Chapter-8

Conclusions and Recommendations
8.0. INTRODUCTION

The purpose of this chapter is to summarize and conclude the findings of this study. From the existing theory of finance and productivity, we had a strong belief that there is a deep linkage between relationship between financial structure and productivity of firms. The new literature which relates the financial structure and productivity only looked at the effect of financial structure on productivity. This narrowed down our understanding of the relationship. Any firm cannot produce without finance. But the nature of financing will not only depend upon financial factors but also on real factors.

The primary interest in this thesis topic arise out of Nucci, Pozzolo and Schivardi (2005) study. Their results showed a negative relationship between leverage and productivity, consistent with theories of firms’ financial structure based on bankruptcy costs, conflicts of interest between equity-holders and debt-holders and control rights.

However our approach and understanding was quite contrary to the assertion that “A major achievement of this renewed research effort is a conclusive answer to the question of causality”. This is because the direction of causality as purported by, Pozzolo and Schivardi (2005) is from financial structure to productivity. Our main question was whether debt to equity ratio causes productivity or productivity causes debt to equity ratio.

- TFP growth is disembodied technological progress therefore it cannot be attributed to any single factor of production.
- It is dynamic because it arises over a period of time. We have argued that TFP is a real variable which leads to residual profits and these profits are the unanticipated profits.
- These surpluses help in financing. Therefore, productivity causes financial structure and not the other way round.
- Growth in embodied technology, on the other hand, implies capital expenditure, so it affects the DER (debt to equity ratio) directly.
We have studied three industries which includes cement, pharmaceutical and steel. We have used secondary data for our analysis. The data for the study was taken from ‘Prowess’ database, 4.01 of the Centre for monitoring the Indian economy (CMIE). The data set comprises for 20 years, i.e. from year 1991-2010. Our sample included 34 cement companies, 47 pharmaceutical and 45 steel companies.

8.1. OBJECTIVES

Our objectives for the study were:

i. To study the financial structure theories and production theories.

ii. To measure productivity growth and financial structure.

iii. To examine the linkages between financial structure and productivity theory.

iv. To study and measure the nominal and real determinants of financial structure.

v. To estimate productivity and financial structure of cement, pharmaceutical and steel industry.

vi. To study the relationship between financial structure and productivity in cement, steel and pharmaceutical industry.

For our first objective, we prepared Chapter 2 of this thesis where, we have studied the research papers of financial structure and productivity in detail and we concluded that these 2 concepts are interrelated.

For our second objective, we have built a conceptual framework by going through the theory of production and finance theory and developed our methodology for measuring productivity and financial structure.

For our third objective, we prepared a new model for this study in Chapter 4, which explained the linkages between financial structure and productivity for cement, steel and pharmaceutical industry.

For our fourth objective, we prepared a list of real and nominal (financial) variables in our methodology Chapter 3. We prepared nine real variables and five nominal variables. The real variables were TFP, NFA, K, K/L, SAL, R&D, ROY, TFE and IMP. The nominal variables were DER, CR, FB, DIV and FE.
For our fifth objective, we estimated both productivity using time series analysis and financial structure by forming various variables for cement, pharmaceutical and steel industry in Chapters 5, 6 and 7.

For the last objective we have run step wise regression. Here we have done cross sectional analysis for cement, pharmaceutical and steel industry in Chapters 5, 6 and 7 and estimated the real and financial determinants of financial structure.

8.2. METHODOLOGY

The methodology was basically divided into time series and cross sectional analysis. First of all, we have framed our two types of real and financial variables. For TFP which is a real variable, we have used time series analysis. Here we have used regression for finding the value of TFP. So for 20 years data, we have got one value for TFP. On the other side the other variables the other variables were available for 20 years. But due to TFP and discontinuous data problem with some of the variables like R&D, ROY, FE, TFE, DIV etc., we have had to limit our study to cross sectional analysis. So we did different types of data treatment with each variable. We took grouped mean for debt to equity ratio and current ratio, whereas we prepared index for TFE, R&D and royalty. We have used grouped mean For NFA, SAL, K, K/L. Lastly we have used dummy for DIV, IMP, FE etc.

For the final model, we have used all the real and financial variables which are fourteen in totality. Through our final model which we prepared in Chapter 4, we applied regression on those variables for cement, pharmaceutical and steel industry. We took DER (debt to equity ratio) as a dependent variable and all the other 13 variables as independent variables.

8.3. SUMMARY

We started our first chapter as the introduction. In this chapter we have discussed the rationale of the study along with the objective of the thesis, the hypothesis, data and data source, a brief methodology and the chapter scheme of the next chapters of the thesis.
In Chapter 2, we have studied the review of literature which was divided into 3 parts. In the first part, we have discussed the previous studies related to the financial structure. In part two, we have discussed the productivity studies and finally in the third part we have mentioned those studies which had dealt with the both financial structure and productivity together.

In Chapter 3, we prepared the conceptual framework for this thesis. Conceptual framework was based on the theory of production and the theory of finance. We concluded that production theory is related to the finance theory and there are linkages between the two.

In Chapter 4, we have prepared the methodology as per the objectives of the thesis. In this chapter, we have framed fourteen real and financial variables. The real variables included TFP, NFA, SAL, K, K/L, R&D, ROY and TFE, whereas the financial variables were DER, DR, DIV, FE and IMP. In this chapter we have also prepared the final model for our study. For the final model we took debt to equity ratio (DER) as independent variable and all the other 13 variables as dependent variables.

Chapter 5 Steel industry, here we started with the profile of the steel industry. Secondly, we estimated all the real and financial variables. For estimation, we have used time series analysis for computing TFP, grouped mean for DER and CR, index for R&D, ROY and TFE, growth rate for NFA, SAL, K, K/L and dummy for DIV, IMP, FE and FB. For finding out the relationship between financial structure and productivity, we have used our final model and applied regression on the same by using SPSS. DER was taken as a dependent variable for regression. For cement industry, approximately 70% companies TFP coefficients were negative and for remaining 30% companies the TFP coefficients were positive. This result rejected our null hypothesis ‘H1A0: There is no productivity growth in cement industry’.

In our final model, constant, TFP, NFA, TFE, K, CR, FE and IMP were found to be significant. The hypothesis ‘H2A0: Financial structure of cement industry does not depends upon real factors’ and ‘H3A0: Productivity does not cause financial structure in cement industry.’ were rejected.
Chapter 6 Pharmaceutical industry, here we started with the profile of the pharmaceutical industry. Secondly, we estimated all the real and financial variables. For estimation, we have used time series analysis for computing TFP, grouped mean for DER and CR, index for R&D, ROY and TFE, growth rate for NFA, SAL, K, K/L and dummy for DIV, IMP, FE and FB. For finding out the relationship between financial structure and productivity, we have used our final model and applied regression on the same by using SPSS. DER was taken as a dependent variable for regression. For pharmaceutical industry, TFP was positive for approximately 60% of the companies and for the remaining 40%, it was found to be negative. So this finding rejected our null hypothesis, ‘H1B0: There is no productivity growth in pharmaceutical industry.

In our final model, constant, TFP, NFA, K and Sales were found to be significant. The hypothesis ‘H2B0: Financial structure of pharmaceutical industry does not depend upon real factors’ and ‘H3B0: Productivity does not cause financial structure in pharmaceutical industry.’ were rejected.

Chapter 7 Steel industry, here also we started with the profile of the steel industry. Secondly, we estimated all the real and financial variables. For estimation, we have used time series analysis for computing TFP, grouped mean for DER and CR, index for R&D, ROY and TFE, growth rate for NFA, SAL, K, K/L and dummy for DIV, IMP, FE and FB. For finding out the relationship between financial structure and productivity, we have used our final model and applied regression on the same by using SPSS. DER was taken as a dependent variable for regression. For steel industry, TFP for approximately 42% companies was negative and for remaining 58% companies the TFP is positive. This result rejected the null hypothesis, ‘H1C0: There is no productivity growth in steel industry’.

In our final model, the results were:

H2C0: Financial structure of steel industry does not depend upon real factors.
- Accepted, as none of the real variables were found significant.

H3C0: Productivity does not cause financial structure in Steel industry.
- Accepted, because the TFP variable was not significant for steel industry.
8.4. RESULTS

On the basis of the results of cement, pharmaceutical and steel industries, we can conclude that productivity and financial structure are interrelated. Productivity also affects financial structure. Besides financial variables, financial structure also depends upon the real variables. We have also noticed productivity growth in cement and pharmaceutical industry but not in steel industry. Steel industry has got a lot of variation in different types of steel manufacturing including cold rolled, galvanized, HR coils, long steel etc. The technology in all these types of steel is not the same. The scale of production varies because of mini, small, and large steel manufacturing plants. Therefore, in the case of steel industry the variation is large. The resultant effect is that the standard error of each of the coefficient is large in relative terms. Hence in comparison to the other two industries, i.e. cement and pharmaceutical, we have seen that the coefficient of steel industry may not be as statistically significant as in case of other industries. This hold true at two levels:

i. At the production level.

ii. At the level of the final estimation.

As the final model is also in terms of average coefficients, hence similar variability occurs in the results. The net effect is that in the case of steel industry, we have found that standard error is high and hence the coefficients do not turn out to be very significant.

Also, the significant determinants of financial structure were found to be different across industries. From all the findings in this thesis, the results of our hypothesis areas under:

i. H10: There is no productivity growth in industries.
   Null hypothesis is rejected, as there is productivity growth in industries.

ii. H20: Financial structure does not depend upon real factors.
   Null hypothesis rejected as we can clearly interpret from the results that financial structure depends upon real factors like NFA, TFE, K, and Sales etc.
iii. \( H_3_0 \): Productivity does not cause financial structure.

Null hypothesis rejected as productivity causes financial structure. The TFP coefficients were significant for cement and pharmaceutical industries.

iv. \( H_4_0 \): The determinants of financial structure do not vary across cement, pharmaceutical and steel industry.

Null hypothesis rejected as the determinants of financial structure were different across industries. As TFP, NFA, TFE, K, CR, FE, IMP were the significant determinants of financial structure for cement industry. TFP, NFA, K, CR, Sales, FB and dividend were the determinants of financial structure for pharmaceutical industry. Finally TFP, NFA, CR, FE and Div were the determinants of financial structure of steel industry.

8.5. CONTRIBUTION OF THE STUDY

With the help of this thesis, we have been able to raise certain new questions in respect of financial structure:

i. Are there limited determinants of financial structure as suggested by the financial structure theories?

ii. What are the linkages between productivity and financial structure?

iii. Do real factors affect financial structure?

iv. What is the direction of relationship between financial structure and productivity (TFP growth)?

v. What are the financial and real determinants of financial structure?

vi. How do the determinants of financial structure differ across industries (cement, pharmaceutical and steel)?

The results of our thesis clearly establish all of the new aspect of financial structure and demonstrate the relationship between productivity and financial structure. There were many sub themes like:

i. What is the relationship between nature of industry and financial structure?

ii. What is the relationship between nature of industry and TFP growth?

iii. What is the differential impact of determinant of financial structure as between different industries?
8.6. LIMITATION OF THE STUDY

i. TFP is a single number so we have to limit our study to Cross Section analysis.
ii. There have been gaps in the data, so the treatment of data was difficult.
iii. The sample size of industries is close to 10% of the available data in ‘Prowess’ due to gaps in data.
iv. Panel data is best for the whole exercise (including real and financial variables), but it could not be done.

8.7. POLICY RECOMMENDATIONS

i. If the business environment favours disembodied technological progress, it allows the opportunity for costless growth because TFP is a residual which arises over a period of time without any investment, either physical or financial. An accounting approach can never arrive at such a conclusion.
ii. The firms need to recognize that the choice of financial structure is not uniquely determined by the financial variables. It is determined by a combination of financial and real variables.
iii. The residual growth due to TFP is a source of finance which has hitherto not been recognized. It leads to synergies between financial management, organisational efficiency, technical efficiency, diffusion of technology, best practices in technology etc. that could then be linked to long term finance. Although all of these factors are given and are found in certain firms but finance theory has never recognized such synergies.
iv. One lesson learned is that the emphasis on cost of capital in financing decision is over emphasized, by which the integration of finance with productivity, efficiency and growth is less understood.
v. The relationship between determinants of financial structure and debt to equity ratio is not straightforward. From our analysis it is apparent that the same determinants could behave differently by either increasing debt or decreasing equity. Similarly the same determinants could have different implications in different industries.
vi. Through the particular estimations of steel industry, certain policy recommendations emerged as under:

- The malleability of technologies needs to be kept in mind. It is on account of the rigidities in the case of steel industry arising out of imported capital goods that real factors have not shown up as significant determinants.
- It also appears that under such circumstances even the costless growth alternative of TFP is not available because TFP is the practice of technology but if the technology is rigid, it is not possible to have TFP growth.
- By contrast, heavy industries such as pharmaceutical and cement have shown how it is possible to achieve costless growth and have experienced synergies.

8.8. SCOPE FOR FURTHER RESEARCH

i. As in this thesis, we have got one value of TFP for twenty years period of study. One scope is that ‘Malmquist index’ can be used for getting TFP every year.

ii. Panel regression can be used for the whole exercise after getting the value of TFP for each year.

iii. In further research, it could be possible to use ‘Frontier functions’ of a mixed variety, using both real and financial inputs.

8.9. CONCLUSION

From this thesis we have understood that finance is not an end in itself; rather productivity, technological progress and efficiency contribute to the growth of the firms significantly. This thesis considers the relationship between financial structure, financial variables and productivity, through real variables like TFP growth, technology growth, capital growth etc. We have found that financial structure is caused by productivity. We can no longer say that financial structure is uniquely determined by financial variables alone. On the basis of the results of cement, pharmaceutical and steel industries, we can conclude that productivity influences financial structure. We have also noticed productivity growth in cement and pharmaceutical industry but not in steel industry because of the variation due to
different variety, scale and technical coefficients. Therefore, in the case of steel industry the variation is large. Hence in comparison to the other two industries, i.e. cement and pharmaceutical, we have seen that the coefficients of steel industry are not statistically significant.

In conclusion, this thesis takes up the unconventional position that financial structure is not dependent on financial factors alone but also on real factors. Through the study of cement, pharmaceutical and steel industry, it clearly establishes that there is a need to redefine the approach to the understanding of financial structure. It verifies and establishes the relationship between production theory and finance theory. Productivity, hence, emerges as a determinant of financial structure.