

The impact of financial development, globalisation and Dutch disease on the Iranian economy

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Abstract

The aim of this study is to investigate a new approach to Dutch disease. For this purpose, the effect of remittance flows on the multidimensional financial development index in Iran during the monthly cycle of 1980-2023 has been investigated. The non-linear approach of Soft Transfer Regression (STR) was used for the desired estimation. The estimated results indicate the existence of a non-linear relationship between all research variables and the multidimensional financial development index of Iran. The estimation results of the STR model show that when human capital, which is considered as a transfer variable, exceeds %3.3732, regime change will occur. The estimated slope parameter is also 10, which indicates a relatively fast adjustment speed. The results of estimating the coefficients of the variables included in the model also show that human capital has a positive and significant effect on financial development in both regimes. Although the remittance flow variable has a negative and significant effect on financial development in both regimes, its negative effect is much smaller at high levels of human capital than at low levels, indicating the asymmetric effect of remittance flows. Financial development. International variables, human capital, GDP positively affect financial development at low human capital levels, but these positive effects increase sharply at high levels. In general, the results show that remittances received in resource-rich countries such as Iran did not contribute positively to the development of the financial system, confirming the phenomenon of Dutch disease. In comparison, the development of the financial system is determined by the results of GDP, LTGs, PRF and HCI. According to the results of this research, it is suggested that policymakers should invest in the development of financial infrastructure, financial literacy training of human resources, etc. in Iran.

Keywords: Financial development, Dutch Disease, Iranian economy

1. Introduction

Studies show that remittance flows to developing and middle-income countries peaked in 2017 at \$466 billion, an increase of 8.5 per cent over the previous year (Mosakwa and Odhiambo, 2019); Ilbatanoni et al. 2021; Chus et al, 2022; Dano-Adenso et al, 2020). It is undeniable that attention should be paid to the size and important role of remittances in the economies of recipient countries; remittances now serve as an important source of external financing, accounting for more than twice net ODA and second only to foreign direct investment (Agarwal et al, 2011). The impact of these financial flows on various macroeconomic variables such as financial development, exchange rate, human capital and GDP growth is tangible. Despite the potential of remittances to improve the economic status of households and their potential positive effects on poverty reduction and growth, questions have been raised from another perspective about their direct impact on financial growth in recipient countries (Acosta et al, 2009). The link between remittances and financial growth is bidirectional. On the one hand, remittances can stimulate financial development by strengthening the banking infrastructure and increasing the funds available for lending or investment. On the other hand, remittances may inadvertently reduce banks' willingness to lend due to credit market constraints, which is associated with higher transaction costs (Ottor et al, 2016; Su et al, 2020). Another issue is that Dutch disease can be seen as a side-effect of the increase in remittance flows leading to a decrease in financial development. In other words, natural resources are considered to be one of the basic foundations of national wealth at the global level. Over the last fifty years, the economic literature has continuously investigated the impact of these resources on economic progress and poverty reduction in the following countries. Although early hypotheses suggested that access to and use of natural resource revenues would increase prosperity and improve the overall economy, there is ample evidence of inadequate economic performance and limited progress in some resource-rich countries (Naftiou, 2020). This contradiction between theory and actual experience in resource-rich economies gave

rise to the concept of "Dutch disease" as a nasty and powerful factor in production in resource-rich countries. The term was first used by The Economist on 26 November 1977 to describe a phenomenon in which advances in the extractive industries have spillover effects on other sectors of the economy. For example, the discovery of natural gas in the Netherlands boosted the economy but also strengthened the national currency and reduced the competitiveness of industrial sectors in other areas (Mastin and Torik, 2005). Factors such as the discovery of resources or a sudden increase in their prices, foreign aid and foreign direct investment can all lead to economic reactions similar to the Dutch disease (Ma et al, 2021); therefore, this issue is clearly evident in countries with oil income and abundant natural resources, where it can lead to a wide range of positive, negative or even non-linear economic consequences depending on the political-economic conditions (Asiameh et al, 2022). Therefore, it seems necessary to identify the importance of remittance flows, even though these flows represent one third of international capital movements and are known as the second most important capital. Previous research has often focused on the impact of remittances on economic growth, poverty reduction, education and, above all, financial development in recipient countries. Meanwhile, the main objective of this study is to examine the impact of various economic factors such as financial development, globalisation and Dutch disease on Iran's economy.

2. Theoretical foundations and background to the research

2.1 Theoretical literature

Financial development encompasses a set of processes that involve the improvement of the efficiency, accessibility, and depth of financial markets, utilizing various indicators to evaluate these dimensions. The process of financial development can be unpredictable and may follow several different paths. Financial development indicators, such as the ratio of liquid liabilities to Gross Domestic Product (e.g., money supply and inflation rate) and domestic credit to the private sector, measure the financial market's capability to finance the economy (Coppola et al., 2015; Sahrawat & Ji, 2014; Su et al, 2019). Studies on indicators should be continuously updated to accurately reflect changes in financial structures (Falahati & Law, 2012; Hassan et al., 2011). These indicators allow policymakers to monitor the financial landscape and make optimal decisions accordingly. Monetary indicators such as money supply and inflation rate reflect the overall economic condition and can aid in forecasting future economic trends (Alkoo et al, 2020). On the other hand, financial development plays a crucial role in advancing growth and economic development in Iran's economy. With improved quality and access to financial services, the private sector gains greater capacity for investment and innovation (Coppola et al, 2015). Specifically, in Iran, the ratio of domestic credit to the private sector indicates the financial sector's potential to meet the financial needs of companies and small and medium enterprises (Sahrawat & Ji, 2014). However, financial development must occur alongside institutional and infrastructural reforms to ensure financial stability and market effectiveness (Jadidi et al., 2014); therefore, a phenomenon that requires careful examination in Iran is the Dutch Disease. Given its vast oil resources, the country is prone to experiencing this affliction (Ahmad et al., 2020). The Dutch Disease can lead to an increase in the real exchange rate and reduce the competitiveness of non-oil goods and services (Lartey, 2007); therefore, meticulous management of foreign exchange revenues from oil exports is essential to prevent deindustrialization and its detrimental effects on the economy (Pang et al; 2007). One of the strategies to counteract the Dutch Disease in Iran is to reduce the excessive reliance on oil revenues and to invest these funds in other sectors. For example, investments in infrastructure and education can contribute to strengthening the non-oil sectors in the short and long term (Hamdi, 2013); consequently, while considering the challenges arising from financial development and the Dutch Disease, Iran should view globalization as an opportunity to achieve sustainable growth (Freeman & Kuisgul, 2007). Globalization, by advancing international trade, capital flows, and migration, can create new opportunities (Siu & Yang, 2015). Particularly, attracting foreign direct investment (FDI) can assist the country's economy in developing different sectors and becoming more competitive in global markets. However, globalization can be accompanied by various challenges, including negative consequences for countries with less developed labor markets (Zakaria, 2008). Iran must implement precise macroeconomic policies and plan for managing these challenges while maximizing the benefits of globalization (Benton-Short et al., 2005). Ultimately, for Iran's economy to achieve sustainable growth and to build resilience against economic shocks, it should operate using an integrated model based on financial development, oil revenue management to counter the Dutch Disease, and leveraging opportunities arising from globalization (Golub et al., 1988). This requires attention to infrastructure development, institutional reforms, precise management of natural resources, and investment in human capital to make the best use of the country's economic potential.

• The Relationship Between the Dutch Disease and Financial Development

The Dutch Disease is a phenomenon resulting from a country's heavy economic reliance on the export of natural resources such as oil and minerals and can lead to decreased competitiveness in other economic sectors. The adverse effects of this phenomenon on financial development are evident through several pathways. First, the appreciation of the exchange rate due to the inflow of capital from resource exports can make other products less competitive in international markets, thereby stifling the development of industry and agriculture (Bearce, 2013). Second, the impact of the Dutch Disease on domestic savings, which if present can constrain economic growth, as individuals tend to derive their income more from wealth-creating sectors and pay less attention to other sectors. The result of this dependency is a reduction in capital flow, particularly foreign direct investment, as the high value of the national currency makes investing in the country expensive (Botta, 2015). Furthermore, this situation can have a negative

impact on government revenues, as governments are less prepared to diversify revenue sources and overly rely on export revenues, which can lead to serious financial problems during an economic downturn or price declines (Hajjort, 2006). The Dutch Disease can also lead to inflationary pressures, thereby increasing uncertainty and discouraging the inclination to invest in the country (Paprikas & Rahe, 2015). To combat the negative impacts of the Dutch Disease on financial development, precise policies and suitable economic approaches are necessary. Allocating a portion of the revenues from natural resources to infrastructure and education investments can help increase productivity and competitiveness in the non-resource sectors (Jubair & Zouri-Ghorbel, 2011). Additionally, financial reserves in sovereign wealth funds or other investment instruments are recommended for use in times of economic downturns or price drops of resources. These strategies can help prevent economic recessions and support sustainable financial development.

• The Relationship Between Globalization and Financial Development

Globalization, through advancements in technology and communications, has strengthened the connection between economies and the reciprocal influence of cultures. This process plays a key role in financial development by increasing international trade and foreign direct investment (FDI). International trade provides countries access to global markets and aids in increasing exports and economic diversification, which consequently is effective in financial development (Zafar et al., 2019; Falahati & Law, 2012). FDI has also transformed into an important source of capital for developing countries and has led to the transfer of technology and knowledge, improving competitiveness and creating new job opportunities, which ultimately assists in poverty reduction (Farooq et al., 2020; Qayum et al., 2022). Globalization also has significant effects on cross-border capital flows, facilitating financial development by increasing the transfer of money between countries for investment purposes. However, these flows can lead to fluctuations in financial markets that must be carefully managed from a policy perspective (Guichard, 2017). In another aspect, remittances, as the transfer of money by migrants back to their home countries, represent a major source of income for developing countries. These financial flows have a countercyclical effect on financial development, improving local employment, investing in health and education, and supporting infrastructure projects. Additionally, remittances lead to increased financial inclusion as recipients are likely to utilize banking and financial services (Asiamah et al., 2022; Autor et al., 2016; Su et al., 2020).

2.2 Background of the research

Shahzad et al. (2014). The aim of this study was to investigate the impact of inbound remittance flows on financial sector development in South Asia. The study period ranged from 1989 to 2011. Using OLS and GMM methods, the results indicated that inbound remittances had a positive and significant effect on financial sector development.

Barro (2018). This study addressed the prevalence of the Dutch Disease in sub-Saharan Africa. Emphasizing on the rent from natural resources and using World Bank data, the paper demonstrates that the development of natural resources and globalization have led to the Dutch Disease in the region.

Bhattacharya et al. (2018). The study examined the role of inbound remittances on financial development in 57 remittance-receiving economies from 1991 to 2006. Using the sys-GMM method, the study showed that remittances positively influence financial development, particularly in developing countries.

Mahdavi Adel and Rouhani (2020): This research investigates the relationship between multidimensional financial development and the abundance of natural resources in OPEC countries using panel data. The results indicate a positive and significant relationship between stock market development and revenues from natural resources. Moreover, inflation has a negative effect, while government size and the degree of economic openness have a positive impact on financial development.

Hin et al. (2020). This research examined whether developing Asian countries are experiencing the Dutch Disease. The study period was from 2006 to 2016. Using the S-GMM method, the results suggested that remittances lead to an appreciation of the exchange rate and an increased likelihood of the Dutch Disease in these countries.

Naftiu (2020). This article focuses on the deindustrialization process in Azerbaijan and the issue of the Dutch Disease. The paper utilizes descriptive statistics to visualize the recent timeline of the economy and the various effects on the country's economy.

Danho - Edenso et al. (2020). The goal was to investigate the relationship between remittances and financial development in sub-Saharan African countries. Using a panel cointegration approach, a long-term positive and significant relation between these two factors was identified.

Ma et al. (2021). This study provided insights into the relationship between the Dutch Disease, globalization, and financialization for resource-rich economies from 1990 to 2018. The results suggested that remittance flows and economic globalization have an impact on financial development.

Finally, according to the theoretical literature and the theoretical foundations of the research, it can be seen that there is no study that directly examines globalisation, financial development and Dutch disease on the Iranian economy, which also indicates the innovative aspect of the research.

3 Methodology

The use of non-linear models, such as soft transition regression models, requires systematic and accurate modelling strategies. Instructions for building STR models include specification, estimation and evaluation stages. Specification

involves the linearity test, selection and determination of the transition variable. The null hypothesis of linearity is rejected. Basically, the creation of the correct form of the transfer function is equivalent to the identification of the number of threshold limits. The evaluation of the model is done using the nonlinear least squares (NLS) model, which is equivalent to the maximum likelihood (ML) estimator. In the estimation stage, it is checked whether or not the evaluated model provides an adequate explanation of the data. The estimation model is subjected to tests with inappropriate specifications. At this stage, the null hypotheses include the existence of no residual nonlinear relationship and no autocorrelation in the error components. Finally, the number of regimes is determined; therefore, in this study the research model will be as follows:

$$FDI_t = \alpha + \beta_1 LPRF_t + \beta_2 Lgdp_t + \beta_3 LHCI_t + \beta_4 LtGs_t + \sum_{j=1}^r [\varphi_1 LPRF_t + \varphi_2 Lgdp_t + \varphi_3 LHCI_t + \varphi_4 LtGs_t] G_j(S_t^j, \gamma_j, C_j) + u_t$$

In which $t=1, \dots, T$ represents time, in time-series data. It should be noted that the variables of Gross Domestic Product (GDP), Human Capital Index (HCI), remittance flows (PRF), and globalization (Gs) have been used in their logarithmic form in the model. In this study, the transition variable will be endogenous and determined within the model itself. In fact, this study assumes that at different levels of the transition variable, the relationship between the independent variables and the financial development index follows a nonlinear pattern. Therefore, in such a model, if the transition variable is less than a certain threshold level c_j , the effect of the independent variables on financial development will respectively be equal to β_1 and β_2 , and if the transition variable is greater than the threshold level c_j , the effect of the independent variables will be $\varphi_1 + \beta_1$, $\varphi_2 + \beta_2$, and so on. Consequently, the operational definition of the research variables will be as follows.

In this study, the multidimensional financial development index presented by Sahay et al. (2015) is used as the dependent variable, denoted as FDI. In recent years, the multidimensional financial index has gained significant popularity in the financial development literature (Altunbas & Thornton, 2019; Sovič, 2019; Khan et al., 2019; Alokou et al., 2020; Alokou & Ibrahim, 2020) because it considers the complexities and multidimensionality of financial sectors over time. It simultaneously reflects the development of both financial markets and institutions. This index is scaled between zero and one, with values closer to one indicating higher levels of financial development (Alkoo & Opekoo, 2022). These data have been extracted from the International Monetary Fund (IMF) website.

The independent variable of this study is the variable for the entry of foreign exchange revenues calculated by KOF, denoted as PRF in the study. This index is obtained by combining the total income from capital and the labor of foreign nationals and international workers (as a percentage of GDP), the total domestic and foreign debt securities portfolio and international loans and bank deposits (as a percentage of GDP), and the total stock assets and liabilities of international equity investments (% of GDP) that have entered the country in the form of remittances. Following the study by Ma et al. (2021), variables such as real Gross Domestic Product (GDP) at constant prices (2010), Human Capital Index (HCI), and globalization (Gis) were introduced as control variables in the model. The first two variables were extracted from the World Bank (WDI, 2022). In this study, internationalization has been used using the international trade index calculated by KOF. The variable includes merchandise exports and imports (% of GDP), service exports and imports (% of GDP), and trade partner diversification averaging the inverse Herfindahl-Hirschman index for export and import markets. Finally, it should be mentioned that the time span of the current study is monthly, from 1980 to 2023.

4. Data and information analysis

Examining the descriptive statistics of the variables used is an important and necessary step in understanding the results and providing a deep insight into the relationship between financial development and the variables of globalization, human capital, etc. in Iran. It should be noted that this statistic plays an important role in identifying the main factors that enable the reduction of Dutch disease in Iran. In this regard, it is noteworthy that the presentation of descriptive statistics in Table (1) is very important and makes a valuable contribution in this regard.

Table 1. Descriptive statistics of the data

	LTGS	LPRF	LHCL	LGDP	FDI
Middle	3.84	3.85	3.13	25.10	0.1291
maximum	4.15	4.14	3.54	26.03	0.14
minimum	3.56	3.29	2.554	23.8278	0.109
standard deviation	0.24	0.28	0.3279	0.654	0.008
crookedness	-0.07	-0.69	-0.17	-0.15	-0.620
Elongation	1.165	1.98	1.56	1.63	2.32
Jarek-bra	5.78	5.13	3.7	3.2	3.4
Possibility	0.06	0.077	0.16	0.20	0.18
observations	41	41	41	41	41

Source: research findings (Eviews13)

According to the results of table (1). Based on the probability of the Jarque-Bera test, it can be seen that all research variables have a normal distribution. On the other hand, if unknown variables are used in the estimation of the time

series regression line, there is a possibility of obtaining a false regression. This is due to the volatility of the time series which may have a single root and lead to a spurious regression. Consequently, the use of conventional econometric methods with unreliable statistical data compromises the validity of F, T, and R2 tests and may lead the researcher to draw incorrect conclusions about the strength and degree of relationship between variables; Therefore, it is very important to check the Dickey-Fuller generalized unit root test before estimating the STR model. Based on the results presented in tables (2) and (3), except for the financial development index (FDI), all the variables are significant after differentiating once; Therefore, all the variables are entered into the model logarithmically.

Table 2. Generalized Dickey-Fuller unit root test at the level

Variable	Possibility	t statistic	Mana's condition
FDI	۰/۰۲	-۳/۳۳	Meaningful
LGDP	۰/۷۷	-۰/۹۲	meaningless
LHCL	۰/۵۶	-۱/۴۲	meaningless
LPRF	۰/۷۷	-۰/۹۰	meaningless
LTGS	۰/۵۶	-۱/۴۱	meaningless

Table (3). Generalized Dickey-Fuller unit root test after one time difference

Variable	Possibility	t statistic	Mana's condition
LGDP	۰/۰۰۰	-۸/۷۹	Meaningful
LHCL	۰/۰۰۰	-۷/۷۴	Meaningful
LPRF	۰/۰۰۰	-۷/۶۲	Meaningful
LTGS	۰/۰۰۱	-۵/۴۷	Meaningful

Source: research findings (Eviews13)

In order to trust the estimation results by the STR model, it is necessary to check the Manay test for the estimated residuals. The results show that the null hypothesis of this test is not accepted at the 95% level, which shows that the variables used in this research are cumulative in the long run.

Table 4. Unit root test for residuals

ADF test	t statistic	-۳/۸۵۵
	Possibility	۰/۰۰۹۳

Source: research findings (Eviews13)

It was done to determine the existence of a non-linear relationship between the variables. After confirming this relationship, appropriate transition variables and the number of nonlinear pattern regimes were determined using F, F2, F3, and F4 tests. The results of this stage of the research are presented in the form of table (5).

Table (5): Test of linearity and non-linearity of the relationship, model type and transition variable

Transfer variable	probable value of F	Possible value of F4	Possible value of F3	Probable value of F2	proposed model
LPRF(T)	۰/۰۰۰۵۷	-	۰/۰۱۲	۰/۰۵۸	Linear
LTGs (t)	۰/۰۰۰۵۲	۰/۰۱۸	۰/۰۶۶	۰/۰۱۴	Linear
LGDP(t)	۰/۰۰۰۶۹	۰/۰۱۸	۰/۰۳۰۳	۰/۰۱۹	Linear
LHCI*	۰/۰۰۰۰۹۹	۰/۰۰۰۱۶	۰/۰۳۰۲	۰/۰۵۱۴	LSTR1

Source: research findings (stata 17)

According to table (5). The findings show that the null hypothesis of linearity is rejected according to the probability value of the F test statistic and the hypothesis of the existence of a non-linear relationship between these variables is accepted. After ensuring that there is a non-linear relationship between the variables, the next step consists in selecting an appropriate transition variable from among the appropriate transition variables for a non-linear model. This step requires the selection of a variable as the transition variable that has rejected the null hypothesis test F more strongly; Therefore, according to table (5), the most appropriate variable of human capital transfer (LHCI) is determined. F2, F3 and F4 statistics are used to select the type of time model. Based on the results reported in the above table, the proposed model is suitable for the transmission variable (LHCI) of the LSTR1 model. which is a logistic model with two regimes. After that, the above model is estimated.

Table 6. Estimation of STR model

t statistic	Coefficient	Variable	The non-linear part	t statistic	Coefficient	Variable	linear part
-۱/۷۵	-۱۲/۱۲ (. /. ۹)	Const		۱/۷۱	۱۰/۷۴ (. /. ۹)	Const	
۴/۶۲	۱/۱۶۴۶	LHCI		۲/۴۰.۷	۰/۵۰.۴	LHCI	

	(۰/۰۰۱)			(۰/۰۲۶)	
۲/۸۸	۰/۱۵۵۴ (۰/۰۰۸۵)	LGDP	۳/۹۲۶۶	۰/۲۵۳۲ (۰/۰۰۳)	LGDP
۴۰/۲۰	۰/۸۱ (۰/۰۰۰)	LPRF	-۲/۲۰	-۱/۸۱ (۰/۰۴۵)	LPRF
۲/۳۵۶۸	۰/۲۲۰۳ (۰/۰۰۰۱)	LTGs	۲/۶۲	(۰/۰۴۱) ۰/۱۵۷	LTGs

Place of regime change: $c=3.3734$

The numbers in the parentheses indicate the probability value.

$$R^2 = ۰/۸۶$$

$$AIC = -۲/۲۸$$

$$SC = -۴/۷۷$$

$$HQ = -۵/۰۹$$

Source: research findings (stata 17)

Table (6) shows the estimation results of the model, from which the slope parameter, which indicates the speed of transition from one regime to another, corresponds to a relatively high transition speed equal to 10. The location of regime change in the model is estimated to be 3.3437. Consequently, if the human capital index (LHCI) exceeds 3.33734%, the behaviour of this variable will change with the second regime. On the contrary, if the value of the parameter is lower than the above threshold, it is placed in the first regime. Given that the coefficients of the variables vary according to the value of the transfer variable (human capital) and the slope parameter and are not constant over time, it is not possible to interpret the numerical values of the coefficients presented in Table (3) directly; therefore, only the symptoms should be analysed. In order to get a clearer understanding of the results, the two regimes mentioned are examined. The initial limit regime refers to the state in which the slope parameter approaches infinity and the value of the transfer variable (human capital) is below the threshold (regime change point). In this particular case, the transfer function assumes a numerical value of zero and is expressed as follows:

$$FDI_t = 10.74 - 1.81 LPRF_t + 0.2532 Lgdp_t + 0.504 LHCI_t + 0.157LGs_t$$

The second limit regime also corresponds to the situation where the slope parameter tends to infinity and the value of the transfer variable (human capital) is less than the threshold limit (place of regime change), in which case the transfer function has a numerical value of zero. It is specified as follows:

$$FDI_t = 1.38 - 1 LPRF_t + 0.4086 Lgdp_t + 1.1646 LHCI_t + 0.3773LTGs_t$$

As observed, human capital improves the financial system. A one percent change in human capital accelerates the development of the financial system by 0.504 percent and 1.646 percent at the 5 percent significance level in the first and second regimes, respectively. Similarly, human capital will also affect financial outcomes. Individuals with education and high human capital (high human skills) usually have more information transparency and are less risk-averse. Furthermore, education allows individuals to switch from the informal to the formal sector and facilitates entry into formal financial services. The results are consistent with researchers such as Mishkin (2009), Hin et al. (2020), Danho-Edenso et al. (2020). The variables of globalization and Gross Domestic Product have a positive and significant effect on financial development in both regimes, but these effects increase with the advancement of human development. In fact, globalization is considered a key factor in institutional restructuring that leads to financial development and market openness for goods and services. With improved human capital and exceeding the threshold value, the labor force produces the necessary financial technologies for financial growth, which in turn increases the impact of globalization and GDP on financial development. The results are confirmed by studies from Ibrahim (2019); Kargbo et al. (2016); Khan et al. (2020); Mishkin (2009), Otrovil Yildirim et al. (2020).

The results related to the findings show that the flow of remittances negatively affects financial development, indicating that a one percent positive change in the flow of remittances reduces financial market development by -1.81 percent and -1 percent at low and high levels of human development, respectively. Although remittances also have a negative relationship with financial development in the second regime, their impact is comparatively less. These findings suggest that migrant families spend their remittances on non-productive activities such as real and non-tradable goods that do not create measurable economic growth or job opportunities. Overall, while remittance flows aid in the financial position development of households or individuals, this leads to low credit demand or no demand from local financial institutions and credit market shortages. Ultimately, remittance flows harm financial development; remittances are spent on consumption, with only a small part invested, and are used as a common method of saving. The logic behind the negative externalities is similar to that of exports, as massive volumes of remittances aim to increase the value of a country's currency, making goods and services more expensive in international markets. Further evidence of the significant adverse effects of remittances can be attributed to a lack of financial knowledge, strengthening online and mobile reciprocal payment networks, intensifying supervisory approaches, and the costs of migrant workers reinforcing socio-economic conditions in the countries of origin. The negative impact of exchange costs on remittances forces migrants to use informal networks when costs are high. The transfer rate is higher because there is less complexity in financial matters, but this effect decreases with the increase in labor skills. Overall, findings indicate that received remittances have not had a positive contribution to the financial system development in resource-rich countries like Iran, thus confirming the Dutch Disease phenomenon. In comparison, the development of the

financial system is determined by the outcomes of GDP, LTGs, PRF, and HCI. The findings of this study are consistent with those of previous studies (Brown et al., 2013; Coulibaly, 2015; Hin et al., 2020).

The third phase, identified as the post-estimation phase of the model, represents the model evaluation stage. In this phase, potential estimation errors are also reviewed. An initial check for the absence of serial autocorrelation was conducted. The F-test probability values for four variable lags were estimated at 0.5, 0.73, 0.27, and 0.37, respectively. The null hypothesis of this test, which states that there is no autocorrelation at the 0.95 confidence level, is accepted. Another test relates to the constancy of parameters across different regimes. The F-statistic probability value for this test was estimated at 0.00, which means that the null hypothesis of equal coefficients in the linear and nonlinear parts is rejected at the 99 percent level. Now, the nonlinear residuals test is employed to determine whether the estimated model satisfactorily captures nonlinearity. The p-value for the nonlinear residual test is 0.05, 0.04, and 0.001, and based on these results, it is stated that the issue of nonlinearity regarding the human capital transition variable has been adequately modeled. Other tests that address potential errors in the estimation phase in the Smooth Transition Regression (STR) model can include the ARCH-LM and Jarque-Bera tests, which are respectively used to check for heteroscedasticity and non-normality of residuals.

According to the ARCH-LM test, the probability values for the F and χ^2 statistics are estimated at 1.19 and 0.87, respectively. Based on the probability value of both these statistics, the null hypothesis of this test regarding homoscedasticity is not rejected at a suitable confidence level. Additionally, the χ^2 statistical probability value for the Jarque-Bera test is estimated at 0.6, which means that the null hypothesis of normal distribution of residuals is accepted at a suitable confidence level. In summary, according to the model evaluation tests, the estimated nonlinear model is qualitatively accepted.

5. Conclusion and Research Recommendations

The main objective of this study was to investigate the Dutch Disease, taking into account a new variable, and therefore examining the factors affecting the multidimensional financial development index. The present study has examined the role of human capital on the impacts of globalization, Gross Domestic Product (GDP), and remittance flows on Iran's multidimensional financial development index for the period from 1980 to 2020. For this purpose, the Smooth Transition Regression (STR) model proposed and extended by Teräsvirta (1998 and 2004) and Aslanidis and Xepapadeas (2005) has been utilized. STR model is a well-known approach for modeling regime shifts as it can continuously represent the nonlinear relationships between variables. Additionally, in the STR model, the variable coefficients are not uniform and change according to the transition variable and the slope parameter.

The estimated results indicate the presence of a nonlinear relationship among all research variables with Iran's multidimensional financial development index. The estimated results of the STR model reveal that when human capital is considered as the transition variable and it exceeds 3.3732 percent, a regime shift will occur. The estimated slope parameter is 10, which denotes a relatively fast adjustment speed. The results regarding the estimated coefficients of the variables included in the model also suggest that human capital has a positive and significant effect on financial development in both regimes. Although the remittance flow variable negatively affects financial development in both regimes, its negative impact is much less at higher levels of human capital as compared to lower levels, indicating the asymmetric effect of remittance flows on financial development. International variables, human capital, and GDP at low levels of human capital have a positive effect on financial development; however, these positive effects significantly increase at higher levels of human capital. The practical recommendations of the study are also as follows:

- 1- Investment in education and skill development: A key policy recommendation is to invest in education and skill development programs at all levels of human capital in Iran. This will help individuals to enhance their employability and reduce their reliance on remittances. It also facilitates economic diversification by creating a skilled workforce capable of contributing to various sectors.
- 2- Encouraging entrepreneurship and innovation: Another important policy recommendation is to create an environment conducive to entrepreneurship and innovation. This can be done by providing support in terms of access to financial resources, training, counseling, and networking opportunities. Promoting entrepreneurial activities will provide individuals with alternative sources of income, not solely reliant on remittances.
- 3- Improving financial literacy: Increasing financial literacy among the population, particularly those who receive remittances, is vital. Policy recommendations should focus on delivering educational programs and awareness that teach individuals how to effectively manage their finances, make informed investment decisions, and save for the future. This reduces people's vulnerability to financial shocks and helps them better utilize their remittances.
- 4- Strengthening the banking sector: To mitigate the negative effects of remittances, policy recommendations should also aim to strengthen the banking sector in Iran. This can be achieved by improving financial infrastructure and expanding access to banking services in remote areas.
- 5- Enhancing access to formal financial services: Increasing access to formal financial services, such as banking institutions and microfinance, is crucial for individuals with lower levels of human capital. Governments and financial institutions should collaborate to create mobile banking networks, simplified account opening procedures, and cost-effective transaction fees.
- 6- Investing in human capital development: Recognizing the importance of education and skill development in improving human capital levels, governments should prioritize investment in educational systems. Allocating

resources towards quality primary and secondary education lays the foundation for future generations to attain higher human capital levels. Additionally, vocational training programs could equip individuals with practical skills that align with market demands and increase their employability.

7- Creating supportive social safety nets: Establishing social safety nets specifically designed for individuals with lower levels of human capital can provide a safety net against economic shocks or uncertainties. These safety nets could include targeted cash transfer programs or subsidized healthcare services that alleviate the burden on remittance receivers. By ensuring minimum living standards, individuals can better allocate their remittances to productive investments and contribute to financial development.

8- Collaboration with international organizations: Collaborating with international organizations to address the negative impact of remittances on financial development is essential. Through joint efforts, Iran can utilize expertise, resources, and funding to implement effective policies. International organizations can provide technical assistance and support in areas such as capacity building, research, and monitoring to ensure successful implementation of these policy recommendations.

9- Enhancing technology infrastructure: Another policy recommendation focuses on enhancing technology infrastructure in Iran. By improving access to internet services and digital platforms, remittance recipients can explore online entrepreneurial opportunities, expand their knowledge, and connect with potential investors. This contributes to the development of digital skills and enhances financial inclusion in the country.

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