Pakistan Journal of Commerce and Social Sciences
2024, Vol. 18(1), 88-112
Pak J Commer Soc Sci

Impact of Financial Development on Macroeconomic Volatility: Does Human Capital Matter?

Mansoor Mushtaq, Gulnaz Hameed (Corresponding Author), Nasir Mahmood
Department of Economics and Agricultural Economics, PMAS-Arid Agriculture University, Rawalpindi, Pakistan
Email (Corresponding author): gulnaz.hameed@uaar.edu.pk

Muhammad Hanif
Department of Statistics, PMAS-Arid Agriculture University, Rawalpindi, Pakistan

Article History

Received: 19 Dec 2023 Revised: 29 Mar 2024 Accepted: 30 Mar 2024 Published: 31 Mar 2024

Abstract

This study adds to the body of literature by investigating the moderating effect of human capital in the association of financial development with macroeconomic volatility in a sample of Asian countries. From 1993 until 2021, annual panel data was collected. For empirical analysis, generalized least squares (GLS) and generalized method of moments (GMM) approaches have been estimated using STATA software. The results of the static and dynamic study demonstrate the detrimental direct as well as indirect effect of financial sector development on macroeconomic volatility via the human capital channel. Macroeconomic volatility is increased by trade openness and inflation, but remittances have a mixed effect. In order to benefit from financial development in terms of reducing macroeconomic instability, human capital is important. In the context of financial development, this study supports the literature's suggestions for fostering the development of human capital to promote sustainable economic growth.

Keywords: Asia, financial development, human capital, inflation, macroeconomic volatility, remittances, trade openness.

1. Introduction

The concept of macroeconomic volatility has gained attention of economists over the few decades. High macroeconomic volatility is a recurring characteristic of many countries and it can be a serious obstacle to sustainable economic growth. The development of financial sector remains crucial for macroeconomic volatility as economies have witnessed macroeconomic volatility due to financial crises in the history. Therefore, financial development has ignited some reasonable debate over its role in dampening macroeconomic volatility (Majeed & Noureen, 2018; Abanikanda & Dada, 2023).

Financial development is a channel for explaining macroeconomic volatility. There is a multi-dimensional relationship between financial development and macroeconomic volatility. Financial development can reduce macroeconomic volatility through the channels of reducing information asymmetries, increasing risk sharing and better resource allocation (Bencivenga & Smith, 1991; Kiyotaki & Moore, 1997; Caballero & Krishnamurty, 2001). Additionally, financial development can help to tackle the issue of financial crisis through channelizing the capital from savers to investors (Munir & Kakar, 2023). Conversely, financial development can become a source of aggravating macroeconomic volatility in case of excessive risk-taking by banks and interconnectedness of financial markets and institutions leading to amplifying macroeconomic volatility (Batuo et al., 2018; Ghosh & Adhikary, 2023).

Human capital is another important determinant of macroeconomic volatility. It is among central driving forces for sustainable growth of a country. Human capital accumulation level of an economy affects the quality of economic growth (Ganeva, 2010; Acemoglu et al., 2014). The claim is that human capital may lead to increased productivity, efficiency, creativity, and innovation (Emara & Raouf, 2017; Prasetyo & Kistanti, 2020), which results in macroeconomic stability (Minhaj, 2021). The population having advanced human capital is able to utilize modern techniques of production and is more productive (Prasetyo & Kistant, 2020), which results in more macroeconomic stability (Han & Lee, 2020). Without sufficient human capital generation, no nation has ever had a substantial increase in economic progress (Dirir, 2023).

Financial development improves human capital by improving people's well-being and skill development, and hence leads to sustained economic growth. Financial development immediately contributes to human capital, increasing the efficiency of transferring buying power from poor to affluent individuals in order to manage poverty. Finance helps to regulate poverty by affecting income, and finance may assist to alleviate poverty in the long run by increasing education and health status. This is made feasible by investing in skill development and providing services and infrastructure that increase health and life expectancy (Sehrawat & Giri, 2017; Sethi et al., 2019).

A developed financial system is a necessary complement to human capital (Evans et al., 2002). A well-developed financial market can mobilize the resources efficiently leading to more investment in the human capital through expenditure on education (Sehrawat & Giri, 2017). As a result, a well-capitalized human potential places a strong emphasis on human growth and potential, including people's information and abilities. It becomes a powerful tool for sustainable economic growth as productivity and consequently, revenue increase (Minhaj, 2021; Tsaurai, 2022).

The aim of the current study is to explore the possible association between financial development and macroeconomic volatility through the moderating role of human capital. This will be the first contribution of the current study in the literature. Bowen & Clercq

(2008) and Dutta & Sobel (2018) are two studies which suggested checking this moderating relationship; however, this has not been check empirically yet, to the best of our knowledge. Second, it utilizes two measures of financial development to show robust estimations. Third, it utilizes human capital index for the measurement of human capital. Fourth, it uses GMM for empirical examination, which eliminates problem of endogeneity. The empirical findings will help the policy makers to better understand the association of financial sector development and macroeconomic volatility via the moderating role of human capital which will ultimately affect sustainable growth.

The remainder of the study is organized as follows: Part two delves into the literature. Part three delves into the facts, theoretical underpinnings, and methodology. Part four presents the findings of the empirical research. Finally, conclusions are arrived upon.

2. Literature Review and Hypotheses Development

2.1 Financial Development and Macroeconomic Volatility

Most of the empirical studies have analyzed the critical role that development of financial sector plays in economic growth (King & Levine, 1993; Beck et al., 2006; Benczúr et al., 2019; Anthony-Orji et al., 2023). However, research on the linkage between financial sector development and economic growth volatility has received little attention.

A developed financial sector can help the economies in achieving sustainable economic growth. Financial sector development can lessen volatility of economic growth by promoting investment portfolios, as well as providing information on risk and return of various types of investment, which is helpful while allocating the capital-based sources more effectively and efficiently managing production activities that involve risks (Moore, 1986; Levine, 1997).

A deep and liquid financial system makes diversification easier (Acemoglu & Zilibotti, 1997), lowers investment and financial risks, and dampens macroeconomic fluctuations (Obstfeld, 1992; Beck et al., 2006). One of the main benefits of having a well-developed financial sector is that it reduces macroeconomic instability, which is more likely to occur in economies with inefficient financial sectors (Aghion et al., 2010). This also occurs by giving monetary policies a solid base (Cecchetti & Krause, 2001) or by easing household liquidity limitations (Jappelli & Pistaferri, 2011).

These channels have been verified by findings of recent empirical studies. The overall volatility of countries may be managed by strengthening their financial sectors. The instability of banking system may increase value added volatility (Fernández et al., 2016). There has been a drop in overall growth volatility due to financial development, with industrialized nations showing noticeably less volatility than developing nations (Xue, 2020). Volatility is significantly and negatively impacted by the expansion of the financial industry in South African nations (Kapingura et al., 2022). Banking industry and reforming the lending environment are necessary to increase economic stability (Munir & Kakar,

2023). A strong financial sector serves as a crucial absorber of shocks in mitigating negative effects of foreign shocks in domestic economy (Abanikanda & Dada, 2023).

The second strand of research contends that because of several flaws and constraints in the market, financial system may be less able for absorbing shocks and increases growth volatility (Jordà et al., 2013; Fang & Miller, 2014). More finance can lead to more risk-taking by banks and entrepreneurs or can facilitate over-leverage which may boost volatility (Aghion et al., 2010; Shleifer & Vishny, 2010). Financial development increases competition and reduces banks' value as a franchise, incentivizing the banks for taking higher risk. As governments do not provide bailouts during crises, banks have more incentives for gambling for resurrection and worsening the business cycle (Hellmann et al., 2000). According to Beck et al. (2006), countries where firms have less access to outside funding via capital markets, financial intermediaries exacerbate the consequences of volatility. It has a positive impact on financial uncertainty. Financial sector's growth are plagued by ongoing financial uncertainty, leading to a loss of investor confidence (Batuo et al., 2018).

The third literature strand contends that there is no significant association between macroeconomic volatility and financial sector development. An increase in stock market size relative to banking industry may have an impact on investment volatility across an economic cycle, but a rise in activity of stock market has no such impact. It is found that the financial structure has no bearing whatsoever on overall investment volatility. Supporting stability in investment growth may not be helpful in the transition to a financial system that is more market-oriented (Mallick, 2014; Bezooijen & Bikker, 2017). Considering this literature, we can hypothesize that:

- *H1: Financial development has a positive role in reducing macroeconomic volatility.*

2.2 Human Capital and Macroeconomic Volatility

It is widely accepted that human capital has a positive association with sustainable economic growth (Ali et al., 2018; Baltgailis, 2019; Vigliarolo, 2020). Several investments affect economic growth in considerable part. Increasing the capacity of human capital and making a variety of other non-physical investments fall under the category of non-physical investments that take time to mature (Prasetyo & Kistanti, 2020). The vital component of economy that transforms the world community is human capital. The primary sociocultural resource in society that affects creativity and production efficiency is known as human capital (Mamedov et al., 2019).

Due to human capital’s fundamental influence on microeconomics via schooling, knowledge acquisition, and experience, investment in human capital is essential (Dirir, 2023). The most precious asset in a nation is its human capital; without it, physical capital formation would not function well, which will limit economic progress (Garzarelli &

Limam, 2019). The human capital helps to boost an individual's productivity (Pomi et al., 2021).

Combining both non-physical and physical investment forms can boost economic expansion, generate job opportunities, and lower poverty (Seran, 2018). One of the four pillars of sustained economic growth is human capital (Prasetyo & Kistanti, 2020). Sustainable economic growth may be used as a measure that is closely related to human capital. It fosters entrepreneurial prospects to reach higher and more sustainable levels of economic growth (Acs, 2018; Panzabekova et al., 2019).

Ehrlich (2017) has developed a model to represent how human capital investments are distributed among creative and commercial industry knowledge. The results have shown that human capital drives economic growth. By raising investment in human capital, employers' and workers' better educational attainments can boost endogenous economic growth. Similarly, Chitsaz et al. (2019) studied entrepreneurship using two forms of human and social capital; communicative, cognitive and structural characteristics are employed to evaluate social capital. In the meanwhile, aspects of knowledge, skills, and self-efficacy are employed to study the human capital emphasis.

Human capital continues to be a primary engine of growth (Han & Lee, 2020). This favorable influence of human capital on sustainable economic growth has been confirmed empirically by Matousek & Tzeremes (2021). Economic complexity and human capital are strongly correlated because more complex economies have better production capacities and are more inclined to have notable growth of economy (Ali et al., 2018). Moreover, a nation's income can rise in parallel with improvements in human capital (Matousek & Tzeremes, 2021; Dirir, 2023). Thus, literature review refers to following hypothesis:

- *H2: Human capital influences the impact of financial development in reducing macroeconomic volatility.*

3. Theoretical Framework, Model and Data

3.1 Theoretical Framework

Economies may achieve sustainable and less volatile economic growth with the support of an effective financial system (McKinnon, 1973; Shaw, 1973). A more sophisticated financial system improves association between investors and savers, reduces information asymmetries, promotes diversification, lowers investment and financial risk, and attenuates macroeconomic volatility (Acemoglu & Zilibotti, 1997). It improves resource allocation and strengthens financial stability. Through mobilization and pooling of money for investment, financial development may promote growth (Levine, 2005). Financial market imperfection leads to increase in macroeconomic volatility (Aghion et al., 2010). In emerging economies without well-functioning financial institutions, boom-bust cycles are caused by or made worse by rapid changes in the direction of capital flows (Caballero & Krishnamurthy, 2001; Aghion et al., 2010).

According to Solow (1956) and Swan's (1956) endogenous growth theory, labor has the same impact on economic growth as any other source of production, such as capital and enterprise. Human capital is also a valuable mean of long-term economic growth and an important element in supporting sustainable economic growth (Lucas, 1988; Mankiw et al., 1992). The majority of research operations are carried out by educated personnel, leading to sustaining growth (Romer, 1990). Borrowing limitations and human capital are negatively correlated and has negative impact on growth (De Gregorio, 1996). Lower investment in human capital becomes a source of higher macroeconomic volatility (Krebs et al., 2010). Financial development boosts human capital development is by enabling individuals to overcome constraints of liquidity and finance their investment in education and skills (Schultz, 1961; Becker, 1962).

3.2 Model Specification and Methodology

The estimation models to be used in the investigation are presented in equations 1 and 2, respectively, under this information. Contributions to the development of the defined model has been made by the research of Kapidani & Luci (2019), Kapingura et al. (2022), Sehrawat & Giri (2017), Abanikanda & Dada (2023) and Ghosh & Adhikary (2023) in terms of model definition.

The specification of model can be written as:

MVOL = (FD, TO, REMIT, INF) *(A)*
*MVOL = (FD*HC, TO, REMIT, INF)* *(B)*

In econometric form, this is written as:

$$MVOL = \beta 01 + \beta 11\ FD + \beta 21\ TO + \beta 31\ REMIT + \beta 41\ INF + \mu \quad (1)$$
$$MVOL = \beta 02 + \beta 12\ FD*HC + \beta 22\ TO + \beta 32\ REMIT + \beta 42\ INF + \mu \quad (2)$$

From 1993 through 2021, yearly panel data was used for nineteen Asian nations (see Appendix 1). This is because the levels of human capital in these economies are comparable (Mushtaq et al., 2022). The findings can be generalized for rest of other developing economies. The dependent variable is macroeconomic volatility (MVOL), calculated by standard deviation of economic growth. For checking the robustness of estimations, three different measures of macroeconomic volatility been used. These are volatility of log of GDP measured in current U.S. $ (MVOL1), volatility of log of GDP per capita measured in current U.S. $ (MVOL2) and volatility of GDP per capita growth measured in annual percentage (MVOL3). This measure has already been used by previous studies (Acedański & Pietrucha, 2019; Ma & Song, 2018; Abanikanda & Dada, 2023; Ghosh & Adhikary, 2023).

The first regressor is financial development (FD1), calculated by domestic lending to private sector as percentage of GDP by banks. Previously, research used this financial development measure (Kpodar et al., 2019; Kapingura et al., 2022; Abanikanda & Dada, 2023; Ghosh & Adhikary, 2023). The second proxy of financial development is financial

development index (FD2). The composite indices of financial sector development are better due to issues of measures of financial development as these indices perform better in measuring the overall development of financial sector (Sahay et al., 2015; Pradhan et al., 2017). Therefore, financial development index will be used as a financial development indicator following previous studies (Pradhan et al., 2017; Sahay et al., 2015; Ghosh & Adhikary, 2023). This proxy has been used to check the robustness of results. Worker remittances (REMIT), measured by logarithm of personal remittances received in current U.S. $ is the second regressor. This measure was originally employed by Ahamada & Coulibaly (2011) and Combes & Ebeke (2013). Trade openness (TO), measured as summation of exports and imports as GDP percentage has been used as the third regressor. This measure was previously employed by previous studies (Awan et al., 2021; Dabla-Norris & Srivisal, 2013; Kpodar et al., 2019; Tang & Abosedra 2020). The fourth regressor is the inflation (INF), measured by consumer price index. Awan et al. (2021), Ma & Song (2018), Yang & Liu (2016) and Zouaoui et al. (2018) have used this measure.

Bowen & Clercq (2008) and Dutta & Sobel (2018) are the studies that theoretically suggested checking the interacting function of the human capital in financial development's impact on macroeconomic volatility. Nevertheless, no study has looked at how human capital interacts with financial development to affect macroeconomic volatility. Following previous studies, the present study will employ the interaction (FD1*HC) to investigate the moderating influence of human capital. To assess the robustness of estimations, (FD2*HC) will be used. Penn World Tables (PWT) calculates the human capital index, a mixed measure at national level. It is an index of human capital per individual, which is based on educational years (Barro & Lee, 2013) and educational returns (Psacharopoulos, 1994). This index is calculated using the average number of schooling years and an expected return rate on education.

For an economic analysis, only ordinary least square (OLS) method can be employed. In actuality, it is uncommon to come across such ideal circumstances. There is often a large variety of placements when heterogeneity or unique influence (H_i) is not mentioned. In this case, OLS findings are skewed and inconsistent due to the missing variables in the model. The fixed effects model is suited for estimation of empirical in this situation, where $i = H_i$ shows all of effects which are observable and it calculates a mean which is conditional. Here i is the intercept based on cross-sections of regression according to fixed effect model. Fixed effect assumes that the explanatory or explained variable is biased or affected by anything in the cross-section, which needs to be considered. In view of hypothesis for a linkage among specific error terms and causal variables, this is rationale. It is possible to compute the regressors' net effect on the dependent variable. The random effect model, on the other hand claims that, similar to i, t in model of linear regression having combined error term, i is the random country specific component. Usually, heteroskedasticity is an issue with this kind of model. To some extent, these problems can be resolved by using statistics and standard errors that are robust or heteroskedasticity-consistent.

Measurement inaccuracy is a basic econometric challenge in empirical research. There are two kinds of measurement mistakes: errors in regressions and errors in variables. Measurement inaccuracy leads to problems for ordinary least squares assumptions and estimation techniques. The coefficients of ordinary least squares estimators are neither unbiased nor efficient in the case of error of measurement. A solution to problem of measuring inaccuracy was put out by Fuller (1987). This type of model may be estimated using the GMM as missing variables or measurement error may induce endogeneity in model (Arellano & Bond, 1991).

For circumstances in which explanatory variables are strictly non-exogenous, they serve as generic estimators. It addresses problems like as autocorrelation and heteroskedasticity in a unified system (Arellano & Bover, 1995). The GMM estimators are made to make estimates on panel data in particular situations. As a lagged dependent variable, the explanatory or dependent variable should be utilized. Usually, explanatory variables have a correlation with past values and maybe with the error's current realizations. GMM provides effective estimates when heteroskedasticity is present. GMM estimators are often applied to rectify endogenous variable bias (Blundell & Bond, 1998).

4. Results and Discussion

4.1 Descriptive Statistics

Key statistical measurements for a range of economic indicators are shown in Table 1. The first and second measures, with means of 0.1006 and 0.0918, respectively, show substantially lower levels of macroeconomic volatility. Additionally, the moderate standard deviations of 0.0696 and 0.0700 for these variables point to a generally stable economic climate. However, the bigger standard deviations of 2.4831, along with substantially higher mean of 2.3930, indicate a higher degree of economic fluctuation in third measure of macroeconomic volatility. Two measurements are used to illustrate financial development: the first one has mean value of 66.9789 and standard deviation value of 48.4921, whereas, second measure has a considerably lower mean value of 0.4282 and standard deviation of 0.1940. Different levels of financial development are shown by these statistics; the first measure has a larger range of values, ranging from 4.7437 to 261.4612. A mean value of 98.0964 and standard deviation value of 93.8274 are used to describe trade openness, which indicates significant variation in trade volumes or policies among the entities under observation. The huge overflow of financial transactions is reflected in remittances, which have a mean of 6.56e+09 and a broad range between 1101304 and 9.19e+10. Lastly, a wide range from -4.0094 to 268.1505 is reflected by the inflation figure, which has mean value of 7.5264 and standard deviation value of 16.4150. The studied entities exhibit different degrees of price level variations, as shown by these values. In conclusion, the table offers a thorough description of economic indicators, emphasizing the variety and scope of these measurements among various organizations.

Table 1: Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
Macroeconomic Volatility 1	.1005659	.0700127	.0061878	.5652617
Macroeconomic Volatility 2	.0918451	.0695986	.0049307	.5753836
Macroeconomic Volatility 3	2.393001	2.483057	.0335389	24.9908
Financial Development 1	66.97889	48.49214	4.743741	261.4612
Financial Development 2	.4282166	.1940417	.0744483	.9383779
Trade Openness	98.09644	93.82737	15.81031	442.62
Remittances	6.56e+09	1.29e+10	1101304	9.19e+10
Inflation	7.526363	16.41504	-4.009434	268.1505

The Hausman test for specification was developed by Hausman (1978) for choosing between fixed and random effects model. Random effect model is appropriate for estimation of empirical model, according to null hypothesis. Contrarily, fixed effect model is sufficient, according to the alternative theory. We had to decide between random and fixed effects models because we were using panel data. Selecting between random and fixed effects models has been done by Hausman test. It was conducted using the null hypothesis that random effects model fits our model. The results showed that fixed effects model is appropriate.

The diagnostic tests of Wooldridge test with null hypothesis of no presence of serial correlation and Wald test with null hypothesis of no heteroscedasticity showed the presence of serial correlation and heteroscedasticity, respectively as both hypotheses have been rejected for all specifications. Therefore, the generalized least squares (GLS) technique is better for static analysis than the fixed effects model.

4.2 Impact of Financial Development on Macroeconomic Volatility

Table 2: Impact of Financial Development on Macroeconomic Volatility (GLS)

Independent Variable	Dependent Variable					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	MVOL1	**MVOL2**	**MVOL3**	**MVOL1**	**MVOL2**	**MVOL3**
FD1	-.00011 (0.135)	-.00004 (0.520)	-.00108 (0.660)			
FD2				-.05000* (0.003)	-.03965* (0.019)	.29507 (0.598)
TO	-.00003 (0.561)	-.00007 (0.169)	.00245 (0.153)	-.00001 (0.720)	-.00004 (0.344)	.00161 (0.297)
LNREMIT	- .00363*** (0.060)	- .00521* (0.006)	-.19565* (0.002)	- .00315*** (0.099)	-.00471* (0.013)	-.20542* (0.001)
INF	.00169* (0.000)	.00178* (0.000)	.02445* (0.000)	.00164* (0.000)	.00173* (0.000)	.02559* (0.000)
Constant	.17546* (0.000)	.19898* (0.000)	6.05031* (0.000)	.17774* (0.000)	.19990* (0.000)	6.13131* (0.000)

*, ** and *** show level of significance at 1%, 5% and 10 %, respectively.

Table 2 displays the GLS results for the direct correlation between macroeconomic volatility and financial growth. The results show that just one (specification 4) of the six model formulations shows a substantial and inverse link between macroeconomic volatility and financial development. Every other model indicates that financial sector development has a little impact on macroeconomic volatility. In all cases, trade openness has little effects on macroeconomic volatility. In all parameters, worker remittances have a negative and considerable influence on macroeconomic volatility. Nonetheless, macroeconomic volatility is favorably and severely impacted by inflation in all circumstances.

Table 3: Impact of Financial Development on Macroeconomic Volatility (System GMM Results)

Independent Variable	Dependent Variable					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	MVOL1	**MVOL2**	**MVOL3**	**MVOL1**	**MVOL2**	**MVOL3**
LMVOL	.58119* (0.000)	.57942* (0.000)	.56744* (0.000)	.58366* (0.000)	.57904* (0.000)	.57694* (0.000)
FD1	-.00050* (0.000)	-.00046* (0.000)	.01935* (0.000)			
FD2				-.11963* (0.000)	-.10669* (0.001)	2.88657* (0.018)
TO	.000548* (0.000)	.00044* (0.000)	-.00997* (0.007)	.00060* (0.000)	.00051* (0.000)	-.00953* (0.016)
LNREMIT	.00437*** (0.064)	.00335 (0.144)	.09786 (0.237)	.00658* (0.017)	.00500** (0.059)	.12898 (0.152)
INF	.00220* (0.000)	.00224* (0.000)	.01175 (0.199)	.00215* (0.000)	.00217* (0.000)	.006464 (0.481)
Constant	-.08093*** (0.108)	-.05658 (0.250)	-1.67211 (0.348)	-.11547** (0.033)	-.08218 (0.118)	-2.29477 (0.213)

*, ** and *** show level of significance at 1%, 5% and 10%, respectively

In Table 3, GMM has been utilized to estimate the models that incorporate the direct impact of financial development on macroeconomic volatility. Every static analysis specification from the past has been recalculated. The outcomes of static and dynamic analysis differ from one another. In all specified regressions (1–6), the lagged explained variable has a positive and substantial influence. According to the coefficients of lagged macroeconomic volatility, a one percent rise in macroeconomic volatility from the prior year will result in an increase in macroeconomic volatility from the current year of 0.581%, 0.579%, 0.567%, 0.583%, 0.579%, and 0.576%, respectively.

The findings suggest that, of the six requirements, four (1, 2, 4, and 5) indicate a strong and negative influence of financial development on macroeconomic volatility. This was important before, but primarily in terms of the GLS results specification. This suggests that using GMM has enhanced the findings, proving the superiority of dynamic model over static model for estimate. The notion is supported by study's findings. The estimations show that macroeconomic volatility for both metrics is significantly and negatively impacted by expansion of financial sector.

By acquiring and verifying information, sophisticated financial institutions can aid in reducing the role of financial frictions brought on by asymmetric information issues on volatility at macroeconomic level. Banks become more adept in gathering information and may employ economies of scale in their supervision and screening of loans, which reduces the likelihood of post-moral hazard and adverse selection. This will even out business cycles, reduce financial friction, and restrict the financial accelerator impact. Macroeconomic volatility is higher in nations with underdeveloped and insufficient financial systems because credit supply and demand are more cyclical. Deeper financial systems therefore have the ability to lower growth volatility by easing constraints on corporate liquidity and encouraging long-term investment (Iwasaki et al., 2020; Bezooijen & Bikker, 2017; Levine & Warusawitharana, 2021; Kapingura et al., 2022). It is believed that financial growth enhances risk-sharing, which lessens financial limitations, boosts businesses' and consumers' capacity to withstand shocks, and permits more consumption smoothing (Abanikanda & Dada, 2023; Akinlo & Dada, 2023).

The ability of banks to provide savings opportunities matters for volatility of growth in both low-income countries and other developing countries, but the credit channel is much more important for low-income countries, reflecting tighter credit constraints (Kpodar et al., 2019). The middle-income nations appear to benefit the most from improving their financial systems. This is because high-income nations already have an effective mechanism for allocating financial resources (Mohaghegh & Valipour, 2020; Ghosh & Adhikary, 2023).

Trade openness was previously insignificant in all parameters, but it has a positive and substantial effect on macroeconomic volatility in four. In two critical areas, worker remittances have a positive and significant impact on macroeconomic volatility. In contrast, inflation has a strong and positive effect on macroeconomic volatility in four key ways.

4.3 Impact of Financial Development on Macroeconomic Volatility through Human Capital

Table 4: Impact of Financial Development on Macroeconomic Volatility through Human Capital (GLS)

Independent Variable	Dependent Variable					
	Model 7	**Model 8**	**Model 9**	**Model 10**	**Model 11**	**Model 12**
	MVOL1	**MVOL2**	**MVOL3**	**MVOL1**	**MVOL2**	**MVOL3**
FD1*HC	-.00006* (0.008)	-.00004*** (0.081)	-.00066 (0.403)			
FD2*HC				-.01672* (0.000)	-.01342* (0.004)	-.02032 (0.895)
TO	2.07e-06 (0.968)	-.00004 (0.436)	.00277*** (0.103)	-.00001 (0.768)	-.00004 (0.368)	.00204 (0.177)
LNREMIT	-.00373** (0.049)	-.00521* (0.005)	-.19814* (0.001)	-.00383** (0.042)	-.00525* (0.005)	-.20038* (0.001)
INF	.00163* (0.000)	.00173* (0.000)	.02371* (0.000)	.00160* (0.000)	.00169* (0.000)	.02476* (0.000)
Constant	.17943* (0.000)	.20107* (0.000)	6.13515* (0.000)	.19013* (0.000)	.20980* (0.000)	6.14013* (0.000)

*, ** and *** show level of significance at 1%, 5% and 10 %, respectively

The moderating role of human capital in the GLS model-determined link between macroeconomic volatility and financial development is shown in Table 4. While the other two parameters (3 and 6) are negligible, the following four model settings (1, 2, 4, and 5) demonstrate a considerable and detrimental influence of financial development on macroeconomic volatility. According to table 2 across four of the six criteria, the influence of financial development on macroeconomic volatility; which is small in table 5 across all specifications, has increased to be significant. This suggests that financial growth lowers economic volatility through the channel of human capital.

Trade openness has insignificant impact on macroeconomic volatility in all specifications except in specification 9, where it is positive and significant. Worker remittances still negatively and significantly impact macroeconomic volatility in all specifications. In all parameters, macroeconomic volatility is favorably and strongly impacted by inflation. The findings demonstrate that GLS static analysis is inappropriate for empirical model analysis. Consequently, GMM has been used for the model's dynamic analysis.

Table 5: Impact of Financial Development on Macroeconomic Volatility through Human Capital (System GMM Results)

Independent Variable	Dependent Variable					
	Model 7	**Model 8**	**Model 9**	**Model 10**	**Model 11**	**Model 12**
	MVOL1	**MVOL3**	**MVOL4**	**MVOL1**	**MVOL3**	**MVOL4**
LMVOL	.57384* (0.000)	.56965* (0.000)	.57419* (0.000)	.57909* (0.000)	.57384* (0.000)	.57443* (0.000)
FD1*HC	-.00017* (0.000)	-.00015* (0.000)	.00515* (0.001)			
FD2*HC				-.03736* (0.000)	-.03278* (0.001)	.61302*** (0.091)
TO	.00057* (0.000)	.00046* (0.000)	-.00984* (0.009)	.00063* (0.000)	.00053* (0.000)	-.00853** (0.036)
LNREMIT	.00515* (0.033)	.00384*** (0.101)	.12199 (0.150)	.00763* (0.007)	.00578** (0.034)	.15040*** (0.105)
INF	.00214* (0.000)	.00219* (0.000)	.00996 (0.280)	.00210* (0.000)	.00213* (0.000)	.00540 (0.558)
Constant	-.09993** (0.051)	-.06881 (0.167)	-1.83985 (0.314)	-.14740* (0.010)	-.10767** (0.052)	-2.29814 (0.234)

* and ** show significance levels at 1% and 5%, respectively

Table 5 presents the estimation of the moderating impact of human capital using the GMM model on the association of financial development with macroeconomic volatility. The four parameters (1, 2, 4, and 5) indicate that macroeconomic volatility is negatively and significantly impacted by financial development. This suggests that financial development uses human capital as a conduit to lessen macroeconomic instability, demonstrating the reliability of the findings seen in Table 4.

The interaction term is negative and substantial with regard to the moderating effect of human capital on the relationship between financial development and macroeconomic instability. Financial development and human capital have a moderating effect that helps to lower macroeconomic instability. Education, trainings and skills are the main drivers of development, and the more governments spend on individuals which are their education, training and skills, the more productive and innovative they may be. (Minhaj, 2021). Modern, sustainable, and high-quality economic growth must be fueled by human capital capacities and quality characteristics that foster an entrepreneurial culture since no country can experience significant economic growth without sufficient development of its human resources (Prasetyo, 2019).

There is a good correlation between sustained economic growth and the targeted financial and educational initiatives. (Dutta & Sobel, 2018; Thathsarani et al., 2021). In addition to the contribution of information and human capital to economic growth, the endogenous growth model highlights the need of enhancing inventions, research, and development in order to create technology as an endogenous variable. The endogenous growth model's premise is supported by the interaction of human capital and finance, which contributes to long-term sustainable economic growth (Chirwa & Odhiambo, 2018). By offering additional credits for education and skill development, the financial sector's development has also been recognized as a critical component linked to the development of human capital and sustainable economic growth. Greater capital stocks resulting from advanced financial growth significantly boost worker productivity in major corporations. The conclusion that a developed financial system is a necessary complement to human resources or manpower development in the growth process is supported by the positive link between money and human capital, which shows that financial development and human capital are complementary for growth (Evans et al., 2002; Thathsarani et al., 2021).

Trade openness has positive impact on macroeconomic volatility in four specifications as estimated in table 3. An economy that depends on trade to fuel economic activity is more vulnerable to external shocks and thus more volatile, which is why more openness increases volatility (Haddad et al., 2013). Openness to trade increases vulnerability to external shocks (Kose et al., 2006, Majeed & Noreen, 2018). The fact that Asian countries are landlocked and have restricted access, which increases production volatility, may be one of the explanations for the beneficial effect that trade openness has in macroeconomic volatility (Awan et al. 2021). A nation becomes more vulnerable to outside shocks as its commerce becomes more open. Increased economic specialization and production of the comparative advantage are the goals of more integrated commerce, which increases vulnerability to external shocks particular to a given commodity. Furthermore, because trade openness increases economic uncertainty, financial vulnerability may also rise (Tauqir & Majeed, 2021). The findings are aligned with the previous studies (Easterly et al., 2001; Awan et al., 2021; Dabla-Norris and Srivisal, 2013; Tang & Abosedra, 2020).

In all four criteria, inflation continues to have a significant and favorable impact on macroeconomic volatility. Rising inflation may have an influence on macroeconomic stability by increasing the opportunity cost of keeping non-interest-bearing money (Tang & Abosedra, 2020). There is a strong correlation between macroeconomic volatility and inflation, and the central bank's efforts to lower inflation volatility also lower production volatility (Conrad et al., 2010). Financial intermediaries' capability to absorb shocks and, consequently, lower production volatility is weakened by inflation (Majeed & Noreen, 2018). Higher inflation rates are associated with an unstable monetary environment, which is harmful to the smooth operation of financial markets and hinders economic growth along with higher production volatility. This might be the explanation for the positive relationship between inflation and output volatility (Awan et al., 2021). High inflation environments

tend to amplify macroeconomic instability (Ma & Song, 2018). The results are consistent with previous studies (Rocheteau & Wright, 2005; Tang & Abosedra, 2020).

Worker remittances have significant and positive impact on macroeconomic volatility in five specifications, which was significant in only two specifications in table 3, showing the results in the models of direct impact of financial development. Remittances have been found to have mixed impact on macroeconomic volatility. It is negative in the static models, whereas, positive in the dynamic models. Remittances can lessen production volatility by diversifying investment portfolios in an effort to protect against economic uncertainty (Chami et al., 2012). If the remitters use the money, they send home to fund their investing activities, they may choose to cut back on these transfers in an unstable and riskier economic climate (Ahamada & Coulibaly, 2011). Economic development increases when remittances are used to fund long-term projects since these initiatives foster growth. Macroeconomic volatility therefore declines (Koren & Tenreyro, 2007; Easterly et al., 2001). The negative impact of remittances on macroeconomic volatility supports the existing studies (Adeniyi et al., 2019; Bugamelli & Paterno, 2011). By adjusting the behavior of remittance receivers and mitigating consumption and investment, remittances may have opposing impacts on volatility. Due to their exogenous nature, remittance flows, like terms of trade, have the potential to create economic instability (Chami et al., 2012; Tauqir & Majeed, 2021).

This implies that model estimation by GMM and using the moderator of human capital in the nexus of financial development and macroeconomic volatility not only improves the results for the coefficient of financial development but also for supporting variables. The results are robust to changing the proxy of financial development as well.

5. Conclusion

This study explores the role of human capital as a moderator in the association between financial development and macroeconomic volatility in nineteen Asian countries. Annual panel data from 1993 through 2021 were gathered for this purpose using 12 models. The dependent variable in the first three specifications (1-3) is three different measures of macroeconomic volatility and main independent variable is financial sector development measured by domestic credit to private sector by banks as GDP percentage. The robustness of results was examined in the following three specifications (4-6) by substituting the independent variable with the second measure of financial development financial development index for checking the robustness of results in first three specifications. In the following six specifications (7-12), the indirect effect of financial development on macroeconomic volatility through human capital channel has been tested by using the moderator of human capital and financial development. The Wald test and Wooldridge test, respectively, have been used to test for heteroscedasticity and serial correlation, and the results demonstrate the existence of both issues. Consequently, the GLS approach has been

used to verify the static link between the variables. The dynamic connection has been verified by the GMM approach.

According to Bowen & Clercq (2008), financial development affects macroeconomic volatility via the human capital channel. This has been confirmed by an examination of the interactive function of human capital. The empirical findings of the study suggest that financial development reduces macroeconomic volatility through the channel of human capital.

The results of GLS's static analysis show how macroeconomic volatility is directly impacted by financial development. According to the data, just one of the six indicators points to a considerable and negative contribution of financial development to macroeconomic instability. Every other model shows that financial development has very little effect on macroeconomic volatility. Consequently, the moderating role of human capital in the relationship between financial development and macroeconomic instability has been evaluated by the GLS model. The four criteria show that the expansion of the financial industry has a significant detrimental impact on macroeconomic volatility through the channel of human capital.

Mixed findings from the static analysis point to the need for using GMM for dynamic analysis. Every static analysis specification from the past has been recalculated. The outcomes of static and dynamic analysis differ from one another. In every specification, the lag in the explained variable's influence is positive and substantial. In four of the six parameters, the financial development has a negative and substantial effect on macroeconomic volatility. The moderator variable of financial sector development and human capital is significant and negative in four out of six model specifications which show the robustness of moderating relationship of human capital as estimated by the static model. This shows that financial development reduces macroeconomic volatility and leads to sustainable economic growth if countries have a sufficient human capital level, as suggested by Dutta & Sobel (2018) and Minhaj (2021).

When the influence of supporting variables is taken into account, the impact of inflation and trade openness on macroeconomic volatility is positive, whilst the impact of worker remittances on macroeconomic volatility is mix. The results are unaffected by changes in the dependent variable which shows that results are robust.

4.1 Theoretical Implications

The development of financial sector and macroeconomic volatility are complicated by many moderating factors. Human capital is an essential moderating component because it influences the efficacy of financial development, dampening macroeconomic volatility as confirmed by findings of the current study. Low levels of macroeconomic instability are often associated with advanced financial systems in countries with high levels of human capital. This argument from current study results guides us that human capital should be a major consideration when calculating the effect of financial development on macroeconomic volatility.

4.2 Policy Implications

As human capital plays an important role in acquiring the advantages of financial sector development for controlling macroeconomic volatility, it is argued that the countries analyzed should place a focus on human capital in order to have sustainable economic growth.

In the context of financial development, concentrating on human capital to reduce macroeconomic volatility entails making investments in high-quality education, acquiring practical skills and supporting lifelong learning. These nations may improve their human capital and enable people to have gains from financial development by implementing these policies. Secondly, these countries should focus on trade policies in order to have lower macroeconomic volatility. Finally, inflation should be controlled. This will assist these countries to achieve sustainable levels of economic growth.

4.2 Future Research

Even though the current study provides significant and robust results, it has a few limitations. Firstly, this study is limited to a subset of Asian countries. The reason for this is that the data on human capital index is available only for these economies. Future research should consider the comparison of developing and developed countries subject to the availability of data. Secondly, the nexus has been checked by using financial development index. It can be further extended by using the indices of financial markets and financial institutions. Thirdly, future studies should consider the moderating role of other variables, such as diversification in financial development and macroeconomic volatility nexus.

Research Funding

The authors received no research grant or funds for this research study.

REFERENCES

Abanikanda, E. O., & Dada, J. T. (2023). External shocks and macroeconomic volatility in Nigeria: does financial development moderate the effect? *PSU Research Review*, [ahead-of-print: 20 November 2023].

Acedański, J., & Pietrucha, J. (2019). Level and dynamics of financial depth: consequences for volatility of GDP. *Applied Economics*, *51*(31), 3389-3400.

Acemoglu, D., & Zilibotti, F. (1997). Was Prometheus unbound by chance? Risk, diversification, and growth. *Journal of political economy*, *105*(4), 709-751.

Acemoglu, D., Gallego, F.A., & Robinson, J.A. (2014). Institutions, Human Capital and Development. NBER Working Paper Series 19933, https://www.nber.org/papers/w19933.

Acs, Z.J., Estrin, S., Mickiewicz, T., & Szerb, L. 2018. Entrepreneurship, institutional economics, and economic growth: an ecosystem perspective. Journal Small Business Economics, 51(2): 501-514.

Adeniyi, O., Ajide, K., & Raheem, I. D. (2019). Remittances and output growth volatility in developing countries: Does financial development dampen or magnify the effects? *Empirical Economics*, *56*, 865-882.

Aghion, P., Angeletos, G. M., Banerjee, A., & Manova, K. (2010). Volatility and growth: Credit constraints and the composition of investment. *Journal of Monetary Economics*, *57*(3), 246-265.

Ahamada, I., & Coulibaly, D. (2011). How does financial development influence the impact of remittances on growth volatility? *Economic modelling*, *28*(6), 2748-2760.

Akinlo, T., & Dada, J. T. (2023). Remittances, Financial Development and Poverty Reduction in Sub-Saharan Africa. *Iranian Economic Review*, [in press].

Ali, M., Egbetokun, A., & Memon, M. H. (2018). Human capital, social capabilities and economic growth. *Economies*, *6*(1), 2.

Anthony-Orji, O. I., Orji, A., Ogbuabor, J. E., & Uka, L. C. (2023). Money matters a lot: empirical analysis of financial development, financial inclusion and economic growth in Nigeria. *International Journal of Economic Policy in Emerging Economies*, *17*(1), 100-117.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), 29-51.

Awan, A., Asghar, N., & Rehman, H. U. (2021). The impact of financial globalization on output volatility: Panel data evidence for Asian countries. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, *15*(1), 213-239.

Baltgailis, J. (2019). The issues of increasing the effectiveness of teaching comparative economics. *Insights into Regional Development*, 1(3), 190-199.

Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of development economics*, *104*, 184-198.

Batuo, M., Mlambo, K., & Asongu, S. (2018). Linkages between financial development, financial instability, financial liberalisation and economic growth in Africa. *Research in International Business and Finance*, *45*, 168-179.

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & finance*, *30*(11), 2931-2943.

Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of political economy*, *70*(5, Part 2), 9-49.

Bencivenga, V. R., & Smith, B. D. (1991). Financial intermediation and endogenous growth. *The review of economic studies*, *58*(2), 195-209.

Benczúr, P., Karagiannis, S., & Kvedaras, V. (2019). Finance and economic growth: financing structure and non-linear impact. *Journal of Macroeconomics*, *62*, 103048.

Bezooijen, E.F.S. and Bikker, J.A. (2017), Financial Structure and Macroeconomic Volatility: A Panel Data Analysis, Utrecht University School of Economics Tjalling C. Koopmans Research Institute, Discussion Paper Series 17-13.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, *87*(1), 115-143.

Bowen, H. P., & De Clercq, D. (2008). Institutional context and the allocation of entrepreneurial effort. *Journal of International Business Studies*, *39*, 747-767.

Bugamelli, M., & Paterno, F. (2011). Output Growth Volatility and Remittances. Economica, 78(311), 480-500.

Caballero, R. J., & Krishnamurthy, A. (2001). International and domestic collateral constraints in a model of emerging market crises. *Journal of monetary Economics*, *48*(3), 513-548.

Cecchetti, S. G., Krause, S. (2001). Financial structure, macroeconomic stability and monetary policy, NBER working paper, No. 8354.

Chami, R., Hakura, D. S., & Montiel, P. (2012). Do Worker Remittances Reduce Output Volatility in Developing Countries? Journal of Globalization and Development, 3(1), 854-923.

Chirwa, T. G., & Odhiambo, N. M. (2018). Exogenous and endogenous growth models: A critical review. *Comparative Economic Research. Central and Eastern Europe*, *21*(4), 63-84.

Chitsaz, E., Tajpour, M., Hosseini, E., Khorram, H., Zorrieh, S. (2019). The Effect of human and social capital on entrepreneurial activities: a case study of Iran and implications. *Entrepreneurship and Sustainability Issues*, 6(3): 1393-1403.

Combes, J. L., & Ebeke, C. (2011). Remittances and household consumption instability in developing countries. *World Development*, *39*(7), 1076-1089.

Conrad, C., Karanasos, M., & Zeng, N. (2010). The link between macroeconomic performance and variability in the UK. Economics Letters, 106(3), 154–157.

Dabla-Norris, E., & Srivisal, N. (2013). Revisiting the link between finance and macroeconomic volatility (Working Paper No. 13/29). Washington, DC: International Monetary Fund.

De Gregorio, J. (1996). Borrowing constraints, human capital accumulation, and growth. *Journal of Monetary Economics*, *37*(1), 49-71.

Dirir, S. A. (2023). The Potential of Human Capital Investment in Contributing to Economic Growth: ARDL Approach in the Context of Eastern and Southern Africa. *Eurasian Journal of Economic and Business Studies*, *1*(67), 52-69.

Dutta, N., & Sobel, R. S. (2018). Entrepreneurship and human capital: The role of financial development. *International Review of Economics & Finance*, *57*, 319-332.

Easterly, W., Islam, R. and Stiglitz, J. E., (2001). Shaken and stirred: explaining growth economic volatility. *Journal of Financial Stability*, 22, 101-120.

Ehrlich, I., Li, D., & Liu, Z. 2017. The Role of Entrepreneurial Human Capital as a Driver of Endogenous Economic Growth. Discussion Paper Series, IZA Institute of Labor Economics, DP No. 11048. http://ftp.iza.org/dp11048.pdf

Emara, A., & Raouf, E. (2017). The role of education inequality in the growth-volatility relationship in MENA region. *E3 Journal of Business Management and Economics.*, *8*(1), 018-025.

Evans, A. D., Green, C. J., & Murinde, V. (2002). Human capital and financial development in economic growth: new evidence using the translog production function. *International Journal of Finance & Economics*, *7*(2), 123-140.

Fang, W., & Miller, S. M. (2014). Does financial development volatility affect industrial growth volatility? *International Review of Economics & Finance*, *29*, 307-320.

Fernández, A. I., González, F. and Suárez, N., (2016). Banking stability, competition, and economic volatility. *Journal of financial stability*, 22, 101-120.

Fuller, W. (1987). Measurement Error Models. *John Wiley, New York*.

Ganeva, R. S. (2010). Human Capital in Economic Growth: A Review of Theory and Empirics. *Journal Economic Thought*, (7), 131- 149.

Garzarelli, G., & Limam, Y. R. (2019). Physical capital, total factor productivity, and economic growth in sub-Saharan Africa. *South African Journal of Economic and Management Sciences*, *22*(1), 1-10.

Ghosh, P., & Adhikary, M. (2023). Dynamicity and nonlinearity in the association between different facets of financial development and macroeconomic volatility: evidence from the World Economy. *International Review of Applied Economics*, 37(6), 745-766,

Haddad, M., Lim, J. J., Pancaro, C., & Saborowski, C. (2013). Trade openness reduces growth volatility when countries are well diversified. *Canadian Journal of Economics/Revue canadienne d'économique*, *46*(2), 765-790.

Han, J. S., & Lee, J. W. (2020). Demographic change, human capital, and economic growth in Korea. *Japan and the World Economy*, *53*, 100984.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, *46(6)*, 1251-1271.

Hellmann, T. F., Murdock, K. C., & Stiglitz, J. E. (2000). Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough? *American economic review*, *91*(1), 147-165.

Iwasaki, I., Kočenda, E., & Shida, Y. (2021). Institutions, financial development, and small business survival: Evidence from European emerging markets. *Small Business Economics*, 1-23.

Jappelli, T., & Pistaferri, L. (2011). Financial integration and consumption smoothing. *The Economic Journal*, *121*(553), 678-706.

Jordà, Ò., Schularick, M., & Taylor, A. M. (2013). When credit bites back. *Journal of money, credit and banking*, *45*(s2), 3-28.

Kapidani, M., & Luci, E. (2019). The Effects on innovation from financial sector development: evidence from developing countries. *Journal of Competitiveness*, *11*(2), 84-94.

Kapingura, F. M., Mkosana, N., & Kusairi, S. (2022). Financial sector development and macroeconomic volatility: Case of the Southern African Development Community region. *Cogent Economics & Finance*, *10*(1), 2038861.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The quarterly journal of economics*, *108*(3), 717-737.

Kiyotaki, N., & Moore, J. (1997). Credit Cycles. *The Journal of Political Economy*, 105 (2), 211-248.

Koren, M., & Tenreyro, S. (2007). Volatility and development. *The Quarterly Journal of Economics*, *122*(1), 243-287.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2006). How do trade and financial integration affect the relationship between growth and volatility? *Journal of International Economics*, *69*(1), 176-202.

Kpodar, K. R., Goff, L. M., & Singh, R. J. (2019). Financial deepening, terms of trade shocks and growth in low-income countries [Working Paper No. 19/68]. International Monetary Fund, Washington DC.

Krebs, T., Krishna, P., & Maloney, W. (2010). Trade policy, income risk, and welfare. *The Review of Economics and Statistics*, 92(3), 467-481.

Levine, O., & Warusawitharana, M. (2021). Finance and productivity growth: Firm-level evidence. *Journal of Monetary Economics*, *117*, 91-107.

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of economic literature*, *35*(2), 688-726.

Levine, R., (2005), "Finance and Growth: Theory and Evidence" in P. Aghion and S. N. Durlauf (eds.), Handbook of Economic Growth, Vol. 1A, North-Holland, Amsterdam, 865-934.

Lucas, R. (1988) 'On the mechanics of economic development', Journal of Monetary Economics, 22(1), 3–42.

Ma, Y., & Song, K. (2018). Financial development and macroeconomic volatility. *Bulletin of Economic Research*, *70*(3), 205-225.

Majeed, M. T., & Noreen, A. (2018). Financial development and output volatility: a cross-sectional panel data analysis. *The Lahore Journal of Economics*, *23*(1), 97-141.

Mallick, D. (2014). Financial development, shocks, and growth volatility. *Macroeconomic Dynamics*, *18*(3), 651-688.

Mamedov, Z. F., Mineva, O. K., & Glinchevskiy, E. I. (2019). Innovative approach to Human Capital Management under conditions of strong turbulence of Fourth Industrial Revolution. In 37th International Scientific Conference on Economic & Social Development: Socio Economic Problems of Sustainable Development (pp. 1517-1524). Baku, Azerbaijan.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The quarterly journal of economics*, *107*(2), 407-437.

Matousek, R., & Tzeremes, N. G. (2021). The asymmetric impact of human capital on economic growth. *Empirical Economics*, 60, 1309-1334.

McKinnon, R. I. (1973). Money and capital in economic development. The Brookings institution, Washington D. C.

Minhaj, N. (2021). The implication of Human Capital Development on Economic Growth by Using Cointegration and Error Correction Modelling in Pakistan. *Global Economics Science*, 2(2), 73-79.

Mohaghegh, M., & Valipour, A. S. (2020). Income-dependent impacts of financial development and human capital on economic growth. A non-stationary panel analysis. *Theoretical & Applied Economics*, *27*(4), 263-274.

Moore, B. J. (1986). Inflation and financial deepening. *Journal of development Economics*, *20*(1), 125-133.

Munir, N., & Kakar, M. (2023). Assessing The Role of Financial Development in Macroeconomic Stability: A Time-series Analysis of Pakistan. *Applied Economics Journal*, *30*(1), 32-45.

Mushtaq, M., Ahmed, S., Fahlevi, M., Aljuaid, M., & Saniuk, S. (2022). Globalization and employment nexus: Moderating role of human capital. *Plos one*, *17*(10), e0276431.

Obstfeld, M., (1992). Risk-taking, global diversification, and growth. *American Economic Review, American Economic Association*, 84(5), 1310-1329.

Panzabekova, A., Satybaldin, A., Alibekova, G., & Abilkayir, N. (2019, August). Human capital for sustainable development: a comparative analysis of regions of the Republic of Kazakhstan. In *IOP Conference Series: Earth and Environmental Science* (Vol. 317, No. 1, p. 012013). IOP Publishing.

Pomi, S. S., Sarkar, S. M., & Dhar, B. K. (2021). Human or physical capital, which influences sustainable economic growth most? A study on Bangladesh. *Canadian Journal of Business and Information Studies*, 3(5), 101-108.

Pradhan, R. P., Arvin, M. B., Bahmani, S., Hall, J. H., & Norman, N. R. (2017). Finance and growth: Evidence from the ARF countries. *Quarterly Review of Economics and Finance*, 66, 136–148.

Prasetyo, P. E., & Kistanti, N. R. (2020). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues*, *7*(4), 2575.

Prasetyo, P.E. (2019). The Reliability of Entrepreneurial Productivity as Driver of Economic Growth and Employment. *International Journal of Entrepreneurship*, 23(4), 1-15.

Psacharopoulos, G. (1994). Returns to investment in education: A global update. *World Development*, *22*(9), 1325-1343.

Sahay, M. R., Cihak, M., N'Diaye, M. P. M., Barajas, M. A., Pena, M. D. B. A., Bi, R., ... & Yousefi, M. R. (2015). *Rethinking financial deepening: Stability and growth in emerging markets*. International Monetary Fund, Washington DC.

Rocheteau, G., & Wright, R. (2005). Money in search equilibrium, in competitive equilibrium, and in competitive search equilibrium. *Econometrica*, *73*(1), 175-202.

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, *98*(5, Part 2), S71-S102.

Schultz, T. W. (1961). Investment in human capital. *The American economic review*, *51*(1), 1-17.

Sehrawat, M., & Giri, A. K. (2017). An empirical relationship between financial development indicators and human capital in some selected Asian countries. *International Journal of Social Economics*, *44*(3), 337-349.

Seran, S. (2018). Investment and Quality of Human Capital in Economic Development. Journal of Economics and Development Studies, 6(1): 30-42.

Sethi, N., Mishra, B. R., & Bhujabal, P. (2019). Do market size and financial development indicators affect human capital of select south Asian economies? *International Journal of Social Economics*, *46*(7), 887-903.

Shaw E. S., (1973). Financial deepening in economic development. New York, Oxford University Press, London and New York.

Shleifer, A., & Vishny, R. W. (2010). Unstable banking. *Journal of financial economics*, *97*(3), 306-318.

Solow, R.M. (1956) 'A contribution to the theory of economic growth', Quarterly Journal of Economics, 70(1), 65–94.

Swan, T. (1956). Economic growth and capital accumulation. *The Economic Record*, 32(2), 334–361.

Tang, C. F., & Abosedra, S. (2020). Does financial development moderate the effects on growth volatility? The experience of Malaysia. *Margin: The Journal of Applied Economic Research*, *14*(4), 361-381.

Tauqir, A., & Majeed, M. T. (2021). Remittances and Output Volatility: The Role of Financial Development. *The Lahore Journal of Economics*, *26*(2), 77-109.

Thathsarani, U. S., Wei, J., & Samaraweera, G. R. S. R. C. (2021). Financial inclusion's role in economic growth and human capital in South Asia: An econometric approach. *Sustainability*, *13*(8), 4303.

Tsaurai, K. (2022). Human Capital Development, Remittances, and Poverty in Central and Eastern European Countries: What Do the Data Tell Us? Comparative Economic Research. Central and Eastern Europe, 25(1), 23-38.

Vigliarolo, F. (2020). Economic phenomenology: fundamentals, principles and definition. *Insights into Regional Development*, *2*(1), 418-429.

Xue, W. J. (2020). Financial sector development and growth volatility: An international study. *International Review of Economics & Finance*, *70*, 67-88.

Yang, G., & Liu, H. (2016). Financial development, interest rate liberalization, and macroeconomic volatility. *Emerging markets finance and trade*, *52*(4), 991-1001.

Zouaoui, H., Mazioud, M., & Ellouz, N. Z. (2018). A semi-parametric panel data analysis on financial development-economic volatility nexus in developing countries. *Economics Letters*, *172*, 50-55.

Appendix 1

List of Countries (included in the study)

Armenia, Bangladesh, China, Hong Kong, India, Indonesia, Iran, Israel, Japan, Jordan, Malaysia, Mongolia, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, Turkey.