0109]	-7.207693 (0) [0.0000]	-13.92258 (0) [0.0000]
Ln In_t	-2.307071 (0) [0.1730]	----- ^c	-9.209108 (1) [0.0000]

Note: ^a The optimal lag chosen by SBC (Schwarz Bayesian Criterion) are given in parentheses. ^b p-values are provided in square brackets. ^c Since Ln(In) does not have an apparent trend, we did not include the trend term in ADF tests.

We use a cointegration analysis for investigating the long-run dynamic empirical relationship between knowledge, macroeconomic instability, and output per worker. However, considering the possibility of the mix of I(0) and I(1) variables noted above, we estimate our model (Equation 4) with the ARDL technique (the ARDL Bounds Test confirms the existence of cointegration relation).¹⁷ The following equation provides the long-run estimates for the specified model:

$$\text{Ln}y_t = 6.239 + 0.391 \text{Ln}k_t - 0.061 \text{Ln}In_t + 0.182 \text{Ln}Kn_t \quad (5)$$

[0.001] [0.005] [0.015]

Note: p-values are provided in square brackets.

Equation 5 demonstrates that the increase in knowledge has a positive and considerable impact on output per worker in Türkiye during the period 1960-2022. However, it also indicates that macroeconomic instability has a negative effect on output per worker during the same period. These results are consistent with the theoretical expectations and the observed patterns in the Turkish economy during the analyzed time period. Hence, as mentioned when formulating the TFP, we link short-run macroeconomic policy outcomes and the associated deep institutional problems (proxied with the macroeconomic instability index) to long-run productivity measures (TFP). These results help explain the substantial volatility in productivity and output trends in Türkiye during this period by considering the aforementioned political economy factors. Our findings are consistent with the view that unsound or distortionary macroeconomic policies should be considered “the symptoms of underlying institutional problems” (see Acemoglu et al., 2003).

¹⁷ The ARDL Bounds Test verifies the existence of a cointegration between the variables of interest at a significance level of one percent. The selected model is ARDL (1, 2, 0) based on the Schwarz Information Criterion (SIC). Additionally, it is important to mention that we incorporate a dummy variable to account for the COVID-19 pandemic. The diagnostic tests conducted indicate no significant statistical issues. However, when the dummy variable is removed, some diagnostic tests, such as the White and JB tests, indicate the presence of heteroscedasticity and non-normality of residuals, respectively. The ARDL Bounds Test verified the presence of a cointegration relation when the COVID-19 (dummy) variable was excluded, and the parameter estimates closely related to those previously reported. The ARDL Bounds Test also confirms the presence of a cointegration relation between the variables of interest for the period from 1960 to 2019. Additionally, the diagnostic tests conducted during the re-estimation of the model for the period 1960-2019 shows no statistical problems.

5. Conclusion and policy implications

This paper analyzes the impact of macroeconomic instability and knowledge on TFP and economic growth over the 1960-2022 period. In our analysis, we use a production function approach and utilize a knowledge index to assess the influence of different aspects of knowledge on the productivity and overall growth of the economy. Furthermore, since policy-induced macroeconomic instabilities may adversely affect the rate of productivity by creating efficiency losses via uncertainty about the macroeconomic environment, we also incorporate a macroeconomic instability index into the TFP specification. By doing so, we measure the quality of macroeconomic performance as well as the quality of institutions with a composite or summary measure of macroeconomic instability.

Moreover, we use a co-integration analysis to examine the long-run dynamic empirical relationship between the variables of interest in Türkiye from 1960 to 2022. The empirical findings indicate that the higher level of knowledge had a positive impact on the growth rate of the Turkish economy over the sample period. Nevertheless, the persistent instability, populist cycles, and resultant crises and regime changes have caused unfavorable effects on economic growth in Türkiye. Thus, it is necessary to establish an economic environment that fosters the advancement of knowledge and consequently promotes economic growth.

The primary empirical finding of our study is that the government can hinder and at the same time support economic growth efforts. It can hinder such efforts through the negative impact of policy-induced macroeconomic instability and associated institutional problems, while it can support them through the positive impact of knowledge accumulation. Thus, it can be said that our study is a counter-example against the widely disputed argument of the “government as *the problem*” vs “government as *the solution*” dichotomy in our profession. In other words, the government can be both the source and the remedy of slow or negative productivity growth. With carefully designed policies and institutions, *solution-creating* factors could outweigh *the problem-creating* factors in the long run.

References

- Acemoglu, A., Johnson, S., Robinson, J. and Thaicharoen, Y. (2003). Institutional Causes, Macroeconomic Symptoms: Volatility, Crises and Growth, *Journal of Monetary Economics*, 50(1), 49-123.
- Aguiar, M. and Gopinath G. (2007). Emerging Market Business Cycles: The Cycle is the Trend, *Journal of Political Economy*, 115(1), pp. 69-102.
- Alesina, A. and Drazen, A. (1991). Why are Stabilizations Delayed? *American Economic Review*, 81(5), pp. 1170-1188.
- Alesina, A. and Rodrik, D. (1994). Distributive Politics and Economic Growth, *Quarterly Journal of Economics*, 109, pp. 465-90.
- Barro, R. (1990). Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economy*, October, Part II, 98 (5), pp. 103-125.
- Benabou, R. (1996). Inequality and Growth, *NBER Macroeconomics Annual 1996*, pp. 11-92, NBER, London: MIT Press.
- Berg, A., Ostry, J., and Zettelmeyer, J. (2012). What Makes Growth Sustained? *Journal of development Economics*, 98(2), pp.149-166.
- Bosworth B. and Collins, S. M. (2003). The Empirics of Growth: An Update, *Brookings Papers on Economic Analysis*, 2, pp.113-206.
- Cerra, V. and Saxena, S. (2008). Growth Dynamics: The Myth of Economic Recovery, *American Economic Review*, 98(1), pp. 439-57.
- Chen, D. and Dahlman C. (2004). Knowledge and Development: A Cross-Section Approach, *World Bank Research Working Paper 3366*, August 2004.
- Dornbusch, R. and Edwards, S. (1990). Macroeconomic Populism, *Journal of Development Economics*, 32, pp. 242-278.
- Dornbusch, R. and Edwards, S. (Ed.) (1991). *The Macroeconomic Populism in Latin America*, Chicago: The University of Chicago.
- Drazen, A. (2000). *Political Economy in Macroeconomics*, N.J.: Princeton University Press.
- Easterly, W., Kremer, M., Pritchett, L., Summers, L. (1993). Good Policy or Good Luck? Country Growth Performance and Temporary Shocks. *Journal of Monetary Economics*, 32, 459-483.
- Fischer, S. (1993). The Role of Macroeconomic Factors in Growth, *Journal of Monetary Economics*, 32(3), pp. 485-512.
- Grossman, G. and Helpman, E. (1989). Product Development and International Trade, *Journal of Political Economy*, 97, pp.1261-1283.
- Hausmann, R., Prichett, L., Rodrik, D. (2005). Growth Accelerations. *Journal of Economic Growth*, 10, 303-329.
- Hulten, R. (2001). Total Factor Productivity: A Short Biography, in Hulten C. R., Dean, E. R., and Harper, M. J., *New Developments in Productivity Analysis*, University of Chicago Press.
- İsmihan, M. (2009). *The Role of Politics and Instability in Macroeconomic Performance: Theory and Lessons from the Turkish Experience*. VDM Verlag Dr. Muller, Saarbrücken, Germany.

- İsmihan, M., (2012). The Political Economy of Productivity Collapses and Accelerations: The Turkish Experience, 1950-2010, presented at the International Conference on Economics organized by Turkish Economic Association [ICE-TEA 2012], 1-3 November 2012, İzmir, Türkiye.
- Lucas, R. E. Jr. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22, 3-42.
- Öniş, Z. (1997). Democracy, Populism and Chronic Inflation in Turkey: The Post Liberalization Experience, *Yapi Kredi Economic Review*, 8(1), pp. 33-50.
- Öniş, Z. (2003). Domestic Politics versus Global Dynamics: Towards a Political Economy of the 2000 and 2001 Financial Crises in Turkey, *Turkish Studies*, 4 (2), pp. 1-30.
- Persson, T. and Tabellini G. (2000). *Political Economics: Explaining Economic Policy*, The MIT Press.
- Poorfaraj, A., Samimi, A. and Keshavarz, H. (2011). Knowledge and Economic Growth: Evidence from Some Developing Countries, *Journal of Education and Vocational Research*, 1(1), pp. 21-25.
- Rodrik, D. (1999). Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses, *Journal of Economic Growth*, 4, pp. 385-412.
- Romer, D. (2019). *Advanced Macroeconomics*, 5th ed., New York: McGraw Hill Publishers.
- Romer, P. (1994). The Origins of Endogenous Growth, *The Journal of Economic Perspectives*, Winter, 8(1), 3-22.
- Romer, P. (1986). Increasing Returns and Long-Run Growth, *Journal of Political Economy*, 94, 1002-1037.
- Roubini, N. and Sachs, J. (1989a). Government Spending and Budget Deficits in the Industrial Countries, *Economic Policy*, 8, pp. 99-132.
- Roubini, N. and Sachs, J. (1989b). Political and Economic Determinants of Budget Deficits in the Industrial Democracies, *European Economic Review*, 33, pp. 903-933.
- Solow, R. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*, 50, 65-94.
- Utku-İsmihan, F. (2016). *Essays on the Impact of Knowledge on Economic Growth*, Ph.D. Dissertation, Science and Technology Policy Studies, Middle East Technical University. Published by Lambert Academic Publishing in 2024.
- Veiga, F. (2000). Delays of Inflation Stabilizations, *Economics and Politics*, 12(3), pp.275-295.
- Weil, D. (2013). *Economic Growth*. 3rd Edition, Pearson.