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Remittances and Economic Growth in the Maghreb Countries: The Role of Financial Development

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Abstract: This study examines the conditional effects of remittances on economic growth in the Maghreb countries, namely, Tunisia, Morocco, and Algeria from 2000 to 2022. Using the system generalized method of moments (GMM) in a panel data analysis, we found strong evidence of a positive relationship between remittances and economic growth. We also found that financial development acted as a complement in the remittances-growth relationship. A clearer understanding of the channels through which remittance flows will enhance economic growth in the Maghreb countries may assist policymakers to formulate appropriate policies. In particular, a policy environment that promotes financial system development would serve to attract more remittances.

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1. Introduction

In fact, remittances affect the receiving country's economy through various transmission channels. On the one hand, remittances represent a vital source of external financing for the domestic economy, alleviating credit constraints, spurring investment, and thereby contributing positively to economic growth (Giuliano and Ruiz-Arranz, 2009). Remittances may also help the domestic economy during idiosyncratic recessions because they serve as an insurance mechanism, boosting consumption and increasing disposable income when other sources of domestic aggregate demand are depressed (Choi, 2007).

While remittances are an important source of income for the emigrants' families, they are often exposed to exchange rate risk and transaction costs. Therefore, it is not surprising that the

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impact of remittances on economic growth is still ambiguous and depends on whether remittances are used for consumption or for investment purposes (Kumar et al. 2018). The net amount of this income largely depends directly on the associated transaction costs of sending remittances. Also, high remittance-transfer costs not only encourage the use of informal channels, with negative implications for the financial sector, but also discourage migrants from sending higher remittance flows (Misati et al. 2019), e.g. postal services and friends or relatives travelling to the recipient countries, as a means to send remittances. The flow of remittances is also affected by the degree of competition among the transfer service providers, the legal restrictions established by monetary authorities on the financial service providers, senders and recipients, and the availability of information to the senders and recipients (Kock and Sun, 2011).
In general, remittances are largely personal transactions carried out by migrants and sent to their friends and families; they tend to be well targeted to the needs of their recipients. Their ability to reduce poverty and to promote human development is well documented and often reported as beneficial to overall development (Ratha, 2007). However, remittances, which can be similar to welfare benefits, change the economic incentive structure and therefore the economic behavior of the receivers. Therefore, it is unclear if these changes will have a desirable effect on macroeconomic indicators, including economic growth. In this context, Rempel and Loddell (1978) noted that, for the most part, remittances were financing and housing expenditures, with limited dynamic effects. At the same time, most socioeconomic studies offered a strongly negative view of remittances; it was argued that remittances were used for conspicuous consumption, thus increasing dissatisfaction among non-migrants and discouraging labor supply and effort on the part of recipients, thus increasing dependency and delaying rural development and change.

It is widely accepted that a well-developed financial system is considered as one of the key foundations on which sustained economic development can be built (Demirguc-Kunt, 2006). Indeed, as Levine's (2005) comprehensive review of finance and development makes it clear, financial systems have five closely interrelated roles: to produce information ex ante about possible investments opportunities and allocate capital to them; to monitor investments and exert corporate governance after providing finance; to facilitate the trading, diversification and management of risk; to mobilize and pool savings; and to facilitate the exchange of goods and services. The financial sector is well placed to mobilize funds like remittances to productive investments and income/employment generating activities (Mundaca, 2009; Nyamongo et al.2012; Adekunle et al. 2020). These arguments above support the fact that financial development is an important channel through which remittances influence economic growth.

The relationship between remittances, financial development and economic growth has been of interest to migration scholars for quite some time. Whenever it was indicated that remittances have increased in or perceived to have an impact on a particular country or region, subsequent studies have followed in conjunction with financial development. The majority of the existing studies showed that remittances have pro-growth effects in the presence of a developed financial system (Aggarwal, et al. 2011; Ramirez, 2013).

Our motivation is to examine and empirically evaluate the significance of the relationship between remittances and economic growth through the financial development channel in 3 Maghreb countries, namely, Tunisia, Morocco, and Algeria from 2000 to 2022. The inclusion of this variable in the model can be motivated by the fact that remittances alone would not be strong enough to promote economic growth. In this context, many empirical studies have investigated the key channels of how remittances affect economic growth. Indeed, this study

examines whether financial development can be a positive moderator for the impact of remittances on economic growth from the perspective that financial development stands for the absorptive capacity of host economies, as in the spirit of endogenous growth theories (Tang and Zhang, 2016).

This paper contributes to the existing literature in two ways. First, as pointed out in the empirical literature, that impact of remittances on economic growth may be conditioned by other factors, particularly financial development; the present study examines this issue. With a poorly developed credit market, households may use remittances as an alternative source of finance to fund activities (Bettin and Zazzaro, 2012). However, it is possible that a well-functioning financial market helps to lower the monetary and non-monetary costs of channeling remittances into the formal sector, thereby enabling more growth-enhancing projects. Second, in terms of policy implications, the results of this research will guide policy makers in designing policies aimed at better directing external capital, such as remittances, towards sectors with the highest effect on economic growth. Our regressions show that a solid financial system complements the positive effect of remittances on economic growth.

Therefore, the remainder of this paper is organized as follows: The second section presents a brief literature overview. Then, the third section describes the data and empirical methodology. As for the fourth section, it presents the results and discussion, and finally, the last section presents the conclusion and policy recommendations

2. Literature review

2.1. Remittances and economic growth

Many empirical studies focus on the impact of remittance inflows on the living standards of recipient households. In this context, Abdih et al. (2012) showed that remittances help lift huge numbers of people out of poverty by enabling them to consume more than they could otherwise. They also tend to help the recipients maintain a higher level of consumption during economic difficulty (Chami et al. 2012). Recent studies report that these inflows allow households to work less, take on risky projects they would avoid if they did not receive this additional source of income, or invest in the education and healthcare of the household. In other words, remittances are a benefit for households. Others focus on the short run macroeconomic impact of remittances, typically finding a positive relationship with aggregate income, investments and employment (Dzansi, 2013).

The effects of remittance inflows on economic growth depend on how such financial resources are used, whether directly by recipients or indirectly, through the intermediation of financial institutions, by other people in the country. If they can be channeled into productive investment, or if they enhance the creditworthiness of recipients and their access to external financial resources, the impact on economic growth is positive. If, however, the usage of remittances is for increasing consumption and expenditures on housing, land and other forms of second-hand non-financial assets, the association with the economic growth is very weak (Coon, 2014).

Similarly, if remittances are used to finance current consumption, this may lead to faster inflation and an increase in the relative price of non-tradable items. The resulting appreciation in the real exchange rate may then discourage exports and have a negative effect on economic growth (Chami et al. 2005). A negative effect could also be exerted if remittances encourage individuals to substitute leisure for work (Chami et al. 2003). In this context, Salvador and

Ducanes (2019) studied the effects of remittances on the economic growth of the manufacturing sector in low-and lower middle-income countries. They concluded that remittances can adversely affect long-run manufacturing growth via a "Dutch Disease" channel. Indeed, remittances, which are deposited in local banks, increase both the economy's liquidity and credit supply and demand. If excess demand for money ensues, there is upward pressure on the interest rate.

In a study covering up to 113 countries from 1970 to 1998, Chami et al. (2005) pointed out a negative association between remittances and economic growth. They noted that remittances are intended for consumption and do not act as a source of capital for economic growth. The fact that remittances are initially spent on consumption, housing, and land, and are not used for direct productive investment is often taken as a loss of resources for promoting economic growth. Some other studies that found a negative or no relation between remittances and economic growth include Barajas et al. (2009) and Gupta (2005). Similarly, a study by the International Monetary Fund (2005), covering 101 countries from 1970 to 2003, found no significant link between remittances sent by migrants and economic growth or between remittances and variables such as education or investment rates. On the other hand, Ekanayake and Mihalis (2008) showed that remittances inflow significantly improves economic growth in developing countries covering Asia, Africa, and Latin America and the Caribbean from 1980 to 2006.

As for Giuliano and Ruiz-Arranz (2009), they analyzed the economic growth of a set of 73 developing countries from 1975 to 2020 and showed that, on average, remittances have no significant influence on economic growth. Similarly, Jongwanich (2007) examined the effects of migrant remittances on economic growth for a panel of 17 countries in the Asia and Pacific region from 1993 to 2003. They found a statistically insignificant coefficient associated with remittances in the economic growth equation. For their part, Lim and Simmons (2015) examined the economic importance of remittances flows to 13 countries in the Caribbean Community and Common Market, from 1975 to 2010. They found no long run association between remittances and economic growth in the region. They also concluded that the remittances flow to the Caribbean are mostly used to finance consumption needs rather than invest in growth-enhancing projects.

On the other hand, Fayissa and Nsiah (2010) studied the impact of remittances on economic growth using panel data from 36 African countries from 1980 to 2004. They found that remittances positively influence economic growth by providing an alternative way to finance investment and helping to overcome liquidity constraints. In addition, Yaseen (2012) investigated the impacts of remittances on economic growth for the panel data of nine MENA countries (Algeria, Egypt, Jordan, Libya, Morocco, Oman, Syria, Lebanon and Tunisia) from 2000 to 2010, and showed a significant increase in remittance inflows to promote economic growth in the sampled countries. Moreover, using the system GMM estimator, Ben Mim and Ben Ali (2012) found that remittances can improve economic growth by encouraging human capital accumulation in 15 MENA countries from 1980 to 2009. In this vein, Nsiah and Fayissa (2013) pointed out a positive association between economic growth and remittances, using a panel of 64 different countries in Africa, Asia, and Latin America-Caribbean (LAC) from 1987 to 2007.

Using a dynamic panel estimation of 33 top remittance-recipient developing countries from 1979 to 2011, Chowdhury (2016) confirmed that remittances exert a positive influence on economic growth in the sampled countries. As for Meyer and Shera (2017), they studied the

economic growth effect of remittances in 6 countries, Bulgaria, Albania, Moldova, Macedonia, Romania, and Bosnia Herzegovina from 1999 to 2013 and noted that remittances exert a positive effect on economic growth. Furthermore, in a study covering 4 North African countries from 1980 to 2012, Zghidi et al. (2018) showed that remittances tend to have a stronger effect on economic growth in countries with higher economic freedom. However, analyzing the impact of remittances on economic growth in African countries from 1980 to 2006, Oumansour et al. (2019) showed that in a sample of 34 African countries, remittances have a significant and positive effect on economic growth. For their part, Ekanayake and Moslares (2020) analyzed the effects of remittances on economic growth and poverty in 21 LAC from 1980 to 2018. They concluded that remittances have a positive effect on economic growth in the majority of the countries studied. On this subject, Gniniguè and Ali (2022) found that remittances contribute to human capital accumulation, investment, and consumption in WAEMU countries. (Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, and Togo) from 1980 to 2017.

More recently, Tchekoumi and Nya (2023) examined the link between migrant remittances and economic growth in six countries belonging to the Economic and Monetary Community of Central Africa zone from 1990 to 2018. They found that there is a non-linear relationship between migrant remittances and economic growth that translates into the existence of two regimes, thus, confirming the existence of a threshold effect. Second, under the first regime, remittances have a positive and significant impact on economic growth, while under the second regime this impact is negative. They also argued that the non-linear relationship between remittances and economic growth depends mainly on trade openness, private investment and political stability

2.2. Interactions between remittances and finance in promoting growth

Current discussions on the relation between remittances and financial development are based on the question whether these two variables are substitutes or complements. On the one hand, the complementarity hypothesis claims that remittances and financial development foster one another. While a higher degree of financial development allows migrants to send money home faster, more safely and above all more cheaply, large amounts of remittances stimulate the interest of financial institutions and public authorities, bringing about higher levels of competition between financial intermediaries, as well as institutional reforms aiming at channeling remittances towards productive investment. In addition, a more developed financial system in the home country should entail lower costs of transferring money (Freund and Spatafora, 2008). Finally, in countries where the banking system is well developed, remittances may complement bank credit or may act as collateral to gain access to it. Migrants might then be encouraged to transfer money to their families in the hope that it will not be wasted in unproductive consumption (Chami et al. 2005). On the other hand, a substitution mechanism could also be at work: when domestic credit markets are poorly developed, a large number of households with potentially productive investment projects have no access to external finance or may borrow only at higher interest rates. In this case, remittances may be used as an alternative source of finance allowing recipient households to fund productive activities.

The empirical literature on the relationship between remittances and financial development tests two hypotheses; the substitutability hypothesis on the one hand, and the complementarity hypothesis, on the other. For example, Giuliano and Ruiz-Arranz (2009) concluded that remittances have a positive and significant effect on economic growth and financial development facilitates such growth (especially in countries with less developed financial

systems), but have a negative impact in countries with a more developed financial system in a panel of 100 developing countries from 1975 to 2002.Substitutability between these two variables is also evident in Barajas et al. (2009). This argument is supported by Ramirez and Sharma (2009) who claimed remittances to be economic growth enhancing in a panel of 23 LAC countries from 1990 to 2005. Both of these studies indicate that in areas with low levels of financial development remittances act as substitutes for financial markets.

In contrast, Mundaca (2009) examined the influence of remittances on economic growth in the context of 25 Latin America and the Caribbean nations from 1970 to 2002 and found that while remittances alone can have a positive and significant impact on economic growth, the impact is even greater when the country has good financial intermediation. For their part, Bettin and Zazzaro (2012) studied the role of remittances in promoting growth in66 developing countries from 1970 to 2005, controlling for financial development and governance institutions. They showed that remittances can improve economic growth only in countries with a properly functioning banking sector and well-established governance institutions.

In addition, El Hamma (2018) investigated the conditional effects of remittances on economic growth in 14 MENA countries from 1982 to 2016. He revealed a complementary relationship between financial development and remittances to ensure economic growth. He also showed that remittances promote economic growth in countries with a developed financial system and a strong institutional environment. On a panel of 54 developing countries from 1970 to 2010, Sobiech (2019) established that the more financially developed a country is, the smaller the effect of remittances on economic growth. Remittances can promote economic growth, but the effect is significant only at low levels of financial development.

For their part, Olayungbo and Quadri (2019) examined the relationship among remittances, financial development and economic growth in a panel of 20 Sub-Saharan African (SSA)countries from 2000 to 2015. They concluded that remittances and financial development are positively associated with economic growth. The interactive term confirmed that financial development acted as a substitute in the remittances-growth link. Similarly, Jongwanich and Kohpaiboon (2019) examined the impact of remittances on economic growth in developing Asian and Pacific countries, from 1993 to 2013, controlling for financial development. They highlighted some degree of substitutability between remittances and financial development. As for Cao and Kang (2020), they studied the effect of remittances and financial development on the economic growth of 29 economic transition countries from 2000 to 2015. They found that there is a positive link between remittances and economic growth. They also confirmed that remittances and the level of financial development have a substitute relationship in promoting economic growth.

On the contrary, the complementarity relationship between remittances and financial development in improving economic growth is found by Mundaca (2009). Using the panel data of 25 LAC countries from 1970 to 2002, she found that while remittances alone can have a positive and significant impact on long-run growth, the impact is even greater when the country has good financial intermediation. Similarly, Aggarwal et al. (2011) considered one hundred and nine countries from 1975 to 2007 and examined the relation between remittances and financial development. They found that a greater financially developed system might lead to larger measured remittances, since financial development helps increase the propensity to remit via official channels.

On the other hand, Nyamongo et al. (2012) examined the role of remittances and financial development on economic growth in a panel of 36 countries in Africa from 1990 to 2009. They concluded that remittances appear to be working as a complement to financial development. As for Bettin and Zazzaro (2012), they examined the role of remittances in promoting growth in66 developing countries from 1970 to 2005, controlling for financial development and governance institutions. They showed that remittances can promote economic growth only in countries with a properly functioning banking sector and well-established governance institutions. In this vein, Ramirez (2013) estimated the impact of remittances and financial variables on the economic growth of selected high- and low-income countries in LAC from 1990 to 2007. They showed that a positive effect of remittances in both income groups was stronger in the presence of credit, although credit and the degree of economic freedom were positive and significant only in the upper income countries.
In addition, Akobeng (2016) estimated the effectiveness of remittances in 41 SSA countries from 1981 to 2010. He found that a well-developed financial infrastructure that promotes the accessibility of migrants and their families in the home country to formal financial institutions is a panacea for increasing remittance inflows for poverty reduction. For his part, Fromentin (2018) examined the relationship between remittances and financial sector development in a panel of 36 LAC countries from 1970 to 2013. He found a positive, significant, and robust bidirectional link between remittances and financial development for the sampled countries.

On the other hand, Kadozi (2019) studied the impact of remittance inflows on economic growth in 45 SSA countries from 1980 to 2014. He found that remittance-growth impact is positively and statistically significantly conditioned by the country's level of development, financial development, and education in the region. In this context, Adekunle et al. (2020) examined the structural linkages between remittances and financial system development in 53 African countries from 1986 to 2017. They found a positive long-run relationship between remittances and financial development. They also argued that, while attracting migrants' transfers who can have significant short-run poverty-alleviating advantages, in the long run, it might be more beneficial for African governments to promote financial system development using alternative financial development strategies.

For their part, Kacou et al. (2022) investigated the dynamic interactions between the migrant remittances and the financial development from a multidimensional perspective in 22 SSA countries from 2004 to 2017. They found that migrant's remittances are detrimental for the overall financial institutions while the financial institutions are found to positively influence the remittances inflows. More recently, Panthi and Devkota (2024) studied the effect of remittances on economic growth using annual time series data from 1980 to 2021. They explored whether financial development intermediates the effects of remittances on economic growth. They revealed that remittances and financial development significantly and positively increase the economic growth of Nepal despite remittances mainly being used for primary consumption.

This paper seeks to extend this literature by examining the conditional effect of remittances on economic growth. Specifically, we investigate the interaction between remittances and financial development to assess the conditions in which remittances can improve economic growth in Maghreb countries.

3. Data and empirical methodology

3.1. Data

This paper considers a sample of 3 Maghreb countries namely, Tunisia, Morocco, and Algeria. The choice of the selected countries for this study is primarily dictated by the availability of reliable data over the sample period. The panel covers the 2000-2022 period. The dependent variable is economic growth, measured as the growth rate of real GDP per capita at 2015 USD prices. The main variable of interest (remittances) and the other control variables are obtained from the World Development Indicators database (World Bank, 2025).

Remittances are generally defined as the sum of three items in the IMF's Balance of Payment Statistics: the compensation of employees (part of the income component of the current account), workers' remittances (part of current transfers in the current account) and migrants' transfers (part of the capital account). This also reveals the standard definition in the World Development Indicators database of the World Bank.

We include a country´s level of financial development as another regressor, because it helps saving and investment decisions. Financial markets also allow for risk diversification through the negotiation of financial instruments that facilitate identification of profitable investment projects and mobilize savings on them. Financial development (FD) is defined as the ratio of credit provided by the banking sector to GDP. This indicator measures how much intermediation is performed by the banking system, including lending to the public and the private sectors. Calderon and Liu (2003) found that a higher ratio of credit provided by the banking sector to the GDP shows more financial services and therefore, more efficient financial intermediation and greater contributionstooveralleconomic growth.

The hypothesis that remittances and other economic and institutional variables affect economic growth is tested by estimating the dynamic panel data model for GDP per capita growth over the 2000-2022 period. Specifically, we consider the most used variables in the empirical economic growth theory defined as follows:

• Initial GDP per capita (log): log of real GDP per capita. The link between initial per capita GDP and growth rates is a vital implication of the neoclassical growth theory; that is, an economy´s growth performance depends on its initial position. This literature indicated that, ceteris paribus, backward countries with a low capital-output ratio may grow faster than rich countries due to the diminishing return to factors of production. A negative coefficient is expected.

• Inflation rate measured as the annual percentage change in the consumption price index. A negative coefficient is expected, as high inflation has been shown to affect economic growth negatively (Elder, 2004).

• Government spending defined as the ratio of government consumption to GDP. Excessive government spending is expected to crowd out investment in the private sector and be harmful to economic growth (Nguyen and Trinh, 2018). Thus, a negative coefficient is expected.

• Private investment (% GDP) is viewed as a direct proxy of contribution to capital accumulation, as well as an indicator of efforts to develop basic economic infrastructure. It is defined as the ratio of gross fixed capital formation to GDP. A positive coefficient is estimated, as greater investment shares have been shown to be positively associated with economic growth (Mankiw et al. 1992);

The extended model will also include the following institutional variable:

• The economic freedom of the World index from the Fraser Institute is used to measure the freedom of economic activities in a country. Higher indices are related to smaller governments (Area 1), stronger legal structure and security of property rights (Area 2), access to sound money (Area 3), greater freedom to trade internationally (Area 4), and more flexible regulations of credit, labor, and business (Area 5). The comprehensive area scores are all on a scale from zero to 10, with zero being the least and 10 being the freest. The greater the economic freedom, the more it enhances economic growth (Azman-Saini et al. 2010). Thus, a positive coefficient is expected. The data are obtained from Gwartney et al. (2024).

3.2. Empirical methodology

The purpose of our empirical analysis is to examine if financial development plays an important role in influencing the effects of remittances on economic growth in the Maghreb countries. To this end, we employ a specification that is broadly similar to Bettin and Zazzaro (2012). We consider the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta_1 REM_{i,t} + \beta_2 FD_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

Eq. (1) can also be alternatively written with the growth rate as a dependent variable as:

$$Growth_{i,t} = y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta_1 REM_{i,t} + \beta_2 FD_{i,t} + \beta_3 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

The subscript "t" represents the periods, whereas i represents the country, y is the logarithm of the real GDP per capita, REM is equal to remittances over GDP, FD is the financial development variable and X is the matrix of control variables, μ_t is a time specific effect, η_i is an unobserved country-specific fixed effect and $\varepsilon_{i,t}$ is the error term. Eq. (2) forms the basis for our estimation. $(\alpha - 1)$is the convergence coefficient.

While REM has the potential to affect economic activity through a host of channels, in a second set of regressions, we examine one specific link between REM and economic growth, specifically the one working through FD. The hypothesis we would like to test is whether the level of FD in the host country affects REM on economic growth. To this end, we add an interaction term constructed as the product of REM and the FD (i.e., REM*FD) to Eq. (2) as an additional explanatory variable, apart from the standard variables used in the economic growth equation. A negative coefficient indicates that remittances are more effective in boosting growth in countries with poorly developed financial systems. In other words, a negative interaction provides evidence of substitutability between remittances and financial development. On the other hand, a positive interaction would imply that the growth effects of remittances are enhanced in countries with better-developed financial systems. This implies complementarity of remittances and financial development.

We estimated equation (2) with an interaction term between remittances and the financial development variable as follows:

$$Growth_{i,t} = (\alpha - 1) y_{i,t-1} + \beta_1 REM_{i,t} + \beta_2 FD_{i,t} + \beta_3 (REM_{i,t}.FD_{i,t}) + \beta_4 X_{i,t} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (3)$$

This paper applies the GMM panel estimator developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). Overall, there are several advantages in the System GMM estimator since it controls for time-invariant country specific effects; deals with the endogeneity problem of lagged dependent variable; permits a certain degree of endogeneity in the other regressors, and optimally combines information on cross-country variation in levels with that on within-country variation in changes.

We analyze this endogeneity by using a two-step system GMM for the estimation of dynamic unbalanced panel data. In the case of a strong endogeneity, the two-stage least squares (2SLS) method can be used. However, Lin and Lee (2010) showed that estimations provided by 2SLS are often weak in the presence of heteroscedasticity. In this context, the GMM is more effective (Lee, 2007). Precisely, system GMM estimators are well-known to treat situations in which explanatory variables are not strictly exogenous. Therefore, the traditional fixed effect estimator is incoherent because the mean of the lagged dependent variable is correlated with the idiosyncratic error term. As mentioned by Nickell (1981), this problem becomes particularly interesting in dynamic panel data models with relatively few time periods. A particular solution has been established by Arellano and Bond (1991), Arellano and Bover (1995) and extended by Blundell and Bond (1998), who argued that the system GMM estimators will reduce the bias associated with the fixed effects in short panels and resolve the problem of endogeneity in dynamic panel data. It is worth mentioning that a two-step system GMM estimator is asymptotically more efficient than a one-step estimator (based on a sub-optimal weighting matrix). However, the former might produce a bias of uncorrected standard errors when the instrument count is high, implying that the number of instruments is less than the number of the cross-sections, which was emphasized by Roodman (2006).

Following suggestions by Roodman (2006), the validity of the instruments implemented in GMM is generally verified by using the Hansen and the Arellano-Bond's AR(2) tests for the estimation of autocorrelation. It is also worth noting that the asymptotic standard errors of the two-step GMM estimators can be reduced through decomposition into small samples (Windmeijer, 2005). As noted in Windmeijer (2005), a Monte Carlo simulation shows that the conventional asymptotic variance estimate of two-step GMM estimators is a good estimate of the variance of GMM estimators using all the true values of the parameters to calculate the efficient weight matrix. In other words, the estimated corrected variance of the two-step GMM estimators achieves more accurate inference results. The two-step system GMM estimators are a good estimation tested in a lot of existing research (Baltagi, 2008) and that is why we used it in this study.

4. Empirical results

Table (1) reports a preliminary analysis of the effects of remittances and financial development on economic growth. He also presents the coefficient estimates obtained from the baseline specification, which used an interaction term constructed as a product of remittances and financial development.

Table 1. The growth effect of remittances and financial development (2000-2022)

Variable	Estimation
Initial GDP per capita	-0.48** (-2.798)
Remittances	0.473** (2.809)
Financial development	0.702*** (3.465)
Remittances*Financial Development	0.13** (2.668)
Inflation	-0.83*** (-6.133)
Government spending	0.544*** (5.844)
Private investment	0.335** (3.018)
Index of Economic Freedom	0.352* (2.087)
Constant	49.575*** (4.399)
R-squared AR(2) test (p-value) Sargan test (p-value)	0.92 0.456 0.421

Note: AR(2) is a test of second order residual serial correlation while the J-test is the Sargan over-identification test. T-statistics are in parentheses. *, ** and *** indicate a statistical significance at 10%, 5% and 1% levels, respectively.

Further evidence of the importance of remittances to economic growth are shown in Table (1), where the financial development indicator is introduced into the model. The results suggest that the main variable of interest, migrant remittances are positive and statistically significant at 5 percent level, suggesting that remittances contribute significantly to economic growth in the Maghreb countries. The results suggests that a 1% increase in remittances leads to a 0.473 % increase in the economic growth. This conclusion is also consistent with the results of many studies, such as Nyamongo (2012) and Lim and Simmons (2015).

In addition, we explore whether the financial development of the recipient country influences the specific uses given to remittances and their capacity to influence growth. To this end, we estimate Eq. (2), which allows the influence of remittances on economic growth to vary across level of financial development in the recipient country. The financial development coefficient carries a positive sign and is statistically significant at 1 percent level, confirming a long-run

positive link between financial development and economic growth. The result means that, a 1% increase in financial development will lead to 0.702% increase in economic growth. This positive impact is in line with much of the empirical finance and economic literature (see Levine, 2005, for a broad survey). Additionally, the estimated regression passed both specification tests. The null hypothesis of no second-order serial correlation cannot be rejected at the 5% level. The regression is not plagued by a simultaneity bias as the orthogonality conditions cannot be rejected at the 5% level, as indicated by the Hansen test. This suggests that the equation is adequately specified and the instruments employed in the analysis are valid.

On the other hand, Table (1) displays the regression results based on interaction specification using an interaction term between remittances and the financial development. In this specification, we relied on the interaction term to establish the contingency. If the term is positive and significant, this would imply that the effect of remittances on economic growth increases with financial development. The first thing to note is that the sign of the coefficient of the interaction term between remittances and the financial development is positive, implying that remittances and the financial development act as complements. This suggests that the growth impact of remittances is enhanced in the presence of a better-developed financial system. Indeed, with improved financial development will result in more remittances being channeled through the official financial system. This will provide more liquidity to the financial system and thereby ensure that more and more credit becomes available. The provision of more credit to the productive sectors of the economy will promote economic growth. This finding supports the complementarity hypothesis and corroborates the findings by Bettin and Zazzaro (2012); Nyamongo et al. (2012) and Kadozi (2019). However, our results recommend that public authorities in today's Maghreb countries should try to maximize the effect of remittances by identifying policies aiming to improve financial development, that is, policies that facilitate the access to financial services, that offer information about the remittance market, and that guarantee greater transparency in the financial system. In so far as financial development has positive effects on economic growth, such policies should also help to accelerate the process of catching-up in the real income of emigration countries.

Most of the results regarding the other explanatory variables are also in line with the expectations. To test the conditional convergence hypothesis in the sample countries, we use the natural log of initial GDP per capita as an explanatory variable. As shown in Table (1), the coefficient of initial GDP per capita is both negative and statistically significant at 5 percent level, which confirms the convergence hypothesis for the selected countries. This is consistent with Barro and Sala-i-Martin (1997). Regarding macroeconomic stability, inflation and government spending have the expected signs and statistically significant at 1 percent levels. In addition, Private investment have positive and statistically significant coefficient at 5 percent level, indicating that greater private investment increases economic growth. The index of economic freedom is included in the model in order to explain the impact of institutional quality on economic growth. It takes a positive sign and is statistically significant at 10 percent level, considering that economic growth is stronger when economic freedom is high because it makes investment more productive. This finding is consistent with the survey conducted by Azman-Saini et al. (2010) who confirmed that economic freedom is an important factor for economic growth.

5. Conclusion and policy recommendations

This paper studied the impact of remittances on economic growth. More specifically, this paper sought to analyze whether the impact of remittances on economic growth is conditioned on financial development. A GMM panel data model was used to examine the link between remittances, financial development and economic growth on a panel of 3 Maghreb countries, from 2000 to 2022, where both remittances and financial development have a significant and positive impact on economic growth.

To explore how the level of financial development of the recipient country affects the impact of remittances on economic growth, we introduce an interaction term between remittances and the financial development level. The result finds some degree of complimentarily between remittances and financial development; that is, remittances potentially help to promote economic growth in countries where the financial system is developed.

From a policy perspective, it is important for policymakers to develop and implement policies to encourage remittance inflows through official channels. The role of public authorities could be to shape the financial environment to leverage these flows by promoting financial development. The Maghreb countries must implement better investment policies that will help to attract more investment from their emigrants, especially in countries with low ratios of remittances to GDP.

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