CHAPTER 6

ANALYSIS OF THE IMPACT OF FINANCIAL DEVELOPMENT ON ECONOMIC GROWTH

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This chapter deals with the supplementary objective of the research work, that is, an econometric analysis of the relationship between financial development and economic growth in the case of India. Several alternative models have been constructed for the purpose. The inquiry into the finance-growth link in the case of India is particularly of great significance given the fact that there have been substantial reforms in the financial sectors in India since the early 1990s. The impact of these changes has been captured and analysed in the various dimensions of financial development, namely, access, depth, efficiency and stability. It is therefore pertinent to undertake an examination of how this development could have impacted growth of the Indian economy.

This section analyses the impact of financial development on economic growth using Ordinary Least Square method. It presents different models constructed using different combinations of indicators of financial development as explanatory variables. Apart from the individual indicators of finance, some of the models include the composite values of financial inclusion index, financial dimensional indices, secondary indices related to financial institutions and markets, and the overall financial development index as independent variables.

The control variables used in the models are gross capital formation, ratio of gross capital formation to labour, gross enrolment ratio primary and secondary school levels, working age population, labour force participation, human capital per person, ratio of foreign direct investment inflows to GDP, ratio of final consumption of government expenditure to total expenditure, and foreign trade to GDP.

The variables are used in its log form to make the data linear. The Augmented Dickey Fuller Test is run to check for stationarity of the variables. All variables are found to be stationary at first difference. Residual diagnostic tests are conducted for each model. The diagnostic tests include the jarque-bera test of normality, Breusch-Pagan-Godfrey test of homoscedasticity and serial co-relation Lagrange Multiplier test. The null hypotheses of diagnostic tests are that the error term satisfies the conditions of normality, homoscedasticity and absence of serial correlation.

The results of regression analysis are presented in two sections, based on the dependent variable used to represent economic growth. The first part analyses the impact of financial development on total factor productivity as the dependent variable used as a proxy of economic growth. The second part is based on GDP at constant prices as the dependent variable used as a proxy for economic growth. Models with PCINNP at constant prices and rate of growth of GDP were also examined but they did not yield good results.

6.1 EMPIRICAL ANALYSIS OF FINANCE – GROWTH RELATIONSHIP WITH TOTAL FACTOR PRODUCTIVITY AS THE DEPENDENT VARIABLE

In the literature on the finance-growth link, there are studies which hypothesize different channels through which finance affects economic growth. One such channel works through enabling efficient allocation of capital. This channel has been dealt with in studies such as, Diamond and Dybvig (1983), Greenwood and Jovanovic (1990), Levine (1991), Bencivenga and Smith (1991), Saint-Paul (1992). Another channel operates through efficient transformation of savings into investment, which is found in Roubini and Sala-I-Martin (1995) and Harrison, Sussman and Zeira (1999). Yet another channel by which finance affects growth is via its impact on the rate of savings, particularly, in improving the rate of savings. This channel is found to be discussed in Jappelli and Pagano (1994) and Kotaro (2000), and in Leland (1968), Sandmo (1970), Kimball (1990) and Caballero (1990) as cited in Kotaro (2000). Rajan and Zingales (1998) show that the link between financial development and economic growth works through the reduction in financial transaction costs.

While the examination of these channels is not within the scope of the present study, it is hypothesized that all the above positive effects of finance ultimately have a favourable impact on the productivity of all inputs. Financial development influences productivity in many ways, by improving the information set on the basis of which economic agents make economic decisions. Ease of availability of financial services and products by means of technology enabled access also go a long way in improving productivity of factors as they help in increasing the speed, efficiency and effectiveness with which transactions are accomplished. The overall impact of all these factors creates a synergy which may not be possible to capture. In this sense, total factor productivity is an appropriate variable to be taken as the dependent variable.

With this assertion, it is proposed to use Total Factor Productivity as a proxy variable for economic growth that captures the impact of financial development. The use of total factor productivity as a dependent variable is also found in Barro (1991) and King and Levine (1993), Obstfled (1994), Levine and Zervos (1998) and Rousseau and Wachtel (2000), and Estrada, Park and Ramayandi (2010).

The variables used in the models include, proxy variables to represent capital, labour, trade and investment openness, inflation, etc. The regression models including total factor productivity as the dependent variable is divided in two sets for purpose of organized reporting of the results. Section 6.1.1 includes set of models with individual indicators of financial development as the explanatory variables, and section 6.1.2 includes the second set of models with composite values of various indices of financial inclusion and development constructed in the present study as the explanatory variables.

6.1.1 Models with individual indicators of financial development as explanatory variables

MODEL I: $TFP = \alpha + \beta_1 LGCF + \beta_2 LH\_CAP + \beta_3 LSM\_GDP + \beta_4 LBCC\_GDP + \varepsilon$

Model I regresses total factor productivity on two financial depth indicators, namely, stock market capitalization to GDP and bank credit to commercial sector to GDP. The simultaneous inclusion of both bank and stock market related indicator follows both Obstfled (1994), who asserts that banks and stock market provide different set of services and therefore can simultaneously be incorporated in the regression models. The control variables include gross capital formation and human capital per person, used as proxies for capital and labour, respectively.

It may be noted that various proxy variables have been tried to represent labour, such as, gross enrolment ratio at primary and/or secondary school education, human capital per person, capital-labour ratio, working age group population and labour force participation. However, most of these variables are found to be insignificant. It may be noted that the Indian economy has undergone dynamic changes, particularly, since the economic reforms were introduced. It is quite possible that these changes no longer support labour to be represented by the conventional proxies found in the literature so far. Moreover, labour and capital have become intertwined in their use across most of the productive sectors, given the nature of technologies used in production, as also the use of information technology. It is with this reasoning that in the present study, it has been attempted to represent labour as ‘capital-endowed labour’,

measured as the ratio of gross capital formation per unit of labour, which may also be said as capital formation per unit of labour. Alternatively, labour as represented by human capital per person has been used in some models.

Table 6.1 MODEL SET – I [TFP]
DEPENDENT VARIABLE: TOTAL FACTOR PRODUCTIVITY
PERIOD: 2001 TO 2020 [*n* = 20]

MODEL / VARIABLES	I	II	III	IV	V
Constant	-0.014 (-.0.565)	0.01 (0.218)	-0.01 (-0.354)	0.01 (1.436)	0.01 (1.149)
LGCF	0.09 (2.384)*	0.34 (3.410)*	0.09 (2.439)**	0.30 (3.209)*	0.33 (3.245)*
LGCF_L	-	-0.36 (-2.696)*	-	-3.08 (-2.298)*	-0.33 (-2.557)**
L H_CAP	3.14 (1.333)	-	3.01 (1.349)	-	-
L FDI_GDP	-	-	-	-	0.003 (1.1470)
L SM_GDP	0.0002 (1.647) 12	0.0001 (2.700)*	0.0002 (1.629) 12	0.0003 (2.454)**	0.0002 (2.587)**
L BCC_GDP	-0.12 (-1.985)***	-0.13 (-2.577)**	-	-	-
L M3_GDP	-	-	-0.19 (-2.413)**	-0.19 (-2.574)**	-0.18 (-2.458)**
R^2	0.56	0.67	0.60	0.67	0.70
D-W test	1.82	2.036	1.79	2.004	1.992
Normality	0.67	0.44	0.63	0.44	0.53
Homoscedasticity	0.29	0.57	0.19	0.74	0.34
Absence of serial correlation	0.75	0.78	0.36	0.63	0.58

***** Significant at 1% level; ****** Significant at 5% level; ******* Significant at 10% level;
Figures in the brackets are t-values.
GCF = Gross Capital Formation; **GCFL =** Gross Capital Formation to Labour; **HKPP** = Human Capital per Person; **FDIGDP** = Foreign Direct Investment to GDP; **SMGDP** = Stock Market Capitalization to GDP; **BCCGDP** = Bank Credit to Commercial Sector to GDP; **M_3GDP** = M_3 to GDP

The stock market capitalization ratio is found to have the expected positive sign, but is significant at a slightly higher level of 12%. Increased stock market capitalization improves the resource availability to business and thereby helps in overall productivity. The findings match with those of Saint-Paul (1992), Bencivenga, et al. (1996), Levine and Zervos (1998) and Rousseau and Wachtel (2000). It suggests that flow of funds to the capital market leads to better resource allocation and risk diversification, along with bringing in market discipline in the use of funds.

The coefficient of bank credit to commercial sector is found to be negative and is significant at 10% level. It suggests that excessive credit, above the absorptive capacity of the private commercial sector may not contribute to economic growth. These findings match with those of Estrada, Park and Ramayandi (2010). Gross capital formation has a positive coefficient which is found to be highly significant at 1 percent level. This finding converges with Bencivenga and Smith (1991). Human capital per person is found to have the correct sign but is not found to be significant.

The model explains 56 percent variation in the dependent variable. The Durbin-Watson statistics is 1.82 implying almost no auto-correlation between the residuals, which is also endorsed by the LM test to check for the null hypothesis of absence of serial correlation, which is significant at 75% level. The model satisfies all the residual diagnostic test, namely, normality, homoscedasticity, and absence of serial correlation, and therefore the results are reliable.

MODEL II: $\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LSM\_GDP + \beta_4 LBCC\_GDP + \varepsilon}$

Model II is the same as model I except one variable. In place of human capital per person, labour is now represented by capital-endowed labour which is measured as gross capital formation to labour. There is improvement in the results. While GCF continues to be highly significant, capital-endowed labour is also found to be significant at 1% level but appears with a negative sign. It suggests that increased capital formation per unit of labour is not found to have a positive impact on total factor productivity.

With the change in the labour proxy, the financial depth indicator – stock market capitalization ratio – is found to have the expected positive sign and is significant at 1% level. Increased stock market capitalization improves the resource availability to business and thereby helps in overall productivity. It may be recalled that in the previous model also, stock market depth was found to have a positive beta coefficient significant at 12 %.

The coefficient of bank credit to commercial sector continues to be negative and with greater significance at 5% level, reinforcing the reasoning given in model I. It suggests that excessive credit, above the absorptive capacity of the private commercial sector may not contribute to economic growth.

The results of the overall model have improved with adjusted R^2 at 0.67. The Durbin-Watson statistics is exactly 2 implying there in no auto-correlation between the residuals. The model

satisfies all the residual diagnostic test, namely, normality, homoscedasticity, and absence of serial correlation, and therefore the results are reliable.

MODEL III:

$$\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LH\_CAP + \beta_3 LSM\_GDP + \beta_4 LM3\_GDP + \varepsilon}$$

Model III replaces bank credit to commercial sector by another financial depth indicator, M3 to GDP, other variables remaining the same as in Model I. The coefficient of M3 ratio is found to be negative and significant at 5% level. These findings match with those of Estrada, Park and Ramayandi (2010). It suggests that too much monetization of the economy does not augur well for the country. Specifically, in the case of India M3 has increased up to 138 percent of GDP. More funds coming into formal sector in the form of M3 may not necessarily improve the growth of the economy, unless used productively. That rising M3 implies greater monetization instead of financial depth is also found in Demetriades and Hussein (1996).

Stock market capitalization is again significant but only at a higher level of 12%, as in the case of the first model. The adjusted R^2 and D-W statistics are a little lower. The significance of all the other explanatory variables is found to be unchanged on the inclusion of the M3 ratio, except for a slight fall in the beta values. Among the indicators of financial depth, the coefficient of M3 is bigger in magnitude compared to that of stock market capitalization. All the residual diagnostic tests are found satisfactory.

MODEL IV:

$$\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LSM\_GDP + \beta_4 LM3\_GDP + \varepsilon}$$

The fourth model is a modification of the third model by replacing the labour proxy human capital by capital-endowed labour. The results are better than model III. The adjusted R^2 has improved to 0.67 and the D-W statistic is 2.004 implying complete absence of auto-correlation among the errors.

Both the depth indicators, stock market capitalization and broad money ratios are found to be significant variables in explaining the variation in total factor productivity. Both are significant at 5% level, however, broad money ratio is found to negatively impact the dependent variable, as in the case of Model II.

MODEL V:

$$TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LFDI\_GDP + \beta_4 LSM\_GDP + \beta_5 LM3\_GDP + \varepsilon$$

Model V adds one more control variable, foreign direct investment to GDP as an explanatory variable in the previous model (IV). Foreign direct investment brings along advanced technology, and technical know-how. Multi-national companies are known to have better organisational practices, including, enabling and inclusive human resource practices which improve the productivity of labour. They also bring in more professionalism, improving overall performance of workers.

The regression results are more or less similar to those of model IV. Like in the case of Estrada, Park and Ramayandi (2010), financial openness as measured by FDI ratio appears with the positive sign. However, in the case of India, it is not found to be significant although its beta coefficient has a positive sign. The explanatory power of the model has improved to 70 percent and D-W statistic is almost equal to 2. The residuals of the model satisfy all assumptions.

Summary Remarks

The set of models attempted above with total factor productivity as the dependent variable bring out the following observations. Measures of financial depth are found to have some impact. Stock market capitalization to GDP, broad money to GDP and bank credit to commercial sector, are all are found to be significant. However, the latter two are not found to positively impact total factor productivity suggesting that high level of monetization of the economy or greater bank credit going to the private sector does not make positive additions to total factor productivity.

6.1.2 Models with Composite Indicators of Financial Development as Explanatory Variables

The second set of regression models are regressed on the calculated index values. The indices used in alternative models are financial inclusion index, index of financial access with reference to financial institutions and markets, index of financial institutions which encompasses sub-indices of access, depth and efficiency, index of financial markets as a composite index of access, depth and efficiency and lastly, the overall index of financial development. It may be noted that no study so far has attempted to include an index related to financial development as an argument in regression model.

Table 6.2 MODEL SET – II [TFP]
DEPENDENT VARIABLE: TOTAL FACTOR PRODUCTIVITY
PERIOD: 2001 to 2020

MODELS / VAR	I	II	III	IV	V	VI
Constant	-0.06 (-3.486)*	0.003 (0.139)	0.004 (0.746)	0.01 (0.549)	-0.01 (-1.133)	0.001 (0.07)
LGCF	0.43 (4.204)*	0.15 (4.806)*	0.28 (3.075)*	0.30 (2.337)**	0.25 (2.529)**	0.15 (4.68)*
L GCFL	-0.35 (-2.863)*	-	-0.25 (-2.157)*	-0.33 (-1.868) ***	-0.21 (-1.537)	-
L H_CAP	-	-1.69 (-0.589)	-	-1.47 (-0.494)	-	-1.60 (-0.51)
L FT_GDP	-	-0.04 (-1.441)	-0.08 (-3.111)*	-	-	-0.05 (-1.58)
LFII	0.01 (3.201)*	-	-	-	-	-0.004 (-0.75)
LFI	-	0.01 (2.257)**	-	-	-	-
LFM	-	-	0.01 (2.376)*	-	-	-
LFIA	-	-	-	-	0.003 (1.525)	-
LFMA	-	-	-	0.03 (2.363)**	0.03 (1.841)***	-
LIFD	-	-	-	-	-	0.01 (1.85) ***
R^2	0.61	0.65	0.71	0.57	0.63	0.65
D-W test	1.655	1.92	2.232	1.82	1.926	1.87
Normality	0.64	0.59	0.54	0.75	0.71	0.79
Homoscedasticity	0.10	0.38	0.65	0.65	0.67	0.52
Absence of serial correlation	0.05	0.30	0.08	0.88	0.96	0.27

* Significant at 1% level ** significant at 5% level *** Significant at 10% level
Figures in the brackets are t-values.
GCF = Gross Capital Formation; GCFL = Gross capital formation/labour;
GERP = gross enrolment ratio of primary; FT_GDP = Total trade/GDP;
FII = Financial inclusion index; FI = Financial institution index; FM = Financial market index; FMA = Financial market access; FIA = Financial institution access

MODEL I: $TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LFII + \varepsilon$

The first model in this set is regressed on the financial inclusion index with control variables of labour and capital. The FII is found to have a positive beta coefficient and is significant at one percent, however, the magnitude of the coefficient is very small at 0.01. The findings imply that improved access to banking services including improved usage of those services has positive impact on total factor productivity. Gross capital formation has a positive coefficient,

whereas incremental capital to labour appears with a negative sign, indicating that more capital per labour is not found to improve total factor productivity.

All the independent variables along with the constant are found to be significant at 1% level and its adjusted R^2 is 0.61. The D-W statistics of 1.65 indicates some degree of autocorrelation which is also substantiated by the residual diagnostic test for absence of serial correlation having probability value just at the margin.

Attempts to improve this model by including other possible arguments in the model did not yield meaningful results and, are therefore, not reported here.

MODEL II: $\mathbf{TFP = \alpha + \beta_1 LGCF + \beta_2 LH\_CAP + \beta_3 FT\_GDP + \beta_4 LFI + \varepsilon}$

This model is constructed with total factor productivity regressed on the index of financial institutions, along with the control variables. The coefficient of IFI is found to have a positive sign and is significant at 1% level, suggesting that the improvement in the access, depth, and efficiency of financial institutions contributes positively to total factor productivity. However, it may be noted that the coefficient attached to IFI is relatively small in magnitude at 0.01. This is possible due to some of the elements of the IFI not contributing favourably to the index and thereby, reducing the effectiveness of other potent elements.

The control variables used in the model are gross capital formation which is found to be positively significant at 1 % level. Human capital per person appears with a negative sign and is not found to be statistically significant. Foreign trade to GDP is also found to be insignificant. The measure of goodness of fit suggests that 65 percent variation in the dependent variables is explained by the variation in the independent variable. The D-W statistic is near to two, which suggests absence of autocorrelation. All conditions of residual diagnostic tests for normality, homoscedasticity and absence of serial correlation are met.

It may be noted that using other proxy variables for labour such as working age population, labour force participation or gross enrolment at secondary school education did result into any improvements in the outcome. Such models are not reported here.

Model III: $\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 FT\_GDP + \beta_4 LFM + \varepsilon}$

The third model tests for the impact of the index of financial market which is a secondary level composite index of access, depth and efficiency dimensions related to financial market. It is found to have a positive coefficient which is significant at one percent level.

Both capital and labour are found to be significant but capital endowed labour appears with a negative sign. Foreign trade ratio continues to have a negative impact but in this model it is also found to be statistically significant.

The model has a higher explanatory power of 0.71, however, the D-W statistic has increased to 2.23 and the test of homoscedasticity is upheld at a relatively lower significance level of 0.08 percent. The residuals meet all other requirements.

Model IV: $\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LH\_CAP + \beta_4 LFMA + \varepsilon}$

This model checks for the effect of the index of financial market access (IFMA) which is a primary level index of dimensions of access. The results indicate that its coefficient is positive and significant at five percent level of significance. It may be noted that the magnitude of the coefficient is relatively bigger than that of IFI and IFM. R^2 is a little lower at 0.57 and D-W statistic at 1.82. Two labour proxies, incremental capital to labour and human capital per person have been used along with capital. Human capital per person is not found to be significant. All other model requirements are satisfied.

MODEL V: $\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LGCF_L + \beta_3 LFIA + \beta_4 LFMA + \varepsilon}$

In this model, attempt is made to examine the impact of index of access for both financial institutions and financial market, that is, IFIA and IFMA. While the former is found to have positive and significant effect on total factor productivity, the latter is found to have a positive coefficient but it is not significant. However, the coefficient of determination has improved to 0.63 and D-W statistic is 1.93.

It may be noted that while the FII was found to be significant, the IFIA is insignificant. This is because of the way the two indices are constructed. While the FII includes measures related to access, that is, penetration and availability, and also elements of depth under the usage dimension, the IFIA has been constructed taking into account only penetration indicators based on principal component analysis. For this reason, while the FII shows significant positive effect on TFP, the IFIA fails to be strong enough, though it has positive coefficient.

MODEL VI:

$\boldsymbol{TFP = \alpha + \beta_1 LGCF + \beta_2 LH\_CAP + \beta_3 LFT\_GDP + \beta_4 LFII + \beta_5 LIFD + \varepsilon}$

The sixth model includes, along with other control variables, the overall index of financial development which is the top level index in the pyramid structure of indices. The IFD is the

composite index of the secondary indices of financial institutions and markets built in turn on the three dimensional indices of access, depth and efficiency. The IFD is found to have a positive and significant impact on total factor productivity. Of course, its coefficient magnitude is only 0.01, which may be because some of the indicators, particularly, efficiency do not have encouraging trends.

Capital and human capital were found to have significant effect, although, like in other models, human capital per person is found to negatively impact total factor productivity.

Summary Remarks

The set of models attempted above with total factor productivity as the dependent variable bring out the following observations. All indices used in the models, except the IFIA are found to have a positive effect on total factor productivity. Although their beta coefficient values are lower, ranging from 0.01 to 0.03, the findings of the regression analysis are important as they establish the significance of the alternative indices constructed in this research work.

6.2 EMPIRICAL ANALYSIS OF FINANCE – GROWTH RELATIONSHIP WITH GDP AS THE DEPENDENT VARIABLE

This section analyses the finance-growth relationship using GDP as the dependent variable and alternative indicators of financial development. Gross domestic product at constant prices is used as the proxy for economic growth. It is expected that with an efficiently functioning financial sector which is both wide and deep would lead to economic growth via the multiple channels which work through informed and efficient resource allocation, resource pooling and risk diversification. The section is divided into two parts on the basis of period as per availability of data. The first set of models shows the results of regression for 30-year period 1990-91 to 2019-20. The second set of models shows the result of alternative regression model for 20 years from 2001 to 2020.

6.2.1 Models with Individual Indicators of Financial Development as Explanatory Variables

MODEL I: $\boldsymbol{LGDP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LBA\_GDP + \varepsilon}$

The first model regresses GDP at constant prices on the ratio of bank assets to GDP. While it is found to have the expected positive sign, it is found to be statistically insignificant. Capital

and labour are found to be significant at one percent level, however, incremental capital to labour appears with a negative sign. The model explains 66 percent of variation in dependent variable and the D-W statistics at 1.85 is very close to two reasonably eliminating the effect of auto-correlation. It satisfies the criteria of normality, homoscedasticity, and no serial co-relation for the residuals.

Table 6.3 MODEL SET I [GDP]

DEPENDENT VARIABLE: GROSS DOMESTIC PRODUCT
PERIOD: 1991 to 2020 (*n* = 30)

MODELS / VARIABLES	I	II	III	IV
CONSTANT	-0.05 (-5.293)*	-0.05 (-0.348)	-0.07 (-7.662)*	-0.07 (-8.049)*
LGCF	0.81 (5.810)*	0.17 (3.546)*	0.78 (6.900)*	0.85 (7.389)*
LGCF_L	-0.78 (-4.585)*	-	-0.79 (-5.709)*	-0.88 (-6.202)*
LWAP	-	0.003 (0.089)	-	-
LBA_GDP	0.04 (0.049)	-	-	-
LBDSS_GDP	-	-	0.26 (3.464)*	0.35 (3.994)*
LBC_GDP	-	-	-	-0.10 (-1.783)***
LM3_GDP	-	0.26 (1.901)***	-	-
R^2	0.66	0.48	0.76	0.79
D-W TEST	1.83	1.86	1.77	2.15
Normality	0.34	0.29	0.66	0.57
Homoscedasticity	0.34	0.20	0.15	0.77
Absence of serial correlation	0.75	0.84	0.91	0.77

***** Significant at 1% level; ****** significant at 5% level; ******* Significant at 10% level
Figures in the brackets are t-values
GCF = Gross Capital Formation; **GCFL** = Gross capital formation/labour;
WAP = Working age population; **BAGDP** = Bank Asset/GDP;
BDSS_GDP = Bank deposit plus small saving/GDP; **BC_GDP** = Bank credit/GDP;
M3_GDP = M3/GDP

MODEL II: $\boldsymbol{LGDP = \alpha + \beta_1 LGCF + \beta_2 LWAP + \beta_3 LM3\_GDP + \varepsilon}$

The second model seeks to test for the effect of broad money to GDP ratio as an indicator of development of the financial sector in terms of financial depth. It is found to be statistically significant at 10% level and bears a positive coefficient value of 0.26. The findings match with

Estrada, Park and Ramayandi (2010). Thus, increased monetization of the economy is said to exert positive impact on economic growth. The proxy for labour, working age group population bears a positive sign but is not found to be significant, unlike capital formation. The adjusted R^2 has fallen to 0.48 but D-W statistic has moved closer to two. The residual diagnosis tests support the reliability of the model.

It may be noted that using other proxies of labour, such as working age group population or labour force participation rate is found to improve the adjusted R2 and D-W statistic only marginally, though both the proxies turned out to be statistically insignificant. Therefore, these models are not reported here.

MODEL III: $\boldsymbol{LGDP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LBDSS\_GDP + \varepsilon}$

The third model is regressed by using the ratio of bank deposit plus small saving to GDP as the indicator of financial depth. This result supports that of Jappelli and Pagano (1994). All variables in the model are found to be significant including the constant term. The financial depth ratio is found to affect economic growth positively and is found to be statistically significant. Capital formation continues to have a positive effect while incrementally capital-endowed labour impacts GDP negatively.

The explanatory power of the model has increased to 0.76 and though D-W statistics has declined to 1.77.

MODEL IV: $\boldsymbol{LGDP = \alpha + \beta_1 LGCF + \beta_2 LGCF\_L + \beta_3 LBDSS\_GDP + \beta_4 LBC\_GDP + \varepsilon}$

Adding bank credit as a ratio to GDP, another measure of financial depth, to the model, has improved the model fit. The adjusted R^2 has improved to 0.79. The D-W statistic is 2.15 which negates existence of auto-correlation. However, bank credit ratio appears with a negative sign and the coefficient is significant at 10% level in the presence of another depth indicator, bank deposits and small savings to GDP, which is found to be significant as in Jappelli and Pagano (1994). The findings on bank credit contradicts that of Rajan and Zingales (1998), though it may be borne in mind that their study involves cross country comparison. This finding is also at variance from those of Estrada, Park and Ramayandi (2010). It may be noted that over the 30-year period of analysis, many qualitative and structural changes have taken place in the Indian economy, bring drastic changes in the way the entire ecosystem works and integrates to create the final impact. It is, therefore, difficult to isolate the reasons for the negative effect of bank credit ratio in this model.

6.2.2 Models with Composite Indicators of Financial Development as Explanatory Variables

The second set of models covering a period of 20 years from 2001 to 2020, attempts to examine the impact of financial development as captured by various indices constructed in the present research work. Other variables include stock market depth in terms of, both, size and activity.

Table 6.4 MODEL SET II [GDP]
DEPENDENT VARIABLE: GROSS DOMESTIC PRODUCT
PERIOD: 2001 TO 2020 (*n* = 20)

MODELS / VARIABLES	I	II	III
CONSTANT	-0.07 (-7.960)*	-0.01 (-0.818)	-0.06 (-6.951)*
LGCF	0.83 (7.993)*	0.81 (8.517)*	0.79 (7.219)*
LGCF_L	-0.92 (-6.688)*	-0.91 (-7.302)*	-0.87 (-5.979)*
LFT_GDP	-	0.04 (1.802)***	-
LIFMA	0.03 (2.576)**	0.03 (2.592)**	-
LIFMD	-	-0.01 (-2.554)***	-
LM3_GDP	0.17 (2.076)***	-	0.15 (1.803)***
LSM_GDP	-	-	0.0003 (2.603)**
LSVT_GDP	-	-	-0.0004 (-1.936)***
R^2	0.87	0.90	0.87
D-W TEST	1.46	1.81	1.61
Normality	0.96	0.45	0.64
Homoscedasticity	0.06	0.19	0.29
Absence of serial correlation	0.22	0.461	0.20

***** Significant at 1% level ****** significant at 5% level; ******* Significant at 10% level
Figures in the brackets are t-values
GCF = Gross Capital Formation; **GCFL** = Gross Capital Formation/Labour;
FT_GDP = Foreign Trade/GDP; **WAP** = Working Age Population;
LFP = Labour Force Participation; I**FMA** = Index of Financial Market Access;
IFMD = Index of Financial Market Depth; **M3_GDP = M3/GDP;**
SM_GDP = Stock Market Capitalization/GDP;
SVT_GDP = Stock Value Traded/GDP.

MODEL I $LGDP = \alpha + \beta_1 LFMA + \beta_2 L\text{M3\_GDP} + \beta_3 LGCF + \beta_4 LGCF\_L + \varepsilon$

The first model is constructed using the index of financial market access and M_3 to GDP as explanatory variables along with capital and labour. The coefficient sign of financial market access is positive and significant at 5% level. It implies that the improvement in the access of financial market will have positive impact on the economic growth of the country. The M_3 ratio has expected positive sign and is significant at 10% level and is found to support the results of Sinha and Macri (2001) on a study on India among other Asian countries. The control variables are found to be significant at 1% level. The labour proxy is found to be negative just as in case of models with total factor productivity as the dependent variable.

The explanatory power of the model is 87%. Although the D-W statistics suggests presence of auto-correlation, which is also evident in the residual test of homoscedasticity having probability value just at the margin. However, the purpose of this model was to check for the impact of IFA of financial markets. Based on this, the model certainly suggests monetary deepening and improved financial market access positively affect economic growth.

MODEL II $LGDP = \alpha + \beta_1 LFMA + \beta_2 LFMD + \beta_3 LGCF + \beta_4 LGCFL + \beta_5 LTTGDP\varepsilon$

The second model replaces the broad money ratio with the index of financial market depth (IFMD), that is, two indices are examined together, IFMA and IFMD. Additional control variable in the model is foreign trade to GDP ratio.

The results show that all variables are statistically significant. Foreign trade ratio is found to positively impact economic growth. IFMA continues to exert positive effect in the presence of the IFMD. But the coefficient of IFMD is found to be negative and significant at 10% level. It implies that deepening of the stock market size need not lead to economic growth. Their beta coefficients, however, are extremely small in magnitude.

The explanatory power of the model is high at 90% and D-W statistic is close to two. The residuals of the model satisfy all diagnostic tests. The model provides good insight into the impact of financial development on growth. replacing IFMA by broad money is found to improve D-W statistic to 1.85, however, the explanatory power of the model falls to 56 percent and is, therefore, not reported here.

MODEL III

$$LGDP = \alpha + \beta_1 LM3GDP + \beta_2 LSMGDP + \beta_3 LSVTGDP + \beta_4 LGCF + \beta_5 LGCFL + \varepsilon$$

This model includes three depth variables, namely, M3 to GDP ratio, stock market capitalization to GDP ratio and stock value traded to GDP ratio. They represent monetary deepening, size-wise deepening of the stock market and activity-wise deepening of the financial market. All three variables related to financial development have statistically significant coefficients, with the first two having positive impact. Positive effect of stock market capitalization ratio suggests that flow of funds to the capital market leads to better resource allocation along with bringing in market discipline in the use of funds. These findings support those of Barro (1991), King and Levine (1993), Atje and Jovanovic (1993), Obstfled (1994), Levine and Zervos (1998) and Rousseau and Wachtel (2000), although these studies refer to cross-country examination. The results also match with those of Wacabaca (2004) which has tested the impact of stock market capitalization for Fiji. Importantly, the results related stock market capitalization match with those of Rjumohan (2019) who has carried the study with reference to India.

However, unlike Obstfled (1994), Levine and Zervos (1998) and Rousseau and Wachtel (2000) and Wacabaca (2004) stock value traded shows negative effect on economic growth in the case of India. Though significant, its coefficient is negligible.

Together with the control variables, the model explains 87 percent of the variation in GDP. However, the D-W statistic is a little poor at 1.60, but heteroscedasticity is ruled out by the diagnostic test.

In a supplementary model, adding gross capital formation to GDP as a control variable and checking for the impact of stock market deepening both in terms of size and activity, yields marginally better results and all the explanatory variables are found to be significant. However, to avoid repetition, the model is not reported here.

All other combinations of variables do not yield good results. The overall index of financial development is also not found to yield good results with GDP as the dependent variable and therefore, such models are not reported here.

Summary Remarks

The empirical analysis in relation to GDP suggests that financial depth in terms of broad money ratio is found to be more effective in terms of the magnitude of its coefficient compared to stock market depth. The index of financial market access and depth are found to be impact GDP positively, though the beta values are low. Models with some variables representing financial development dimensions are found to improve the explanatory power of the models, especially, those with alternative indices of financial development. The results support many of the studies found in the literature.