Prague Economic Papers
2024, Volume 33, Issue 3
https://doi.org/10.18267/j.pep.858

VŠE / PRAGUE UNIVERSITY OF ECONOMICS AND BUSINESS

Budgetary policy and Macroeconomic resilience in Morocco: Assessment and Impact

Oussama Ritahi, Abdellah Echaoui

University Mohammed V- Souissi, Rabat, Morocco, email: oussama.ritahi@um5r.ac.ma

Abstract

This study investigates the macroeconomic resilience of the Moroccan economy using a comprehensive analysis of key indicators and policy variables. Utilising data from sources such as the World Bank, we examined GDP per capita, government debt, government final expenditure, agriculture and industry sectors as a percentage of GDP, output gap, and trade openness. Applying the Autoregressive Distributed Lag (ARDL) method, we established both long-run and short-run relationships between these variables and the output gap, which represents the cyclical trend in the economy. Our findings revealed that both government final consumption in % of GDP and government debt in % of GDP have a significant impact on the economy as they were found to be countercyclical measures, mitigating the adverse effects of shocks on the economy. The ARDL model's diagnostic tests confirmed the validity of our estimations, ensuring robust and reliable results. Overall, this study sheds light on the budgetary determinants of macroeconomic resilience in the Moroccan economy and provides valuable insights for policymakers to implement measures that promote stability and sustainability. By carefully managing government expenditure and debt levels, the Moroccan economy can better navigate economic shocks and foster a more resilient and prosperous future.

Keywords: macroeconomic resilience, ARDL, Budgetary policy, Moroccan economy

JEL Classification: C32; E32; E10; O4

Introduction

The concept of resilience in ecology and socio-ecological systems presents challenges in reconciling knowledge and approaches with current understanding. Various definitions of resilience exist, including "engineering", "ecological", and "adaptive" resilience. Engineering resilience focuses on bouncing back to the pre-shock level, while ecological resilience involves the economy reconfiguring itself into a new growth path. Adaptive resilience emphasises the economy's ability to reconfigure and adapt its structure to maintain an acceptable growth trajectory. Different authors propose their own interpretations of resilience, with some emphasising the ability to recover from shocks, maintain economic activity levels, or anticipate and respond to disruptions. Understanding resilience requires considering dimensions such as shock absorption, speed of recovery, resistance, reorientation, and renewal. These definitions offer insights into measuring and assessing resilience in economic contexts, with evolutionary perspectives highlighting the capacity for long-term development and adaptation.

In economics, resilience refers to the behaviour of a place (country, region or locality) after experiencing a shock, whether economic or otherwise. Shocks represent sudden disturbances on the supply or demand side of an economy, with potential effects depending on the different perspectives of development theories. Martin and Sunley (2014) assess the significance of resilience within four different streams of development theories, including new economic geography, evolutionary, Schumpeterian and Marxist regional theories, as well as path dependence approaches. This analysis can be extended to examine resilience within cumulative or circular development theories and endogenous growth approaches. The differences between these perspectives revolve mainly around the understanding of the meaning and processes of resilience, as well as the underlying influencing factors, rather than the impact of shocks on localities.

New economic geography would consider resilience as the ability of a system to maintain its spatial equilibrium pattern after experiencing a shock within a framework of multiple equilibria. A Schumpeterian approach would emphasise technology and view resilience as the ability to successfully navigate through the "storms" of creative destruction. In Marxist theories, shocks are primarily attributed to over-accumulation, and resilience would concern the ability to retain capital outflows from one place to another while offering better returns. In path dependence perspectives, shocks are seen as "unlocking" the locked-in regions. However, it is still debatable whether resilience in these approaches is a positive or negative attribute.

In the current context, macroeconomic resilience holds significant importance due to the increasing frequency and severity of economic shocks. Understanding the determinants of macroeconomic resilience becomes crucial for policymakers, economists, and stakeholders alike. As shocks can disrupt the stability and growth of an entire economy, identifying the fac-

tors that contribute to resilience becomes essential in designing effective strategies to mitigate the adverse impacts. The determinants of macroeconomic resilience encompass various aspects, including the strength of institutional frameworks, fiscal and monetary policies, diversification of economic sectors, adaptability to technological advancements, human capital development, social safety nets, and the ability to attract investments. By comprehending these determinants and their interplay, we can gain valuable insights into how economies can better withstand and recover from shocks, ensuring sustained growth and stability. Therefore, the question arises: What are the key determinants that underpin macroeconomic resilience and how can they be effectively cultivated and enhanced? By addressing this question, policymakers can formulate targeted measures to strengthen resilience, bolster economic stability, and foster sustainable development.

1. Theoretical and Empirical Literature Review

The concept of economic resilience, when examined through the lens of economic stability, can be understood in two key dimensions: shock amplification and shock persistence. Shock amplification refers to the extent to which aggregate output deviates from the equilibrium path, as demonstrated by Robelo (2005).

These shocks can occur in various components of aggregate demand (AD), leading to a deviation from the potential output and causing an amplification of the impact on the overall economy. In simpler terms, when the economy lacks resilience, external shocks or internal disturbances can lead to significant fluctuations in output, as evidenced by research conducted by Duval et al. (2007), Sutherland & Hoeller (2013), and Ziemann (2013).

The dimension of shock amplification is influenced by two main factors: the size of the shock itself and the economy's ability to withstand or resist the shock's impact. A larger shock, when combined with low shock resistance, can result in more significant deviations from the equilibrium path, making the economy less resilient.

Moreover, the dimension of shock persistence is concerned with the duration of output fluctuations within the economy. Research by Fatás (2000) and Duval et al. (2007) has shown that a high level of shock persistence indicates prolonged fluctuations in the business cycle, leading to delayed adjustments in aggregate output towards its potential level and ultimately resulting in reduced economic resilience.

The Keynesian perspective highlights that the persistence of shocks is closely linked to the rigidity of wage and price levels within the economy. When wage and price levels are inflexible and do not easily or quickly adjust to changes in supply and demand, they contribute to the prolongation of shocks and hinder the timely adjustment of aggregate output and employment towards their potential levels in the short run, as emphasised by Mankiw (2015).

In simpler terms, when wage and price levels remain fixed despite changes in economic conditions, the economy experiences a more extended period of output fluctuations. This lack of flexibility in wages and prices prevents the economy from swiftly adapting to new circumstances, making it less resilient in the face of shocks.

1.1 Economic resilience

Various empirical studies have delved into the concept of economic resilience at the macroeconomic level, with a primary focus on developing measurements and assessing the resiliency of countries or regions when faced with shocks. One such study conducted by Briguglio et al. (2009) utilised an economic resilience index (ERI) and a vulnerability index (VI) to evaluate the resilience of different countries.

The Economic Resilience Index (ERI) serves as a gauge of a country's ability to withstand and recover from shocks effectively. It is constructed using a comprehensive set of economic, social, and political indicators, including macroeconomic stability, market microeconomic efficiency, governance, and social development.

In essence, ERI takes into account various aspects that contribute to a nation's resilience, such as the overall stability of its economic policies, the efficiency of its markets in responding to disturbances, the quality of governance in managing crises, and the progress of social development initiatives.

Han and Goetz (2015) conducted an assessment of economic resilience in various US regions during the Great Financial Crisis (GFC) spanning the period from 2007 to 2009. The research encompassed two distinct stages: the drop stage and the rebound stage.

The drop stage primarily focused on examining the impact of the economic recession on employment within each region. To measure this, the researchers calculated the deviation between the actual employment figures and the expected employment levels during the recession period. Essentially, this analysis helped to determine the severity of the employment decline experienced by each region as a result of the crisis.

On the other hand, the rebound stage aimed to gauge the speed and effectiveness of recovery in the aftermath of the recession. This stage was characterised by calculating the rate of change between the employment levels recorded after the recession and the lowest employment levels observed during the recession itself. By quantifying the velocity of recovery, Han and Goetz (2015) sought to understand how quickly each region was able to bounce back from the economic downturn.

The study's results highlighted interesting disparities among different regions in the US. The Southwest and Plain regions demonstrated strong economic resilience during the GFC.

These regions experienced only minor drops in employment and exhibited rapid employment rebounds after the recession, indicating a robust ability to withstand and recover from the shock of the financial crisis.

In contrast, the Midwest and New England regions showed lower levels of economic resilience. These regions experienced significant employment drops during the GFC and exhibited slower employment rebound rates after the recession, suggesting a more prolonged and challenging recovery process.

The findings of this study underscore the importance of economic resilience in the face of severe economic shocks. Regions with stronger resilience can absorb the impact of crises more effectively and achieve faster recoveries, while regions with lower resilience may face prolonged periods of economic difficulty.

Bhattacharya and Dasgupta (2012) conducted a comprehensive examination of the economic resilience of the least-developed countries (LDCs) during the Global Financial Crisis (GFC) from 2008 to 2009. They employed two prominent analytical tools – the Impulse Response Function (IRF) and the Generalised Method of Moments (GMM) methods – to assess the resiliency of these countries.

The study's findings revealed that LDCs experienced significant output losses, measured by a decline in GDP growth. These losses were primarily attributed to two main factors: a decrease in foreign direct investment (FDI) and fluctuations in exchange rates and terms of trade. The interplay of these factors exacerbated the economic downturn for the LDCs during the GFC.

Using the Impulse Response Function (IRF) estimation, the researchers demonstrated that the declining GDP growth in LDCs persisted over time. The growth of GDP remained below the pre-crisis GDP growth trend for a prolonged period of at least five years. This prolonged downturn suggested that external shocks, such as declining external demand, and limited domestic resources mobilisation rendered LDCs structurally vulnerable to external shocks.

Furthermore, the study highlighted the role of high debt-to-GDP ratios and low international reserves in exacerbating the vulnerability of GDP growth in LDCs to shocks. The burden of debt relative to the size of their economies and insufficient reserves left LDCs with limited buffers to weather the impacts of economic shocks effectively.

1.2 The impact of budgetary measures on economic resilience

The pioneering study by Galí (1994) introduces the concept of a government size as an automatic stabiliser, drawing upon the real business cycle (RBC) model. The RBC model assumes that agents in the economy aim to maximise their expected utility. Galí's study utilised two key metrics

to assess output fluctuations: the standard deviation of GDP growth and the representation of government size through government expenditure to GDP and government revenue to GDP ratios.

To investigate the relationship between government size and output fluctuations, Galí conducted a cross-country regression analysis on 22 member countries of the Organisation for Economic Co-operation and Development (OECD) for the period spanning from 1960 to 1990.

The study's findings revealed that an increase in the government revenue to GDP ratio, which can be interpreted as higher tax rates, corresponded to an increase in the standard deviation of GDP growth. This indicates that tax rates have a procyclical effect on the economy, exacerbating output fluctuations and potentially destabilising the economic environment.

Conversely, an increase in the government purchases to GDP ratio, representing higher government expenditures, was associated with a reduction in output fluctuation. This denotes that government purchases have a countercyclical response, meaning they tend to mitigate the impact of economic fluctuations and stabilise the economy.

The implications of these findings are significant for policymakers. The study suggests that using government purchases (expenditures) as automatic stabilisers can be an effective tool to counteract economic downturns and stabilise the economy during periods of fluctuating output. On the other hand, relying on tax rate adjustments as automatic stabilisers may inadvertently contribute to increased output volatility and economic instability.

Debrun et al. (2008) built upon the earlier study conducted by Fatás and Mihov (2001) by investigating the effectiveness of various automatic stabilisers in 20 OECD countries from 1961 to 1990. They employed a range of measures, including the government expenditure to GDP ratio, government expenditure on social security and transfers, direct taxes, and indirect taxes.

Interestingly, their findings showed a significant shift in the behaviour of automatic stabilisers in these countries since the 1990s. The countercyclical nature of these stabilisers, which had historically helped mitigate economic fluctuations, appeared to have diminished in effectiveness during this period.

Using pooled ordinary least squares (OLS) and two-stage least squares (2SLS) estimations, Debrun et al. (2008) discovered a negative association between the standard deviation of real GDP per capita growth and all the automatic stabiliser measurements. However, this relationship was deemed insignificant during the years 1990 to 2007.

Furthermore, their analysis revealed a non-linear trend, where the impact of automatic stabiliser tools diminished over time. Specifically, the interaction term of squared government size was positively and significantly associated with output fluctuation. This suggested that the efficacy of automatic stabilisers declined as government size increased, and the ability of these tools to counter economic fluctuations waned.

Drawing on these findings, Aghion et al. (2006) argued that other economic factors, such as monetary policy and financial liberalisation, had assumed a more prominent role in stabilising the economy. Financial liberalisation allowed more households to access financial resources, enabling them to better self-insure against income fluctuations, thus reducing the reliance on fiscal policy measures.

In their research, McKay and Ries (2013) explored alternative techniques of estimation to assess the impact of tax rates as an automatic stabiliser tool in the United States from 1988 to 2007. They employed a solution algorithm method featuring a linear rational expectation algorithm, which analyses the dynamic behaviour of an economy with perturbations around its stationary equilibrium.

For their analysis, McKay and Ries (2013) used the variance of nominal GDP as the measurement of output fluctuation. This allowed them to evaluate the effects of changes in tax rates on the volatility of economic performance during the specified period.

The study's findings indicated that tax rates when used as automatic stabilisers exhibited a countercyclical response in the US economy. Specifically, a one per cent decrease in both proportional taxes (comprising total corporate income, property, sales, and excise taxes revenue) and progressive taxes (total income tax revenue) resulted in less than a one per cent reduction in the variance of nominal GDP. This implies that reducing tax rates during economic downturns had a limited impact on stabilising the economy.

On the other hand, the study revealed a more significant countercyclical response with regard to transfer payments. A one per cent increase in transfer payments led to a remarkable four per cent reduction in the variance of nominal GDP. This suggests that higher transfer payments during economic downturns had a more pronounced effect in stabilising the economy and mitigating output fluctuations.

2. Stylised Facts

In this section, we present the stylised facts observed from an empirical analysis of the data. These facts are derived from a comprehensive examination of economic indicators and trends over a specific time period. They provide valuable insights into the underlying economic dynamics and relationships.

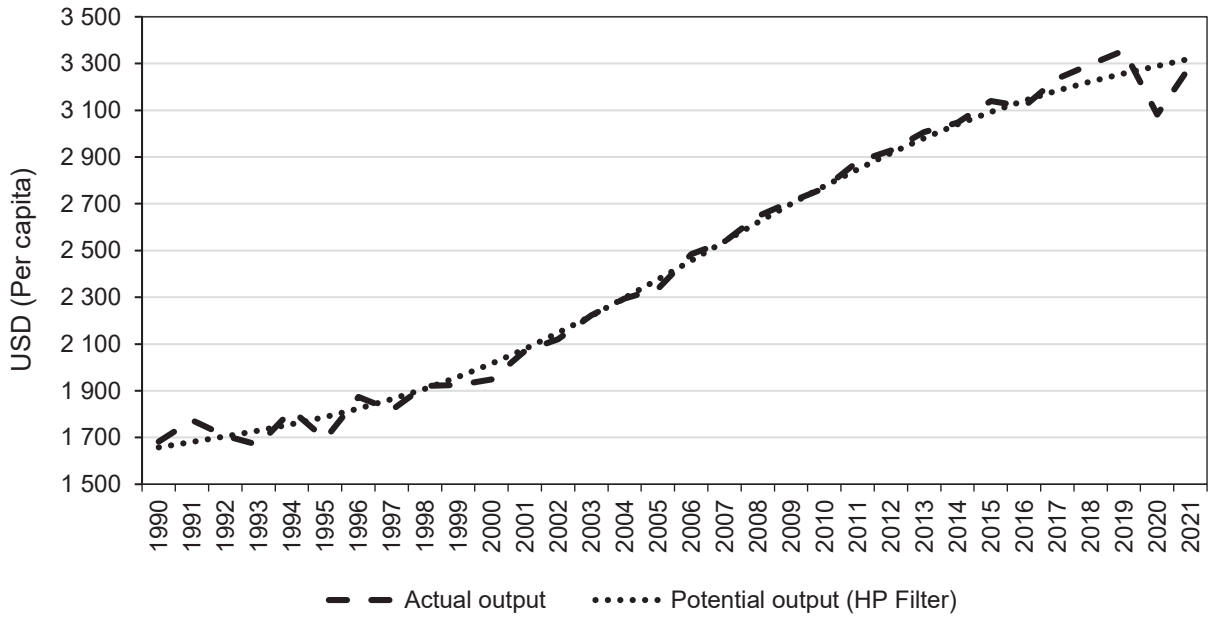
2.1 Output gap

The measurement of output fluctuation in the business cycle is commonly known as the output gap, which indicate the cyclical trend within an economy. It is calculated as the difference be-

tween the aggregate output and the potential output of the economy. By using the percentage output gap relative to potential output, we can assess the extent to which aggregate output deviates from potential output, even in the presence of shocks like the Asian Financial Crisis (AFC) and the Global Financial Crisis (GFC).

A negative output gap relative to potential output indicates that the economy is experiencing an economic recession or slowdown, where the aggregate output falls below the potential output. Conversely, a positive output gap relative to potential output suggests that the economy is in an economic boom, with aggregate output surpassing the potential output level.

Figure 1: Development of GDP per capita in USD and potential output using HP filter

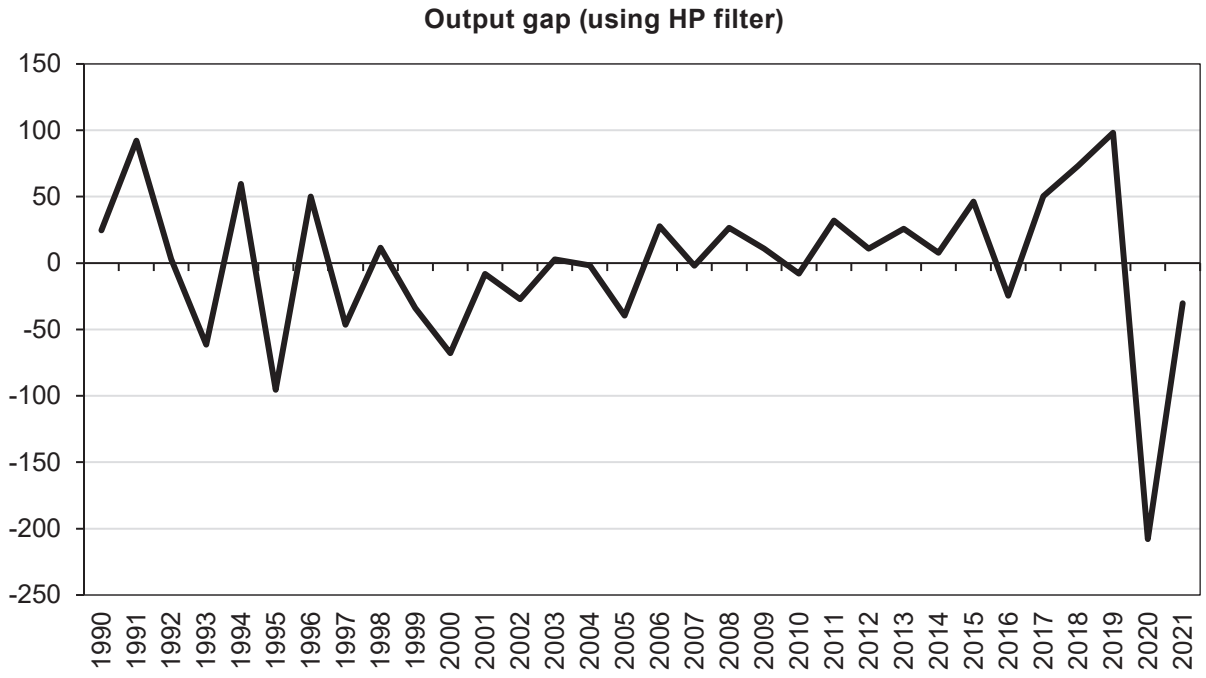


Source: Author's calculations based on World Bank data

During the 1990s, the Maroccan output gap was significantly influenced by the performance of the agricultural sector, which was highly reliant on precipitation levels. In 1994, favourable weather conditions led to a remarkable economic upswing, with the Moroccan economy experiencing an impressive 12% GDP growth rate. However, the following year, a particularly severe drought caused a sharp downturn, resulting in a 5% contraction in GDP in 1995.

Triggered by the subprime mortgage crisis in the United States, the 2008 global financial crisis had a limited impact on the Moroccan economy. The country managed to navigate through the turmoil relatively unscathed due to its diversified economic structure and prudent financial policies.

Figure 2: Development of output gap in Morocco between 1990 and 2021



Source: Author's calculations based on World Bank data

However, the COVID-19 pandemic that emerged in 2020 proved to be a much greater challenge for the Moroccan economy. The pandemic's widespread impact on international trade, tourism, and domestic activities significantly affected various sectors, leading to a notable decline in the economic growth. As businesses shuttered, supply chains disrupted, and international travel halted, the Moroccan economy faced unprecedented hardships.

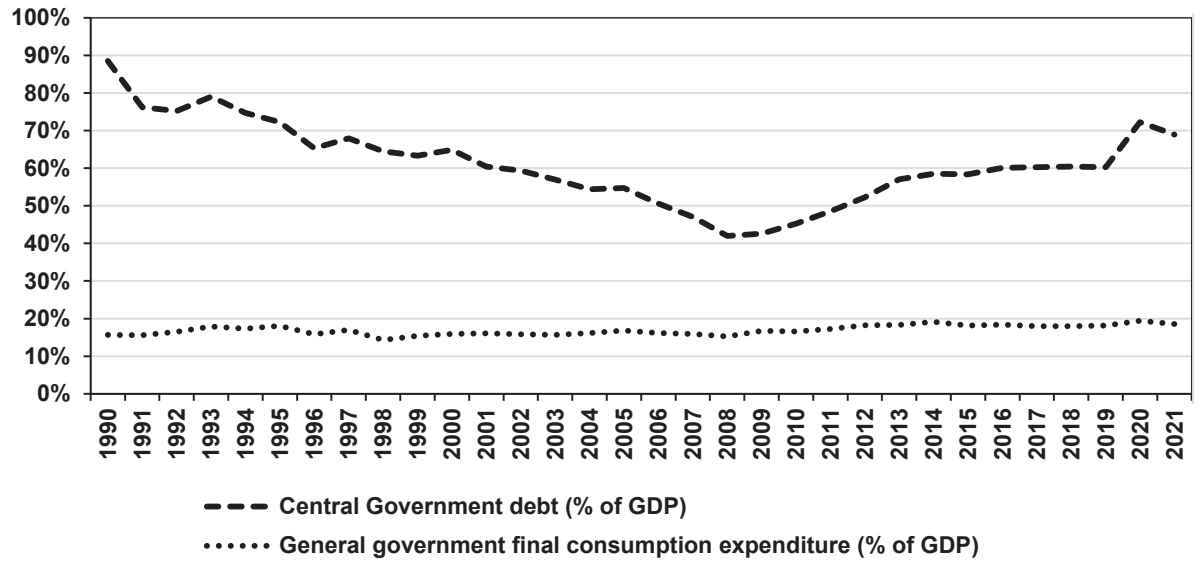
In response to the COVID-19 crisis, the Moroccan government implemented various measures, including fiscal stimulus packages and financial support for affected sectors, to mitigate the economic fallout and bolster resilience.

2.2. Government debt and final consumption expenditure

Between 1990 and 2008, the central government debt, measured as a percentage of GDP, displayed a notable declining trend, dropping from 89% to 42%. During this period, robust economic growth and prudent fiscal policies contributed to a significant reduction in the debt burden, indicating an improved fiscal position. However, the situation shifted after 2008, as the global financial crisis and subsequent economic challenges prompted an increase in the central government debt, which rose to 69% in 2021. Notably, a significant surge occurred between 2019 and 2020, with the debt level increasing by 12%, reflecting the exceptional strain caused

by the COVID-19 pandemic on the country's economy. The increase in government spending and revenue shortfalls amid pandemic-induced disruptions led to the upswing in central government debt during this period. As policymakers navigate the ongoing economic recovery, addressing the debt trajectory will be a crucial aspect of maintaining fiscal sustainability and fostering long-term economic resilience. Efforts to balance debt management with strategic investments and targeted fiscal measures will be essential in shaping the country's economic trajectory in the post-pandemic landscape.

Figure 3: Development of central government debt and government final consumption expenditure in % of GDP between 1990 and 2021



Source: Authors' calculations, World Bank, IMF

The majority of the debt is attributed to domestic sources, constituting 77% of the total, while external debt accounts for 23%. This allocation aligns with the set objectives for the benchmark portfolio, aiming for a distribution of 70%–80% for domestic debt and 20%–30% for external debt.

As of 2021, the outstanding domestic debt of the Treasury reached MAD 681.5 billion, indicating a notable 7.7% increase compared to the previous year.

Regarding the maturity of the debt, the long-term segment continues to dominate, comprising 58.6% of the total, which is slightly lower than the 59.8% reported a year earlier. The medium-term debt represents 25.0%, remaining relatively stable compared to the previous year's figure of 25.2%, while short-term debt accounts for 15.2%, experiencing a slight increase from the 14.2% recorded previously.

As for the external debt, it amounted to MAD 203.8 billion at the end of December 2021, showing a moderate 2% increase compared to the end of December 2020.

2.3 Fiscal policy

In the early 1980s, Morocco embarked on a significant tax reform (1984 law) by introducing and modernising progressivity in the tax system and providing incentives across all economic sectors. To enhance neutrality, some tax incentives were adjusted in 1988, while others were reintroduced in priority sectors in 1996. The Investment Charter, consolidating all investment-related tax incentives, was adopted in 1996, followed by the General Tax Code in 2007, unifying key tax laws.

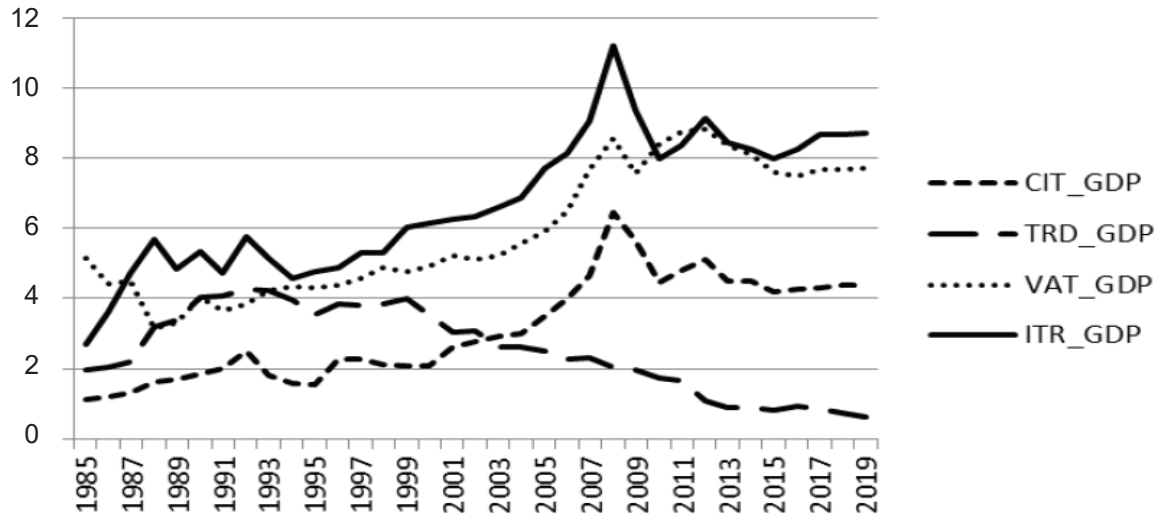
The tax system fundamentally relies on three major taxes: the value-added tax (VAT) introduced in 1986, the corporate tax (CT) introduced in 1988, and the general income tax (GIT) introduced in 1990, which became individual income tax (IIT) in 2006.

Income Tax (IT) is a direct, annual tax calculated on a progressive scale. Governed by Article 22 of the General Tax Code, it applies to the incomes and profits of individuals and entrepreneurships not opting for corporate tax. The taxed incomes encompass salary, professional, real estate, movable capital, and agricultural incomes.

Corporate Tax (CT) applies at a rate of 30%, effective from January 1, 2008, to income and profits of capital companies and certain legal entities, except financial institutions which are taxed at 37%. Special rates of 8.75%, 10%, and 17.5% apply to companies in export-free zones for twenty consecutive years after the fifth year of the total exemption, to service companies with the "Casablanca Finance City" status, and to offshore banks (optional) for the first fifteen consecutive years after approval, respectively. Exporting, hotels, and mining companies enjoy total exemption for the initial five years.

Between 1985 and 2019, the tax burden on taxpayers in Morocco saw a notable increase as a percentage of GDP. Figure 4 highlights the progressive concentration on income tax, VAT, and corporation tax. VAT initially declined from 1985 to 1990 due to drought impacting consumer goods and household purchasing power. However, from 2003 onwards, VAT exhibited a significant upward trend. Driven by the volume of imported products and improvement in the gross national income per capita, it contributes on average by 8.75% of GDP. Income tax surpasses corporate tax, particularly from 1985 to 1990. Various other taxes, including deductions from wages, real estate profits tax, and the national solidarity participation tax, collectively constituted 6.56% of GDP during this period.

Figure 4: Development of tax revenues as % of GDP



Source: Author's calculations based on World Bank data

3. Methodology

3.1 Data sources

In this study, we analysed several key macroeconomic indicators to understand the economic resilience of Morocco. These indicators included output gap, government debt, government final expenditure, and agriculture and industry sectors as a percentage of GDP, and trade openness. The study relied on time series data ranging from 1990 to 2021. To ensure the accuracy and reliability of our analysis, we sourced the data from reputable and widely recognised institutions, primarily the World Bank. The output gap, a critical measure of economic performance and potential, was calculated based on GDP per capita data and compared to potential GDP to gauge the economy's cyclical position. The World Bank's reliable GDP data facilitated this analysis. The government debt data, an essential indicator of fiscal sustainability, was also sourced from the World Bank. For government final expenditure, we relied on the World Bank's comprehensive data on government finances and public expenditures. To understand the contributions of the agriculture and industry sectors to the economy, we used the World Bank's data on sectoral GDP as a percentage of total GDP. This data helped us analyse the diversification of the economy and its exposure to different sectors. Finally, trade openness, a significant determinant of economic vulnerability and resilience, was assessed using data on imports and exports from the World Bank's trade database.

3.2 Data stationarity

In this study, we rigorously examined the stationarity of the time series through the application of two statistical tests which are Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. These tests are essential in time series analysis as they determine whether the data exhibits stationary behaviour or contains a unit root, indicating non-stationarity. By subjecting variables such as GDP per capita, government debt, government final expenditure, agriculture and industry sectors as a percentage of GDP, output gap, and trade openness to these tests, we ascertained the order of integration for each variable, ensuring the validity and reliability of our time series analysis.

3.3 Output gap estimation method

The HP filter is a widely used and straightforward technique employed to estimate potential output. This method calculates potential output (y) by minimising the discrepancy between actual output (y) and potential output under a constraint that allows flexibility in potential output growth (Hodrick and Prescott, 1997). The HP filter mainly minimises the difference between actual and potential output based on the following equation:

$$y't, HT = min\left[\sum_{t=1}^{T}\left(y_t - \widehat{y_t}\right)^2 + \lambda\sum_{t=1}^{T-1}\left\{\left(y_{t+1} - \widehat{y_t}\right) - \left(y_t - \hat{y}_{t-1}\right)\right\}^2\right] \tag{1}$$

where the sample period denoted by t, the variables $\hat{y}$ and y represent potential output and actual output, respectively. The parameter λ serves as a critical restriction parameter that influences the level of smoothness in the trend. The selection of the appropriate value for λ is of utmost importance as it determines the rate at which the cyclical component vanishes, ultimately aligning actual output with potential output.

3.4 Estimation method

In this study, we have considered the following functions that will be estimated:

Model 1:

$$GAP = f\left(GOV\_DEBT, VA\_AGRI, VA\_IND, GOV\_FIN\_CONS, OPENNESS, SHOCK \times GOV\_DEBT\right) \tag{2}$$

Model 2:

$$GAP = f\left(GOV\_DEBT, VA\_AGRI, VA\_IND, GOV\_FIN\_CONS, OPENNESS, SHOCK \times GOV\_FIN\_CONS\right) \tag{3}$$

In this study, we adopted the Autoregressive Distributed Lag (ARDL) method to examine the relationship between various macroeconomic indicators and the output gap. The ARDL method is particularly suitable for analysing the dynamics between variables that may have long-term and short-term effects on each other. In our regression model, we used the output gap as the dependent variable, which represents the difference between aggregate output and potential output. The models are specified as follows:

For the first model (interaction between shock and government debt):

$$\begin{aligned}\Delta GAP_t = {} & \alpha_0 + \sum_{i=1}^{n}\alpha_{1,i}\Delta GAP_{t-i} + \sum_{i=1}^{n}\alpha_{2,i}\Delta VA\_IND_{t-i} + \sum_{i=1}^{n}\alpha_{3,i}\Delta VA\_AGR_{t-i} + \\ & + \sum_{i=1}^{n}\alpha_{4,i}\Delta GOV\_DEBT_{t-i} + \sum_{i=1}^{n}\alpha_{5,i}\Delta GOV\_FIN\_CONS_{t-i} + \\ & + \sum_{i=1}^{n}\alpha_{6,i}\Delta(GOV\_DEBT \times SHOCK)_{t-i} + \Delta\sum_{i=1}^{n}\alpha_{7,i}\Delta SHOCK_{t-i} \\ & + \beta_1 GAP_{t-1} + \beta_2 VA\_IND_{t-1} + \beta_3 VA\_AGR_{t-1} + \beta_4 GOV\_DEBT_{t-1} + \\ & + \beta_5 SHOCK_{t-1} + \beta_6 GOV\_FIN\_CONS + \beta_7 GOV\_DEBT \times SHOCK_{t-1} + \\ & + \varepsilon_{1t}\end{aligned} \tag{4}$$

For the second model (interaction between shock and government final consumption):

$$\begin{aligned}\Delta GAP_t = {} & \alpha_0 + \sum_{i=1}^{n}\alpha_{1,i}\Delta GAP_{t-i} + \sum_{i=1}^{n}\alpha_{2,i}\Delta VA\_IND_{t-i} + \sum_{i=1}^{n}\alpha_{3,i}\Delta VA\_AGR_{t-i} \\ & + \sum_{i=1}^{n}\alpha_{4,i}\Delta GOV\_DEBT_{t-i} + \sum_{i=1}^{n}\alpha_{5,i}\Delta GOV\_FIN\_CONS_{t-i} \\ & + \sum_{i=1}^{n}\alpha_{6,i}\Delta(GOV\_FIN\_CONS \times SHOCK)_{t-i} + \sum_{i=1}^{n}\alpha_{7,i}\Delta SHOCK_{t-i} \\ & + \beta_1 GAP_{t-1} + \beta_2 VA\_IND_{t-1} + \beta_3 VA\_AGR_{t-1} + \beta_4 GOV\_DEBT_{t-1} \\ & + \beta_5 SHOCK_{t-1} + \beta_6 GOV\_FIN\_CONS + \\ & + \beta_7 GOV\_FIN\_CONS \times SHOCK_{t-1} + \varepsilon_{2t}\end{aligned} \tag{5}$$

Where α and β represent the short-run and long-run parameters respectively; ε_t is assumed to be Independent and identically distributed.Regardng the variables in these models, these are:

- GAP represents the output gap
- GOV_DEBT is the government debt

- OPENNESS represents trade openness
- VA_AGRI and VA_IND are the contributions of the agriculture and industry sectors as a percentage of GDP
- GOV_FIN_CONS represents the government final expenditure
- SHOCK is treated as a dichotomous variable that takes a value of 1 when there is a decrease of the Moroccan GDP and 0 otherwise.

4. Results and Discussions

4.1 Descriptive statistics

As part of the descriptive analysis of the time series, the following Table 1 summarises key statistics for the variables used in the regression model. The mean values indicate the central tendency of each variable, with GAP showing a negligible deviation from zero (Mean: −0.0002). Government debt in % of GDP (GOV_DEBT) and Government Final Consumption in % of GDP (GOV_FIN_CONS) exhibit a mean of 0.613 and 0.169 respectively.

The Jarque-Bera statistic and its associated probability assess the normality of the distribution of each variable. For GAP, OPENNESS, GOV_FIN_CONS, GOV_DEBT, and VA_IND, p-values suggest normality, while for VA_AGRI, deviations from normality are indicated.

Table 1: Key statistics for the variables used in the regression model

	GAP	GOV_DEBT	OPENNESS	VA_AGRI	VA_IND	GOV_FIN_CONS
Mean	−0.0002	0.613	0.603	0.125	0.159	0.169
Median	0.002	0.603	0.581	0.120	0.152	0.168
Maximum	0.055	0.885	0.802	0.184	0.193	0.194
Minimum	−0.063	0.420	0.418	0.099	0.137	0.143
Std. Dev.	0.024	0.110	0.132	0.021	0.018	0.013
Jarque-Bera	2.211	0.507	3.688	11.268	4.031	1.329
Probability	0.331	0.776	0.158	0.004	0.133	0.514

Source: authors' calculations

4.2 Stationarity

Before proceeding with the regression, it is essential to conduct unit root tests to ensure the stationarity of the time series to be estimated, thus avoiding the risk of spurious regression and loss of information. The stationarity of the variables can be assessed either by comparing the Augmented Dickey-Fuller (ADF) test statistics with the critical values of McKinnon or by testing the significance of the ADF test statistics and their probabilities. In this case, we will test the stationarity of the variables and determine their order of integration by first testing the significance of each variable in level. If the variable is not significant in level, we apply the ADF test on the first differences to verify its significance, and so on using higher differences if needed. Additionally, to complement the unit root tests, the Phillips-Perron test was also used to assess the stationarity of the variables. It is crucial to ensure stationarity in the data before proceeding with regression analysis to ensure the validity and reliability of the results obtained. The results of Augmented-Dickey Fuller (ADF) and Phillips-Perron (PP) tests are reported in the following Table 2.

Table 2: Stationarity tests results

Variable	Augmented-Dickey Fuller		Phillips-Perron	
	Level	1st Difference	Level	1st Difference
GAP	–6.81***	–12.70***	–6.81***	–15.24***
GOV_DEBT	–1.25	–6.57***	–1.22	–6.57***
GOV_FIN_CONS	–2.87	–8.39***	–2.87	–8.42***
VA_AGRI	–2.35	–11.60***	–4.77***	–20.53***
VA_IND	–1.72	–5.04***	–1.54	–8.96***
OPENNESS	–3.08	–6.75***	–2.99	–7.26***
SHOCK	–7.29***	–5.13***	–7.45***	–27.47***
SHOCK * GOV_DEBT	–7.32***	–5.02***	–7.34***	–34.65***
SHOCK * GOV_FIN_CONS	–7.24***	–5.01***	–7.30***	–27.06***

Notes: *** Significant at 1% ** Significant at 5% * Significant at 10%

Source: authors' calculations

Based on these results, the dependent variable, GAP, showed stationarity at the level I(0), indicating that the average and the variance of this time series do not change in time. Also, the independent variables SHOCK, SHOCK × GOV_DEBT and SHOCK × GOV_FIN_CONS showed a stationarity at the level I(0). On the other hand, the independent variables, OPENNESS, VA_AGRI, VA_IND, HK, GOV_FIN_CONS, and GOV_DEBT, displayed stationarity at first difference I(1). The ADF and PP test results corroborated these findings, demonstrating that differencing the data once was necessary to achieve stationarity for these variables.

4.3 ARDL model results

The ARDL bounds test of long run relationship for the two models between the variables, presented in Table 3, yields significant results with the F-statistic value of 3.36 for the first model and 4.06 in the second model, exceeding the upper bound I(1) for 5% significance level. This outcome suggests the existence of a long-run relationship between the variables, namely output gap, trade openness, government debt, government final consumption, agriculture value-added, and industry value-added, with the output gap being treated as the explained variable.

Table 3: ARDL Bound test results

Models	Test Statistic	Value	Signif.	I(0)	I(1)
Model 1	F-statistic	3.36	10%	1.92	2.89
	K	7	5%	2.17	3.21
			2.50%	2.43	3.51
			1%	2.73	3.9
Model 2	F-statistic	4.06	10%	1.92	2.89
	K	7	5%	2.17	3.21
			2.50%	2.43	3.51
			1%	2.73	3.9

Source: authors' calculations

The Bond tests conducted indicate the existence of a long-run relationship in the analysed data. Subsequently, we employed the Autoregressive Distributed Lag (ARDL) approach to estimate two models, and the outcomes are detailed in the accompanying table. The utilisation of the ARDL approach allows us to capture both short-term and long-term dynamics in the relationship between the variables under consideration. The presented results in the Table 4 offer insights into the coefficients, significance levels, and other statistical measures, providing a comprehensive understanding of the estimated models and their implications for the variables in question.

Table 4: Coefficients, significance levels, and other statistical measures

Variable	Model 1		Model 2	
Long-run Relationship	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
$SHOCK_{t-1}$	0.29	0.07	0.98	0.03
GOV_DEBT_{t-1}	−0.10	0.25	−0.11	0.02
$GOV\_FIN\_CONS_{t-1}$	−0.58	0.28	−0.05	0.04
$OPENNESS_{t-1}$	0.18	0.01	0.05	0.43
VA_AGRI_{t-1}	−0.19	0.67	−0.75	0.30
VA_IND_{t-1}	2.47	0.07	1.41	0.09
$SHOCK * GOV\_DEBT_{t-1}$	−0.53	0.04		
$SHOCK * GOV\_FIN\_CONS_{t-1}$			−5.54	0.04
C	−0.30	0.01	−0.09	0.48
Short-run Relationship	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
ΔGAP_{t-1}	0.38	0.01	−0.67	0.00
$\Delta SHOCK_t$	0.11	0.00	0.55	0.00
$\Delta SHOCK_{t-1}$	−0.13	0.00	−0.29	0.00
ΔGOV_DEBT_t	−0.20	0.01	−0.18	0.00
ΔGOV_DEBT_{t-1}	0.27	0.00	0.32	0.00
$\Delta OPENNESS_t$	0.09	0.02	0.11	0.00
ΔVA_AGRI_t	0.48	0.00	1.98	0.00
ΔVA_AGRI_{t-1}			0.40	0.01
ΔVA_IND_t	1.48	0.00	−1.31	0.00
ΔVA_IND_{t-1}	−0.47	0.13	1.33	0.00
$\Delta GOV\_FIN\_CONS_t$			0.02	0.89
$\Delta GOV\_FIN\_CONS_{t-1}$			−1.70	0.00
$\Delta GOV\_DEBT * SHOCK_t$	−0.21	0.00		-
$\Delta GOV\_DEBT * SHOCK_{t-1}$	0.23	0.00		-
$\Delta GOV\_FIN\_CONS * SHOCK_t$			−3.15	0.00
$\Delta GOV\_FIN\_CONS * SHOCK_{t-1}$			1.64	0.00
ECT(–1)	−1.12	0.00	−1.04	0.00

Source: authors' calculations

Based on the results of the previous table, the first model shows a very high degree of explanatory power or goodness of fit for the model. In this case, 95% of the variability in the dependent variable is accounted for by the independent variables included in the regression model. This suggests that the model is highly effective in capturing and explaining the observed variability in the data. The estimates show that there is a negative relationship between the government debt ratio in % of GDP and the output gap which implies that a higher government debt ratio hurts the output gap in the long run. This might suggest that during periods of economic downturns or recessions, the government tend to accumulate more debt as it engages in fiscal stimulus measures to counteract the negative effects on the economy. Also, the negative relationship between the interaction term of the shock and government debt (SHOCK × GOV_DEBT) and the output gap indicates that the increase of government debt decrease the impact of the shock on GDP in the long run. In fact, when faced with economic downturns, governments often deploy expansionary fiscal measures, such as increased public spending or tax cuts, to stimulate economic activity. The infusion of funds into the economy, financed by a rise in government debt, aims to boost demand, create employment, and support businesses.

In times of crisis, government injection of funds into the economy can drive increased consumption and investment, effectively narrowing the output gap by moving the economy closer to its full potential. This additional government spending initiates multiplier effects, fostering positive impacts across diverse sectors. Importantly, it serves as a strategic countermeasure to mitigate the adverse effects of reduced private sector spending and investment – a characteristic challenge during economic crises.

The second model in which we analysed government public spending ratio in % of GDP impact on output gap during the period of crisis has shown a strong explanatory capacity or model fit, the R^2 value of 0.98 underscores the proportion of variance in the dependent variable elucidated by the independent variables. Specifically, 98% of the variability in the dependent variable is systematically captured by the included independent variables within the regression model. This outcome implies a notably proficient model, adept at comprehensively capturing and elucidating the observed variability in the dataset.

The second model suggests a negative relationship between government final consumption and the output gap as the coefficient associated with the variable is statistically significant at 5%. This result implies that as government final consumption increases, the output gap tends to decrease. This could indicate that during periods of economic expansion or recovery, governments may increase their final consumption, which, in turn, contributes to closing the output gap by stimulating economic activity.

Government final consumption has a similar outcome as government debt in the context of crisis. Based on the results, the interaction term was negative which indicates that higher gov-

ernment final consumption reduces the impact of shocks on GDP in the long run. In fact, the government final consumption can act as a stabilising force in an economy by mitigating the impact of shocks on GDP. When faced with economic shocks, such as recessions or financial crises, governments often increase their final consumption as part of countercyclical fiscal policies. The increase in government final consumption can boost overall demand in the economy, offsetting declines in private-sector spending and investment that typically accompany economic shocks.

Trade openness refers to the degree to which a country is engaged in international trade and the extent to which it participates in global markets. A higher level of trade openness implies that a country is more integrated into the global economy, actively importing and exporting goods and services with other nations. The positive impact of trade openness on the output gap suggests that increased international trade can stimulate economic growth and contribute to higher output levels.

Trade openness can act as a transmission channel for both positive and negative shocks from the global economy to the domestic economy. When the economy is highly open to international trade, it becomes more integrated with global markets and more exposed to external factors, such as changes in foreign demand, commodity prices, and international financial conditions. Consequently, any shock originating from the international market can have a more pronounced effect on the domestic economy when the later is more open to trade.

Similarly, in the case of government final expenditure, higher spending by the government can serve as an effective countercyclical policy response during economic crises. By boosting public investments, social programs, and other expenditure categories, the government stimulates aggregate demand and fosters economic activity, which can offset the adverse effects of the shock and contribute to economic recovery.

To assess the validity of the short-run and long-run estimations in the ARDL model, we conducted various diagnostic tests, including normality, serial correlation, heteroskedasticity, and Ramsey RESET tests. The results of these tests indicate that the residuals are normally distributed, there are no specification and serial correlation issues, and the policy implications derived from the model are reliable. Additionally, the stability of the estimated model coefficients was confirmed by CUSUM and CUSUM square plots. These diagnostic tests collectively support the robustness and reliability of the ARDL model, providing confidence in the accuracy of its estimations and the validity of the policy implications drawn from it.

In our evaluation of the ARDL model, we systematically examined the potential multicollinearity issue using Variance Inflation Factor (VIF) analysis. The findings from this assessment, presented in Table 5, reveal that there is no significant multicollinearity concern among the variables included in the model.

Table 5: Results of statistical tests and indicators of ARDL models

Statistical test	Model 1		Model 2	
	Value	p-value	Value	p-value
Normality (Jarque-Bera)	0.98	0.61	0.44	0.79
Serial correlation	5.14	0.07	2.44	0.11
Heteroskedasticity	20.45	0.38	23.45	0.37

Source: authors' calculations

Conclusion

The analysis reveals several important findings regarding the macroeconomic resilience of the Moroccan economy. The ARDL model, incorporating variables such as trade openness, government final expenditure, government debt, and interaction terms, has provided valuable insights into the dynamics of the economy.

The negative signs of the interactions terms of the shock and government final expenditure (SHOCK × GOV_FIN_CONS) and government debt suggest that higher levels of government spending and debt act as countercyclical measures to dampen the impact of shocks. By implementing expansionary fiscal policies during downturns, governments can stimulate demand and support economic activity, bolstering the economy's resilience in times of crises.

Moreover, the ARDL model has undergone rigorous diagnostic tests, including normality, serial correlation, heteroskedasticity, and Ramsey RESET tests, which have validated the robustness and reliability of the estimations. The stability of the model's coefficients has also been confirmed by CUSUM and CUSUM square plots which provided further assurance of the accuracy of the results.

The study highlights the critical role of government final expenditure and government debt in influencing the macroeconomic resilience of the Moroccan economy. Budgetary policies play a vital role in mitigating the adverse effects of such shocks. The findings emphasise the significance of balanced and well-managed fiscal policies to support economic stability and promote resilience in the face of uncertainties and challenges.

Policymakers can utilise these insights to implement prudent measures that enhance economic resilience, such as promoting economic diversification, ensuring fiscal discipline, and developing comprehensive policy frameworks that account for both domestic and global factors.

References

Aghion, P., Angeletos, G., Banerjee, A., Manova, K. (2005). Volatility and Growth: Credit Constraints and Productivity – Enhancing Investment. *NBER Working Paper*, 11349,1–33. https://doi.org/10.3386/w11349

Bhattacharya, D., Dasgupta, S. (2012). Global Financial and Economic Crisis: Exploring the Resilience of the Least Developed Countries. *Journal of International Development*, 24, 673–685. https://doi.org/10.1002/jid.2860

Briguglio, L., Cordina, G., Farrugia, N., Vella, S. (2009). Economic Vulnerability and Resilience: Concepts and Measurements. *Oxford Development Studies*, 37(3), 231–247. https://doi.org/10.1080/13600810903089893

Briguglio, L. Piccinino, S. (2012). Growth with Resilience in East Asia and the 2008– 2009 Global Recession. *Asian Development Review*, 29(2), 183–206.

Cheung, Y.-W., Lai, K. S. (1995). Lag Order and Critical Values of the Augmented Dickey–Fuller test. *Journal of Business & Economic Statistics*, 13(3), 277–280. https://doi.org/10.1111/j.1468-0084.1995.mp57003008.x

Debrun, X., Pisani-Ferry, J., Sapir, A. (2008). Government Size and Output Volatility: Should We Forsake Automatic Stabilization? *IMF Working Paper,* 08(122), 1–55.

Debrun, X., Kapoor, R. (2010). Fiscal Policy and Macroeconomic Stability: Automatic Stabilizer Work, Always and Everywhere. *IMF Working Paper*, 10(111), 1–47.

Duval R., Elmeskov, J., Vogel, L. (2007). Structural Policies and Economic Resilience to Shocks. *OECD Working Paper*, 567, 1–53.

Eller, M., Fidrmuc, J., Fungáčová, Z. (2013). Fiscal Policy and Regional Output Volatility: Evidence from Russia. *Bank of Finland Discussion Paper*, 13, 4–38. https://doi.org/10.1080/00343404.2015.1064884

Eraydin, A. (2015). Attributes and Characteristics of Regional Resilience: Defining and Measuring the Resilience of Turkish Regions. *Regional Studies*, 1–16. https://doi.org/10.1080/00343404.2015.1034672

Fatàs, A., Mihov, I. (2001). Government Size and Automatic Stabilizers: International and Intranational Evidence. *Journal of International Economics*, 55(1), 3–28. https://doi.org/10.1016/S0022-1996(01)00093-9

Fatàs, A., Mihov, I. (2006). Fiscal Policy and Business Cycle: an Empirical Investigation. *Mimeo INSEAD*, 1–37.

Fatàs, A., Mihov, I. (2012). Special Issue: Long-Term Effects of the Great Recession. *The B.E. Journal of Macroeconomics*, 12(3), 1–68. https://doi.org/10.1515/1935-1690.113

Fatima, B., Uma, K. (2011). Determinants of Output Growth Volatility in South Africa. *International Journal of Economics and Finance*, 3(5), 151–160. https://doi.org/10.5539/ijef.v3n5p151

Fernández-Villaverde, J., Guerrón-Quintana, P. A., Kuester, K., Rubio-Ramírez, J. (2011). Fiscal Volatility Shocks and Economic Activity. *NBER Working Paper Series,* 17317, 1–47. https://doi.org/10.1257/aer.20121236

Fingleton, B., Garretsen, H., Martin, R. (2012). Recessionary Shocks and Regional Employment: Evidence on the Resilience of U.K. Regions. *Journal of Regional Science*, 52(1), 109–133. https://doi.org/10.1111/j.1467-9787.2011.00755.x

Galí, J. (1994). Government Size and Macroeconomic Stability. *European Economic Review*, 38, 117–132. https://doi.org/10.1016/0014-2921(94)90009-4

Galí, J. (2003). Fiscal Policy and Monetary Integration in Europe. *Economic Policy*, 18(37), 535–572.

Han, Y., Goetz, S. J. (2015). The Economic Resilience of U.S Counties during the Great Recession. *The Review of Regional Studies*, 45, 131–149. https://doi.org/10.52324/001c.8059.

Hodrick, R. J., Prescott, E. C. (1997). Postwar US Business Cycles: An Empirical Investigation. *Journal of Money, Credit, and Banking*, 29(1), 1–16. https://doi.org/10.2307/2953682

Martin, R., Sunley, P. (2006). Path Dependence and Regional Economic Evolution. *Journal of Economic Geography*, 6, 395–437. https://doi.org/10.1093/jeg/lbl012

McKay, A., Reis, R. (2016). Optimal Automatic Stabilizers. CFM Discussion Papers No 1618

Rebelo, S. (2005). Real Business Cycle Models: Past, Present and Future. *The Scandinavian Journal of Economics*, 107(2), 217–238.