

The Determinants of Financial Development in the Republic of Yemen: Evidence from the Principal Components Approach

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Abstract: This paper provides new evidence that sheds light on the main determinants of financial development in the Republic of Yemen. The result demonstrates that economic growth, natural resource dependence, trade openness and inflation are the main determinants of financial development in Yemen. While economic growth and trade openness have a positive impact on the pace of financial development, the natural resource dependence has a negative impact. However, the effect of inflation is sensitive to the choice of proxy for financial development. Hence, whether a factor is good or bad for financial development depends on the indicator used as a proxy for financial development. Moreover, constructing a new proxy by Principal Components Analysis that summarizes the most information of all the available proxies is an efficient way to reflect the characteristics of financial development.

Keywords: Financial development, Principal Components Analysis, Yemen.

JEL classification: O11, O16

1. Introduction

Over the past three decades, it has been undeniably observed that the financial sector of many successfully developed countries have always played a crucial role in economic growth because the financial sector is able to contribute to economic development through accumulating capital and redirecting aggregate savings into financing productive investments. The financial sector has also been considered a fundamental building block for a healthy and well-diversified economy. The failure of one of its components (e.g., banks, markets, other financial institutions) can spill over to the entire sector and harm the real economy. For example, the financial crises in some Southeast Asian countries in 1997, the Russian Federation in 1998, Turkey in 2001, and the recent global financial crisis, are all marked with the failure of the financial sector. Likewise, a successfully effective and efficient, sophisticated, wise and well-managed financial sector will be a great national boon. This will allow that country to transform itself into a modern and developed society standing out among its peers.

Given the importance of financial development and the large socioeconomic cost of its weak performance, many countries have made an effort to develop their financial sector; however, the results were different. Hence, one crucial question arises here, why do some countries have growth-enhancing financial system, while others do not?

In fact, answering this question requires exploring the determinants of financial development across countries. Therefore, it is not surprising that exploring financial sector development determinants is becoming a growing priority for countries that aim to achieve high and sustainable economic growth. Nevertheless, since countries have significant

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differences in financial development conditions, further single countries analyses are necessary.

To this end, this paper aims to investigate the determinants of financial development in Yemen. Although this country is one of the developing countries that experienced early financial sector activity relative to other developing countries, and embarked on several financial reform programs, its financial sector indicators remain at a low level and are considered to be the lowest in the Arab and Middle Eastern countries. Therefore, Yemen is an interesting case study, particularly as no study has taken a close look at the reasons behind this fragility and the factors that disrupt this sector. Another reason that makes Yemen an interesting subject is that the economy of Yemen is highly dependent on natural resources (oil & gas) which generated more than 70% of government revenues, 80-90% of its exports and accounts for 25% of GDP. As financial sector's structure is expected to reflect the production's structure (Lin *et al.*, 2009), we presume that the financial sector in a resource-dependent economy like Yemen is shaped by the extraction sector (Kurronen, 2015). Additionally, Yemen is a highly entrepreneurial based economy.¹ A recent survey conducted by the Qatari organization, *Silitech* reports that Yemen has a notably entrepreneurial culture. The research shows that 86% of young Yemenis feel that they can get ahead by working hard; and 61% of the population are satisfied with the freedoms they have enjoyed and what they can choose to do with their lives.

With the aim of making a significant contribution, this paper follows Ang and McKibbin (2007) in constructing a single proxy for financial development using principal components analysis (PCA). PCA is a standard tool in modern data analysis to extract relevant information from confusing datasets. With minimal effort, PCA provides a roadmap concerning how to reduce a complex dataset to a lower dimension to reveal the sometimes hidden, simplified structures that often underlie it (Shlens, 2014).² Through PCA, we can transform a number of possibly correlated financial development variables into one variable that captures most of the information from the original dataset. This method has been shown to be more efficient in establishing the optimal weights of variables in comparison to other methods in which variables are given equal or subjective weights.

The rationale behind doing this is that there is no general consensus as to which measure of financial development is the most appropriate. Therefore, having a summary measure of financial development that includes all relevant financial proxies to capture several aspects of the financial sector at the same time will provide better information about financial development.

The rest of this paper is organized as follows: the literature review is presented in section 2. In section 3, we overview the financial development in Yemen. Section 4 focuses on data and methodology, and the empirical results and discussion are presented in section 5. Finally, section 6 concludes with policy implications.

2. Literature Review

Financial development around the world has been uneven, with prominent explanations for its variation tied to a nation's macroeconomic stability, corporate and securities law

¹ Yemen is a good place for running an enterprise. In its Doing Business Survey, the World Bank cites the progress made in Yemen over the (2006-2011). The most notable example is the one-stop shop concept for starting a business that was introduced in 2008. While Yemen's rate-of-change was less robust over 2006-2011 than Saudi Arabia, it was dramatically better than the rate-of-change in Brazil. The country is also better placed in the global league table than many lower middle income emerging countries like Indonesia and India (see www.doingbusiness.org/reforms/five-years)

² For further information see Johnson and Wichterl (1992).

institutions, its legal origin, its trade openness, financial liberalization, and, recently, the degree of reliance on natural resources.

While Boyd *et al.* (2001), Demirgüç-Kunt and Detragiache (2005), and Bittencourt (2011) showed the importance of macroeconomic stability in which economies with higher inflation rates are likely to have smaller, less active and less efficient banks and equity markets, and cause crisis, Law and Demitrades (2006), Beck *et al.* (2006), Law and Azman-Saini (2012) and Law *et al.* (2013) showed the importance of institutions, and suggest that institutional quality is a significant determinant of financial development. Financial development is stronger when institutions that protect and match the needs of investors are present.

While institutions are at the top of the list of the most often cited determinants of financial development, Law and Habibullah (2009) added to the institutional quality the importance of trade openness and financial liberalization. According to the authors, when a country is open to trade and capital flows, it is more likely to develop its financial system due to its role in promoting competitive markets (see also, Baltagi *et al.*, 2009; Huang and Temple, 2005; Kim *et al.*, 2010; Svaleryd and Vlachos, 2002). In terms of financial liberalization, the importance of this determinant is traced back to Stanford economists McKinnon (1973) and Shaw (1973) who argued that liberalizing the financial system, i.e. removing interest rate ceilings, reducing reserve requirements and abolishing priority lending, is critical in delivering financial development (see also Ang, 2008; Fischer and Valenzuela, 2013). Public ownership in the banking sector can also have an impact on financial development. La Porta *et al.* (2002) and Andrianova *et al.* (2008) suggested that state banks are inherently less efficient than private banks in terms of their lending and investment decisions.

Guiso *et al.* (2000) discussed the significant role of social capital on financial development. In areas of the country with high levels of social trust, households invest less in cash and more in stock, use more checks, have higher access to institutional credit, and make less use of informal credit. In these areas, firms also have more access to credit and are more likely to have multiple shareholders.

Fiscal policy also has a crucial role for the development of the financial sector. Aside from the potential for inflation, heavily indebted governments may engage in financial repression to use the financial sector as an 'easy' source of funding (Roubini and Sala-i-Martin, 1992, 1995). There is considerable evidence that excessive public debt may crowd-out private investment, especially in emerging economies with less developed financial systems (Caballero and Krishnamurthy, 2004; Christensen, 2005). In addition to financial crowding-out, the safe returns from a large public debt may make banks become too complacent and undermine their efficiencies. Hauner (2008, 2009) confirmed the so-called "lazy-bank" view, which argued that financial systems become less efficient in countries that run substantial fiscal deficits.

In addition to the above-mentioned determinants, the literature also came up with political determinants such as legal system (La Porta *et al.*, 1998) and political instability (Huang, 2010; Roe and Siegel, 2011). Other determinants included economic growth, income, population and religious, language and ethnic characteristics. Greenwood and Jovanovic (1990) documented that as the economy grows, the costs of financial intermediation decrease due to intensive competition, inducing a larger scale of funds available for productive investment. The importance of income levels for financial development has been addressed in Levine (1997, 2003, 2005). Jaffee and Levonian (2001) demonstrated that GDP per capita and saving rate have positive effects on the banking sector's development in 23 transition economies.

Stulz and Williamson (2003) stressed the impact of differences in culture, proxied by the differences in religion and language, on financial development. They provided evidence that culture predicts cross-country variation in protection and enforcement of investor rights, especially the creditor's rights. It was also shown that the influence of culture on creditor rights protection is mitigated by the introduction of trade openness. Djankov *et al.* (2003) shed light on the role of state ownership of the media in the extent of financial development. Last but not least, natural resource dependence is added to these determinants in the recent studies (see Beck, 2011; Bhattacharyya and Hodler, 2014; Gylfason and Zoega, 2006). All the about mentioned determinants are summarized in Figure 1.

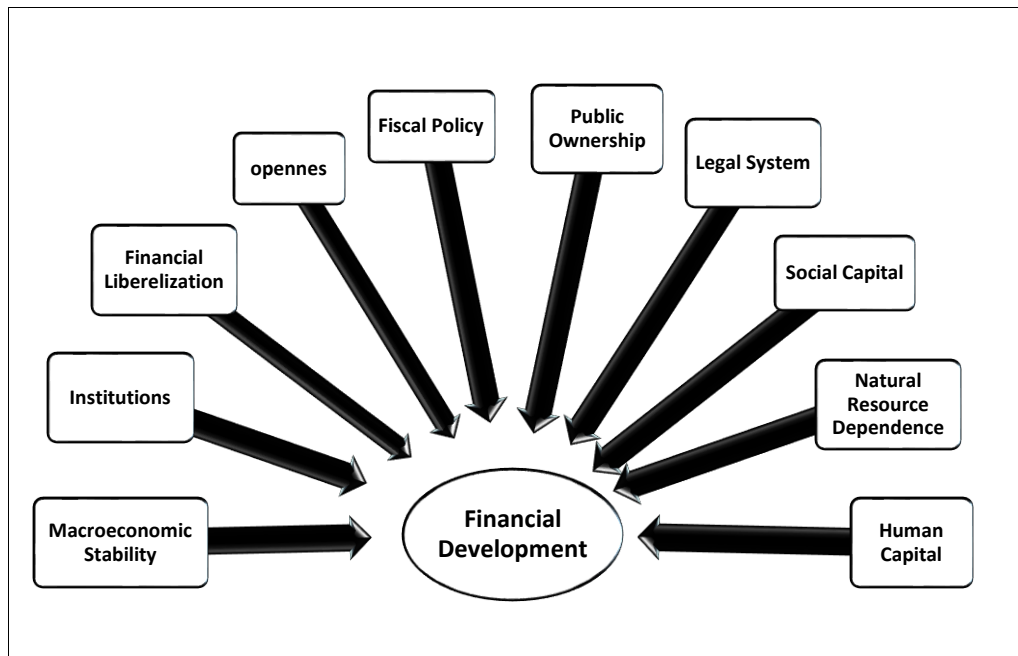


Figure1: Financial development determinants

All the existing literatures on the determinants of financial development are based on cross-country analysis. To the best of our knowledge, there exists no prior study based on country-specific level. Nevertheless, time series analysis of a single country provides a better framework in understanding the aspects that affect financial development. In contrast, cross-country panel data studies could only provide a general understanding on how the variables are related; they are not able to offer specific policy implications tailored for each country individually (Ang, 2009). Moreover, cross-sectional studies have several weaknesses related to omitting variable bias, sample selection bias, inappropriate weighting of countries and unobserved country-specific effects (Demetriades and Hussein, 1996).

Lacking of single country studies on the determinants of financial development indicates the necessity to carry out studies on individual countries, so that a tailored path towards sustainable financial development can be formulated. Hence, this paper attempts to fill this research gap by investigating the factors that affects the path of financial development in a single country, Yemen.

3. Financial Development in the Republic of Yemen

As is the case of most developing countries, the financial system in Yemen is dominated by the banking sector, with no existence of a stock market, and a marginal role for non-bank financial institutions, such as insurance company, money-changers and pension funds.

The Central Bank of Yemen controls overall monetary policy and oversees the transfer of currencies abroad. It is the lender of last resort; it exercises supervisory authority over all commercial banks, and serves as a banker to the government. Currently, there are 18 banks operating in Yemen, four of which are state-owned banks, four are Islamic banks, another four are private conventional banks, there are two of these banks that are specialized in microfinance, and the remaining four are foreign owned banks.

Before unification, the northern part of Yemen had two state-owned banks (i.e. The Yemen Bank for Reconstruction and Development (YBRD) and the Industrial Bank of Yemen); and one private owned bank (i.e. The International Bank of Yemen). In addition, there are several specialized or purpose focused local banks such as the Housing Credit Bank and branches of foreign banks such as the Arab Bank of Jordan, Banque Indosuez, Banque Nationale de Paris and the Bank of Credit and Commerce International (BCCI). The Southern part of Yemen had only two significant banking institutions, namely the Central Bank and the state-owned National Bank of Yemen. Foreign banks had been nationalized in 1969.

It is worth mentioning that Yemen has some of the most advanced microfinance institution laws and regulations in the MENA region. This has helped in widening credit and savings options for smaller enterprises as well as for lower income households, both in the urban and rural areas, and, in general, widened the market for financial services in Yemen (World Bank, 2013).

The banking sector in Yemen is crucial to the economy because it represents the backbone of the Yemeni financial system, being the only source of finance and the only financial institution that can provide loans and credit in Yemen, unlike other countries where the stock market contributes in this way.

Prior to unification, the financial sector in the former northern Yemen was more developed than the southern part (Breitschopf, 1999). It was, however, weaker than many MENA countries in terms of structure and efficiency (World Bank, 2002). After achieving the unity in 1990 and integration of the banking sector in both countries, several problems have appeared in the financial sector, such as bad loans, loan and client concentration, lack of investment opportunities, short-term contract, and weak regulatory and institutional framework (UNDP, 2006). Therefore, in line with the early mentioned economic reform program, the Yemeni government embarked on a reform program focusing on the financial sector. This program comprised several fields, starting with the monetary policy level by freeing all lending interest rates and establishing minimum benchmark saving deposit rates. The second level of the reform program focused on the financial intermediation process by reforming the institutional, legal and regulatory framework comprising a review of the banking law and central bank law. The government also pledged to make reforms in the capital market by establishing a bond and stock exchange; however, it has failed to fulfil this project because of its failure to complete the market prerequisites, such as creating a transparent business environment and corporate governance. Nevertheless, the plan to develop this market still exists.

Following the reform process, the total assets of commercial banks increased from YR179 billion in 1996 (24% of GDP) to YR310 billion in 2000, and YR1323 billion in 2012 (30% of GDP). The deposits also witnessed a significant rise from YR120 billion in 1996 to YR250 (16% of GDP) billion in 2000, and YR1799 billion in 2012 (23% of GDP). However, the credit to the private sector had witnessed a slight increase after the

implementation of the reform program, increasing from 4.6% to around 5.2% of GDP at the end of 1990's (Figure 2). This slightly increase in aggregate credit brought about through its intermediation role was less in impact than what would be generally fair expectation when we compare it with similar efforts brought about in other Arab countries.³

Furthermore, the financial sector liberalization was expected to bring other benefits, such as boosting financial deepening; however, this has not yet been fulfilled. The ratio of M2 to GDP is still low and considered the lowest in the Arab countries according to the World Bank reports. The banking sector remains small and contracted further during the recent political crisis in 2011(IMF, 2013).⁴

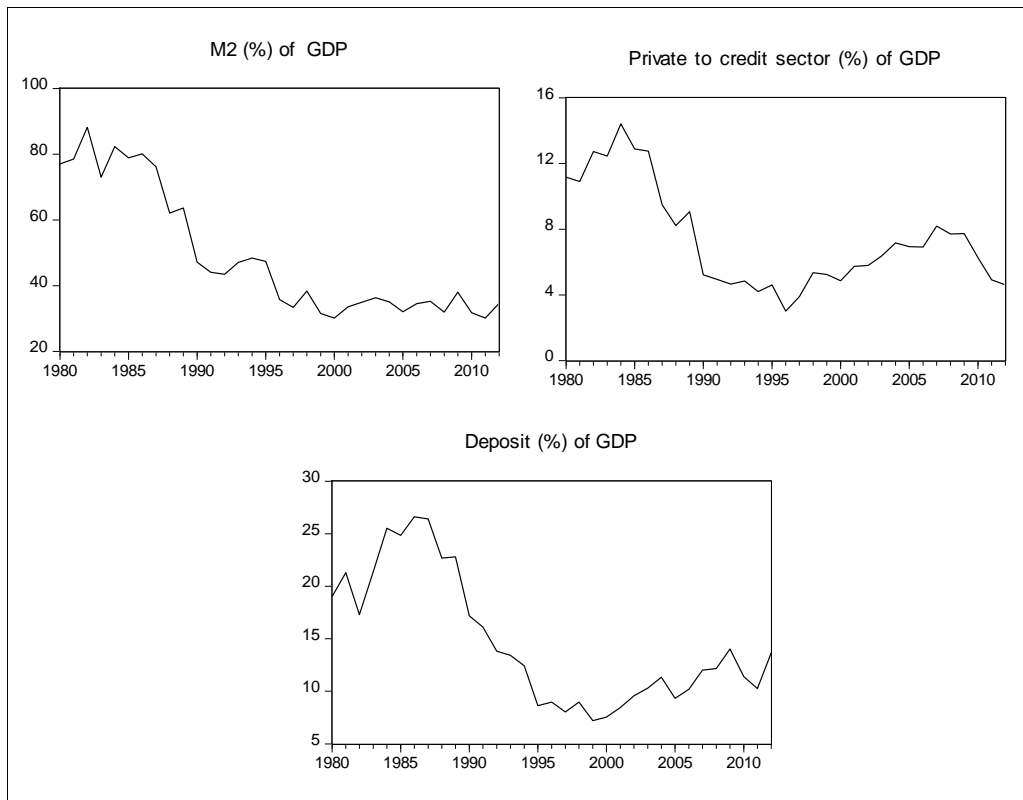


Figure 2: Selected Financial Development Indicators

³ During the same period, this ratio ranged between 65% in Jordan, 45% in Egypt, 30% in Oman and 22% in Saudi Arabia (WDI, 2015).

⁴ The increase in total assets and deposit reflects only the banking depth or size, while the efficiency is measured by the intermediation proxies (i.e., the credit in the private sector to GDP ratio) which had contracted to around 4.6% in 2012. The banking sector of Yemen remains small compared to the banking sector in the regional countries around it.

4. Data, Model and Methodology

4.1 Data and Variables

4.1.1 Data Source

The study employs data for Yemen over the period 1980 to 2012.⁵ All the data for the period 1980-1989 were obtained from the International Financial Statistics (IFS), while data for the period (1990-2012) was from the World Development Indicator (WDI). The data for oil revenue was sourced from the Yemeni Ministry of Finance and International Monetary fund (IMF) country reports.

4.1.2 Measures of Financial Development

Financial development is usually defined as a process that marks an improvement in the quantity, quality, and efficiency of financial intermediary services (Abu-Bader and Abu-Qarn, 2008). This process involves the interaction of many activities and institutions. Consequently, with one single indicator, not all the dimensions for financial development can be captured. Therefore, this paper uses three main indicators related to banks due to the bank-dominated characteristic of the Yemeni financial situation and the absence of a stock market.

The first proxy is M2 as the share of GDP, which was put forward by McKinnon (1973) and Show (1973), and used by King and Levine (1993), and many other studies. This measure equals cash outside banks plus the demand and interest bearing liabilities of banks and non-financial intermediaries divided by GDP. It is considered to be the broadest measure of financial intermediation and includes three types of financial institution: the central bank, deposit money banks and other financial institutions.

The second measure is domestic credit to the private sector as a share of GDP,⁶ which is considered to be one of the best indicators to measure financial development, and has been widely used in the literature (King and Levine, 1993; Nili and Rastad, 2007). It provides information about the commercial bank's credit allocated to the private sector, as compared to the size of the economy as a whole. Therefore, this indicator accurately measures the role of financial intermediation in channelling funds to the private sector. The higher ratio implies more financial services, and, therefore, greater financial development.

Our third measure is the size of the deposits relative to GDP, which is an indicator for the potential investments (Rajan and Zingales, 1998; Nili and Rastad, 2007; Jalil and Ma, 2008). The larger the amounts of the deposits the more resources are available for the financial intermediary system to translate into economic development. This indicator equals the demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP.

In order to test for the robustness of our estimates, we develop a summary measure for financial development using PCA based on the three proxies for financial development.⁷ This measure is expected to represent the overall financial development and deals with the

⁵ Following Vetlov and Warmedinger(2006) for the case of Germany, we use Northern Yemen data for the period prior to 1990 and united Yemen data after 1990, combined with a dummy variable to account for the unification.

⁶ Domestic credit to private sector refers to the financial resources that are provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

⁷ The principal components of a set of variables are obtained by computing the Eigen value decomposition of the observed variance matrix. The first principal component is the unit length linear combination of the original variables with maximum variance. Subsequent principal components maximize the variance among unit-length linear combinations that are orthogonal to the previous components (see Johnson and Wichtern, 1992).

problems of multicollinearity and over parameterization as an overall indicator of the level of financial development (Ang and McKibbin, 2007). This new index is able to capture most of the information from the original dataset, which consists of three financial development measures.

Table 1 presents the results obtained from PCA. The Eigenvalues indicate that the first principal component explains about 71% of the standardized variance, the second principal component explains another 2.4% and the last principal component accounts for only 0.04% of the variation. Thus, the first principal component, which explains the variations of the dependent variable better than any other linear combination of explanatory variables, is the best measure for financial development. Accordingly, we have been able to reduce the dimension of the financial development indicators to one preserving 71.3% of the information in the original data. The new financial development index is denoted as FI. All factor loadings are high (i.e. 55% for M2, 66% for credit to private sector and 51% for deposits), indicating that the expected three-dimensional structure of the three variables is in fact well represented only by the first principal component.

Table 1: Principle component analysis for financial development index

	PCA1	PCA2	PCA3
Eigenvalues	2.1401	0.7335	0.1264
% of variance	0.7134	0.2445	0.0421
Cumulative %	0.7134	0.9579	1.0000
Variable	Vector 1	Vector 2	Vector 3
M2	0.5533	-0.6507	0.5200
PRV	0.6583	-0.0409	-0.7517
DPS	0.5104	0.7582	0.4057

Notes: M2 is logarithm of M2 to GDP, PRV is natural logarithm to private to credit sector to GDP and DPS is natural logarithm to deposit to GDP

4.1.3 Explanatory Variables

Initially, the literature showed many potential determinants for financial development as previously mentioned. However, as this research focuses on the case of Yemen, and due to the short time span, the financial development model includes three potential determinants in addition to economic growth.⁸

According to the supply side and demand side hypotheses, natural resource dependence is considered to be an important factor influencing the pace of financial development in natural resource based countries, such as Yemen (see Gylfason and Zoega, 2006; Beck, 2011; Bhattacharyya and Hodler, 2014). Therefore, it is appropriate to be included in the first model. We use oil and gas revenues relative to GDP as a proxy for natural resource dependence.

As Yemen's economy is well integrated with the outside world, the second potential determinant is trade openness (the sum of exports and imports as percent of GDP) due to its role in financial development (see Svaleryd and Vlachos, 2002; Rajan and Zingales, 2003; Huang and Temple, 2005; Baltagi *et al.*, 2009; Kim *et al.*, 2010).

The third potential determinant is inflation as an indicator of macroeconomic instability where economies with a high inflation rate are likely to have, smaller, less active and less efficient banks and cause crisis (see Boyd *et al.*, 2001; Demirgüç-Kunt and Detragiache, 2005; Bittencourt, 2011). Inflation in Yemen has been high and volatile in recent years, which has had a strong effect on macroeconomic stability (Almansour, 2010). Therefore, inflation is expected to have an important impact on financial development in Yemen.

⁸ GDP per capita in constant 2005 USD price is used to measure economic growth.

Finally, we add a dummy variable to capture the unification period (1990 -2012), which will take 1 if the observation is in the period of 1990-2012 and 0 if the observation is in the period of 1980-1989.⁹

4.2 Models

Based on our previous discussion, our estimation equations will look as follows after being transformed into natural logarithm form:

Model 1:

$$M2_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 NR_{t_t} + \alpha_3 TO_t + \alpha_4 INF_t + \alpha_5 Dum_t + \varepsilon_t \quad (1)$$

Model 2:

$$PRV_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 NR_{t_t} + \alpha_3 TO_t + \alpha_4 INF_t + \alpha_5 Dum_t + \varepsilon_t \quad (2)$$

Model 3:

$$DPS_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 NR_{t_t} + \alpha_3 TO_t + \alpha_4 INF_t + \alpha_5 Dum_t + \varepsilon_t \quad (3)$$

Model 4:

$$FI_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 NR_{t_t} + \alpha_3 TO_t + \alpha_4 INF_t + \alpha_5 Dum_t + \varepsilon_t \quad (4)$$

where M2, PRV, DPS and FI¹⁰ are financial development indicators, Y is the natural logarithm of GDP per capita in constant 2005 USD, NR is the natural logarithm of natural resource rent as the share of GDP, TO is the natural logarithm of trade openness, INF is inflation, Dum is the dummy variable for unification period and ε is the error term.

4.3 Methodology

In order to test the long run relationship of the variables, we adopt the auto-regressive distributed lag (ARDL) bound testing approach of cointegration by Pesaran *et al.* (2001). Most of the recent studies indicated that the ARDL model is preferable for estimating the cointegration relationship because it is reliable and applicable irrespective of whether the underlying regressors are I(0) or I(1). In addition, this approach is better and performs well for a small sample size. The ARDL version of the estimation models can be specified as:

$$\begin{aligned} \Delta Z_t = & \beta_0 + \beta_1 Z_{t-1} + \beta_2 X_{1,t-1} + \beta_3 X_{2,t-1} + \beta_4 X_{3,t-1} + \beta_5 X_{4,t-1} + \sum_{i=1}^m \beta_6 Z_{t-i} + \sum_{i=0}^p \beta_7 \Delta X_{1,t-i} \\ & + \sum_{i=0}^q \beta_8 \Delta X_{2,t-i} + \sum_{i=0}^r \beta_9 \Delta X_{3,t-i} + \sum_{i=0}^s \beta_{10} \Delta X_{4,t-i} + \psi_t \end{aligned} \quad (5)$$

where Z is the financial development indicators for our models, X_1 , X_2 , X_3 and X_4 are Y , NR , TO and INF , respectively.

The coefficients ($\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$) of the first part of the model measure the long run relationship, whereas the coefficients ($\beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}$) represent the short run

⁹ In 1990, the modern Republic of Yemen was established after unification between Yemen Arab Republic (YAR) and the People's Democratic Republic of Yemen (PDRY).

¹⁰ FI is constructed by using natural logarithmic financial development variables.

dynamics. The F-statistic is used for testing the existence of a long run relationship among the variables. We test the null hypothesis, $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$, that there is no cointegration among the variables. The F-statistic is then compared with the critical value given by Narayan (2005), which is more suitable for a small sample. If the computed F-statistic is greater than the upper bound critical value, then we reject the null hypothesis of no cointegration and conclude that steady state equilibrium exists among the variables. If the computed F-statistic is less than the lower bound critical value, then the null hypothesis of no cointegration cannot be rejected. However, if the computed F-statistic lies between the lower and upper bounds critical values, then the result is inconclusive.

5. Empirical Findings and Discussion

Table 2 gives the summary descriptive statistics of financial development presented by M2, DPS, PRV respectively; GDP per capita in constant 2005 US Dollars, natural resource dependence, trade openness and inflation. The table shows natural resource fluctuations during the study period between 0 as the minimum value and 28.9% as the maximum value. The inflation rate also witnessed severe fluctuations from around 2% to around 55%. The value of the mean and median of the variables were close to each other. This implies normal distribution of the variable. Furthermore, the maximum and minimum of the data were far enough for data analysis. This indicates the increasing trend of the series.

The correlations among the financial development indicators are quite high. Hence, if all the variables are used simultaneously in the model then there is a high possibility of multicollinearity, which may lead to incorrect inferences. In order to overcome this problem, the principal components of the selected financial development variables are estimated.

Table 2: Descriptive statistics

	M2	PRV	DPS	FI	Y	NR	TO	INF
Mean	3.8222	1.9009	2.8249	-0.0000	6.1171	2.1307	4.0289	17.6488
Median	3.6473	1.8428	2.9455	-0.4034	6.2219	2.6946	4.0883	12.5600
Maximum	4.4796	2.6680	3.2816	2.7155	6.4112	3.3979	4.4536	55.0800
Minimum	3.4054	1.1034	1.9324	-1.9295	5.6276	0.0000	3.3393	2.1800
Std. Dev.	0.3648	0.4011	0.3782	1.4856	0.2634	1.2239	0.3275	13.1106
Correlation								
	M2	PRV	DPS	Y	NR	TO		
M2	-	0.7497	0.2692	-0.9576	-0.9433	-0.6997		
PRV	0.7497	-	0.6578	-0.7254	-0.7110	-0.3845		
DPS	0.2692	0.6578	-	-0.3281	-0.1566	0.1039		
Y	-0.9576	-0.7254	-0.3281	-	0.9080	0.6565		
NR	-0.9433	-0.7110	-0.1566	0.9080	-	0.6718		
TO	-0.6997	-0.3845	0.1039	0.6565	0.6718	-		

Notes: M2, PRV and DPS are the natural logarithm of financial development indicators. Y is the natural logarithm of the GDP per capita in constant 2005 US Dollar. NR is the natural logarithm of natural resource revenues as a percentage of GDP. TO is natural logarithm of trade openness. INF is inflation rate (%).

Since the ARDL approach is applicable for variables that are I(0), I(1) or mutually integrated, the next step concerns establishing the order of integration of each variable to ensure that none of the variables are I(2) or beyond. The unit root test of the variables was investigated using the Augmented Dickey-Fuller (1979, ADF) and Phillips-Perron (1988, PP) tests. In both tests the null hypothesis of the series has a unit root, which was tested against the alternative of stationarity.

Table 3 summarizes the results of the ADF and PP unit root tests on the level and first differences of the variables. The results suggested that all the series are stationary in their

first differences, indicating that they are integrated of order one; hence, the unit root test confirms that the ARDL approach can be applied for the cointegration relationship.

After investigating the time series properties for all variables, the ARDL approach is used to examine the potential long run equilibrium relationship. This test is sensitive to the number of lags used. Given the limited number of observations in this study, lags of up to two years have been imposed on the first difference of each variable.

Table 3: Unit root test results

	ADF test Statistics				PP Test Statistic			
	Intercept		Intercept and Trend		Intercept		Intercept and Trend	
	Level	1 st diff.	Level	1 st diff.	Level	1 st diff.	Level	1 st diff.
M2	-1.3453	-6.7195***	-1.8500	-6.7130***	-1.3453	-6.7195***	-1.8046	-6.8787***
PRV	-1.3950	-5.7898***	-1.48591	-5.6970***	-1.4062	-5.7856***	-1.5902	-5.6953***
DPS	-1.9276	-5.8207***	-1.8928	-5.7574***	-2.1227	-5.8163***	-2.0797	-5.7545***
Y	-1.9706	-5.3068***	-0.9685	-5.7238***	-1.9972	-5.3048***	-0.9674	-5.8120***
NR	-1.7358	-4.3134***	-0.9943	-4.0589**	-1.7673	-4.18211***	-0.9614	-5.5148***
TO	-1.5305	-5.5383***	-1.7661	-5.4442***	-1.5145	-5.5435***	-1.8489	-5.4452***
INF	-2.2620	-4.7103***	-2.3877	-4.6660***	-2.3349	-4.8464***	-2.2709	-4.7803***

Notes: *** denotes the significance at 1% level.

The ARDL bounds testing approach starts with the F-test to confirm the existence of the cointegration between the variables in the model. In the first stage of empirical analysis, the F-test was performed at optimum lags. The critical values of the F-statistic in this test are available in Pesaran *et al.* (2001). However, these critical values were generated for a sample size of 500 and 1000 observations. Narayan (2005) calculated critical values for sample sizes ranging from 30 to 80 observations. Given that the sample size of this study is 33 observations, the critical values of Narayan (2005) for the bounds F-test were employed throughout this study. SBC suggested ARDL (1,2,2,0,1), (1,0,1,0,1), (1,1,0,2,1) and (1,0,1,2,0) for our models, respectively. The results of the ARDL bound test of cointegration are tabulated in Table 4.

Table 4: Result of ARDL cointegration test

Model	SBC Optimum lag	F-statistics	ECT _{t-1} (t-Ratio)	Result
1	(1,2,2,0,1)	6.7283***	-0.6597 (-3.3738)***	Cointegration
2	(1,0,1,0,1)	6.7661***	-0.678 (-4.628)***	Cointegration
3	(1,1,0,2,1)	4.4895*	-0.668 (-5.2213)***	Cointegration
4	(1,0,1,2,0)	4.2232*	-0.2251 (-4.0292)***	Cointegration
Critical values for F- statistics		Lower I(0)		Upper I(1)
1%		4.590		6.368
5%		3.276		4.630
10%		2.696		3.898

Notes: *** and * denotes the significance at 1% and 10% level. Critical values bounds are from Narayan (2005, p. 1988) with unrestricted intercept and no trend (Case III).

The results of the cointegration in Table 4 show that the F-statistic is greater than the upper bounds critical values for the 1% level of significance for our first two models, and the 10% level of significance for the third model. This confirms the existence of a long run relationship among the variables. Moreover, the coefficient of ECT_{t-1} is negative and significant, which confirms the existence of a long run relationship.

Since there is cointegration among the variables, the long run coefficients can be estimated using the ARDL procedure. Table 5 Panel A shows that economic growth and financial development are positively related in the long run and statistically significant in

the three models. The results imply that the process of financial development in Yemen has been shaped by the level of economic growth, which results in a higher demand for financial services. This means that a lack of financial development is a manifestation of a lack of demand for financial services. Such a finding is consistent with the theory and is in line with the empirical evidence of several studies, including Ang (2009), Ang and Mckibbin (2007), Arestis *et al.* (2002) and Law (2009).

Table 5: Long run and short run analysis

Variable	Model 1	Model 2	Model 3	Model 4
Panel A: Long Run Analysis				
Constant	5.0100*** (5.1991)	-10.2144* (-2.0593)	-12.4474** (-4.8020)	-39.0802*** (-3.8358)
Y	-0.1864 (-1.0529)	2.1761** (2.2671)	2.0122* (1.9879)	6.9637*** (3.4250)
NR	-0.0719*** (-2.824)	-0.0173** (-2.3337)	0.0027 (0.3467)	-0.0396** (-2.2005)
TO	0.0912** (2.2642)	0.0042* (2.0158)	1.0654** (2.7660)	1.9996*** (3.1796)
INF	0.0075*** (7.3138)	-0.00562* (-2.1519)	0.0120* (1.9624)	0.0018 (0.2007)
Dummy	-0.5673*** (-7.2069)	-1.5858*** (-3.6435)	-2.0874*** (-4.8020)	-6.1255*** (-7.1186)
Panel B: Short Run analysis				
ΔY	1.8472*** (6.5903)	1.4757* (1.8039)	0.6242 (0.6801)	6.9637*** (3.4250)
ΔNR	-0.3697*** (-8.7754)	0.0008 (0.1058)	0.0018 (.3445)	-0.0023 (-0.1130)
ΔTO	0.1427** (2.1868)	0.00281 (0.0158)	0.6525 (3.1041)	0.5439 (0.7078)
ΔINF	0.0043** (2.7941)	0.00289 (0.9206)	-0.0023 (-0.5465)	0.0018 (0.2007)
Dummy	-0.8877*** (-5.7653)	-1.0753** (-2.5504)	-1.3950*** (-3.6401)	-6.1255 (-7.1186)
EC_{t-1}	-0.6597*** (-3.3738)	-0.6781*** (-4.6276)	-0.6683*** (-5.2213)	-0.2251*** (-4.0292)
Diagnostic Test				
Adjusted R^2	0.939	0.891	0.899	0.923
Serial Correlation	0.1796 [0.672]	0.0083 [0.927]	1.9758 [0.160]	0.0017 [0.967]
Functional Form	0.0022 (0.963)	1.0519 [0.305]	0.5086 [0.476]	0.3271 [0.567]
Normality	1.1766 [0.555]	1.2515 [0.535]	0.4217 [0.810]	0.5256 [0.769]
Heteroscedasticity	0.8820 [0.348]	0.8621 [0.353]	0.6580 [0.417]	2.1134 [0.143]

Notes: ***, ** and * denotes the significance at 1%, 5% and 10% levels respectively. t statistics in parenthesis, P value in brackets.

However, we find the absence of a significant relationship between economic growth and M2. This could be due to Yemen being a developing country. Hence, a large portion of its M2 quantum consists of currency being held outside of the banks¹¹ (Demetriades and

¹¹ For example, Abu-Badr and Abu-Qarn (2008b) found that the currency held outside banks/M2 ratio was higher than 30% on average over the period (1960-2004) in five developing countries (i.e.,

Hussein, 1996; Abu-Badr and Abu-Qarn, 2008 a, b). Therefore, an increase in the M2 to GDP ratio may reflect the extensive use of currency instead of an increase in bank deposits (Abu-Badr and Abu-Qarn, 2008). Hence, the standard or usual effect of economic growth on M2 is absent. However, the absence effect of economic growth on M2 of this study does not mean the absence of the generally universal relationship between financial development and economic growth.

In addition, the natural resource dependence indicator has a negative and statistically significance coefficient at the 5% level. An increase of 10% in natural resource dependence would lower M2 and credit to the private sector by 7% and 1.7%, respectively. These results, therefore, corroborate the findings of previous studies that show an adverse impact of natural resource dependence on financial development (Gylfason and Zoega, 2006; Beck, 2011; Yuxiang and Chen, 2011; Kurronen, 2015). It seems that the exploitation of natural resources tended to shift factors of production away from the non-resources traded goods sectors (agriculture and manufacturing). As a result, these sectors tended to shrink¹² and reduced their demand for financial services, which negatively affected the pace of financial development.

For inflation, there are mixed results. Although there is a negative relationship between inflation and credit to the private sector, inflation has a positive relationship to M2 and deposits. Therefore, it is fair to say that the mixed relationship between the financial development indicators and inflation in the long run analysis can be attributed to the effect of the third variable, i.e. interest rate. This is because the high level of inflation in Yemen has forced the CBY to raise the interest rates, which increased the bank deposits and crowded out bank credit to the private sector. However, one should take into consideration the potential for the existence of a non-linear relationship between inflation and financial development indicators. If a non-linear relationship exists then it should be possible that the sign of the relationship between the two variables would switch with higher inflation levels (Boyd *et al.*, 2001).

Trade openness has a positive and significant impact on financial development in all four models. In this context, increased trade openness generates demand for new financial products, including instruments for trade finance and for hedging of risks (Svaleryd and Vlachos, 2002). Finally, the estimated coefficient for the dummy variable is significantly negative, which infers that the country's unification did not benefit the financial sector in Yemen. It seems that the circumstances of the transition period after unification¹³ negatively affected the performance of the financial sector.

After achieving unification between the northern and southern halves of the country in 1990 and the subsequent integration of banks in both parts of the country, several problems appeared in the merged financial sector such as the occurrence of bad loans, loan and client concentration and the distribution of the market coverage, the lack of investment opportunities, short-term contracts, and the weak regulatory and institutional framework (UNDP, 2006). Moreover, high lending rates associated with the high inflationary induced environment then had greatly constrained demand. Banks were reluctant to lend to the private sector due to weaknesses in the insolvency regime and the judiciary infrastructure

Algeria, Egypt, Morocco, Syria and Tunisia). In Yemen, this ratio reached to 40% in 2000 and declined significantly recent years and reached to 30% in 2012.

¹² During the oil decades, the agriculture sector declined from 20% of GDP in 1990 to around 10% in recent years. Likewise, the manufacturing sector also declined during the same period from 16.5% to 7%.

¹³ During the transition period, the country faced the formidable task of unifying two countries with different economic systems, two separate, bloated and inefficient administrative systems, and two different legal systems. Moreover, both countries had unsustainable debt burdens.

for enforcing creditor rights, in addition to the prevailing weak economic environment. Therefore, these factors presented a great damper on the role of the financial sector in the Yemeni economy.

The result of Model 4 in which the financial development index is the dependent variable confirms that economic growth, natural resource dependence and trade openness are the main determinants of financial development in Yemen in the long run.

The short run estimation results in error-correction representation are provided in Table 5 panel B. The results reveal the existence of a positive relationship between financial development and economic growth in the short run. However, the resource curse hypothesis in the short run is only supported in Model 1. Additionally, the coefficient of the dummy variable is in line with the result for the long run analysis.

The coefficient of the estimated error correction model is negative and significant in all four models; this confirms the existence of a long run relationship among the variables. In addition, the coefficients suggest that a deviation from the long-run equilibrium following a short-run shock is corrected by about 66%, 68%, 67% and 23% per year for the four models, respectively.

Additionally, Table 5 panel C tabulates the result of some major diagnostic tests. Based on the results, the models pass all the diagnostic tests for serial correlation, autoregressive conditional heteroskedasticity and model specification. Furthermore, the stability of the models was supported (see Figures 3)¹⁴ and the adjusted R^2 indicates the good fit of the models.

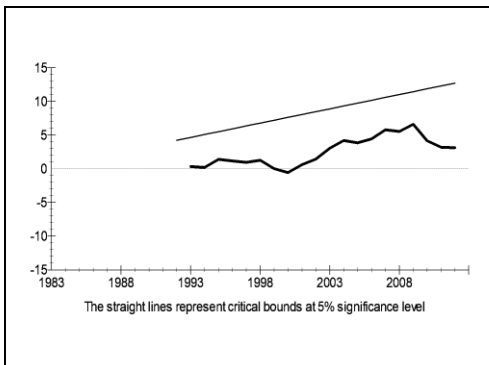


Figure 3a: Plot of cumulative sum of recursive (Model 4)

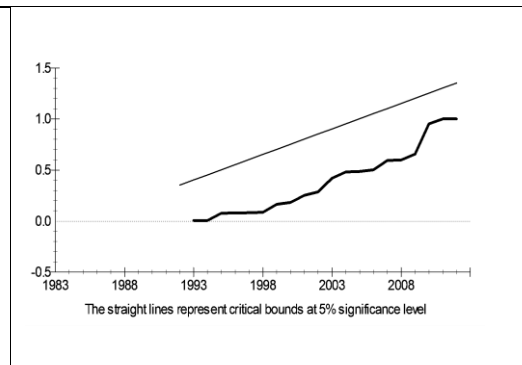


Figure 3b: Plot of cumulative sum of squares of recursive residuals (Model 4)

In sum, it is fair to say that the impact of the factors on financial development is sensitive to the choice of proxy. Therefore, the findings suggest that whether any factor is good or bad for financial development depends on the indicator used to proxy for financial development. However, we argue that using one indicator that summarizes the information of all the available proxies is fruitful because it gives significant results for two out of the three available proxies. This means that the new proxy reflects the most characteristics of the financial development concept in terms of both depth and efficiency.

6. Conclusion

This paper examines the main determinants of financial development in Yemen. To this end, a model for financial development determinants is constructed. Our model includes the most

¹⁴ Figures 3 and 4 only demonstrate the plots of CUSUM and CUSUMQ for Model 4 due to its importance in our study. The plots of models 1, 2 and 3 are available upon request.

potential factors that affect the pace of financial development in Yemen, i.e. economic growth, natural resource dependence, trade openness and inflation. PCA is used to construct a summary measure of financial development to address the problem of measuring the extent of financial development.

It is apparent that economic growth, natural resource dependence, trade openness and inflation are the main determinants of financial development in Yemen. While, the economic growth and trade openness have a positive impact on the pace of financial development, the natural resource dependence has a negative impact. However, the effect of inflation is sensitive to the choice of proxy for financial development. Whether inflation is good or bad for financial development depends on the indicator used to proxy the financial development. Using one indicator that summarizes the information of all available proxies is fruitful because it gives us significant results for two out of three available proxies. This means that the new proxy captures the most characteristics of the financial development concept in terms of both depth and efficiency.

A well-developed financial sector is a key factor for a healthy and well diversified economy. Therefore, liberalize the financial sector and remove obstacles of its development is an essential step for developing the economy. Accordingly, in terms of policy implications, our result suggest that improving economic growth as well as trade openness will encourage the development of the financial sector in Yemen. Additionally, the negative impact of natural resource dependence on financial development highlights the importance of economic diversification. Increasing the contribution of other sectors to GDP will reduce the level of dependence to natural resource revenue in the country. In addition, to have a deeper and more active financial sector, the rates of inflation have to be low and consistently under control. Finally, the observed impact of trade openness on financial development suggests the desirability of more opening up the trade policy. This may recommend that policy reforms in Yemen should give priority to trade openness along with adequate and sound macroeconomic policies.

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