A DYNAMIC ANALYSIS FOR
A PRIVATIZATION PROCESS
IN IVORY COAST

by

Ali Toure

Master of Sciences in Economics
University of Montreal, 1985

Submitted to the Urban Studies and Planning
in Partial Fulfillment of the Requirements
for the Degree of

MASTER OF SCIENCES

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 1998

© 1998 Ali Toure. All rights reserved.
The author hereby grants to MIT permission to reproduce and distribute publicly paper and
electronic copies of the thesis document in whole or in part.

Signature of AUTHOR: ____________________________

MIT Department of Urban Studies and Planning
March 05,1998

Certified by ____________________________

Paul Smoke, Associate Professor
MIT Department of Urban Studies and Planning
Thesis Supervisor

ACCEPTED BY ____________________________

Lawrence Bacow, Professor
Chair, Master of City Planning Committee
The term privatization is used to refer to the process where state-owned enterprises (SOE’S) or operations are transferred to the private sector. The benefits associated with privatization are interesting for developing countries facing with budget deficits, bureaucracy and low credibility with the private sector and population. Despite the dominance of state-owned enterprises in Ivory Coast privatization represents now an opportunity for the state to modernize and be prepare for the increased global competition.

The literature and research on privatization have principally addressed the topic in a static view. Privatization, is a dynamic process and should be addressed in this manner. Differently to previous research, the thesis looks the main sectors, key relationships and variable behaviors involved in the Ivory Coast privatization program. Through the development of a dynamics model, a deeper understanding of how public enterprises can be efficiently transferred to the private sector is gained.

The results are based on twenty-year simulations divided into historical (1980-1994) and projected (1994-2000) components of the privatization process in Ivory Coast. This division allows the validation of the behavioral assumptions used in the historical component, lending greater validity to the projected component results. Based on the simulation of several possible scenarios, the model forecasts by measuring the magnitude and direction of alignment among the sectors involved in privatization. This thesis is addressed to the state planners involved in the privatization at the Bureau of Privatization. It is intended to provide them or more global view and a better understanding of the dynamics of the privatization in order to implement better privatization policies.

Thesis Supervisor: Paul Smoke
Title: Associate Professor of Political Economy and Planning.
ACKNOWLEDGMENTS

I would like to thank my thesis advisor, Paul Smoke, for his time, support and valuable insights. He has been instrumental in generating my initial interest in global public finances and strategy especially in developing countries.

I would also like to thank Nelson Ripenning who provided me with the "tools" used in this thesis through his system dynamics class; I hope to apply system dynamics in many future endeavors.

I thank Alice Amsdam, Professor Frenkien, Paul Smoke who have given me continuous support and encouragement during my years at the Institute.

To all the faculty with whom I had the opportunity to meet during my studies at M.I.T., my sincere appreciation for your patience and support in helping me understand the sometimes non-understandable.

To my son Abou Baker Sidick and my wife Cisset Fatou I thank you both for the great times spent together here in Boston.

And last, but certainly not the least, I thank my managing Director Tidiane Thiam and his staff who have made all this possible. Thank you for your countless encouragement, continuous support and genuine enthusiasm during my studies at M.I.T. It is to you all that I dedicate this thesis.
# TABLE OF CONTENTS

ABSTRACT .............................................................................................................. 2

ACKNOWLEDGEMENTS .................................................................................. 3

TABLE OF CONTENTS ...................................................................................... 4

1 INTRODUCTION ............................................................................................ 7

2 PRIVATIZATION PHENOMENON .................................................................. 9

2.1 Growth of State-Owned Enterprises ....................................................... 9

2.2 Benefits from Privatization ..................................................................... 11

2.2.1 Industrialized versus developing country ........................................... 14

2.2.2 Complementary policies ..................................................................... 14

2.3 Types of Privatization ............................................................................ 14

2.4 Static Approach to Privatization .......................................................... 17

3 SYSTEM DYNAMICS MODELING APPROACH ........................................ 18

3.1 Systems Thinking .................................................................................... 19

3.2 Basic System Structure .......................................................................... 20

3.3 Privatization Model Fundamentals ........................................................ 24

4 MODEL ANALYSIS: BASE CASE ............................................................. 27

4.1 Current Situation ..................................................................................... 27

4.2 Economy Sector ..................................................................................... 28

4.3 Political Sector ....................................................................................... 33

4.4 Financial Market Sector ......................................................................... 36

4.5 Privatization Legislation Sector ............................................................. 40

4.6 Organization Sector ................................................................................ 45

4.7 Labor Sector ........................................................................................... 50

4.8 Foreign Investor Sector ........................................................................... 54

4.9 Alignment Index Control Sector ........................................................... 58
4.10 Validation......................................................................................... 61

5.  MODEL ANALYSIS: ALTERNATE SCENARIOS ................................. 62
   5.1  Key Sensitivity Factors................................................................. 62
   5.2  Dual Scenario Analysis................................................................. 64
       5.2.1 Optimistic case scenario ....................................................... 65
       5.2.2 Pessimistic case scenario ...................................................... 65
   5.3  Sequencing Privatization ............................................................. 69

6.  CONCLUSION....................................................................................... 72

7.  APPENDICES
   Appendix A ...................................................................................... 73
   Appendix B ...................................................................................... 74

8.  REFERENCES...................................................................................... 83
LIST OF FIGURES

Figure 1: IMPORTANCE OF NUMBER OF PRIVATIZATIONS
Figure 2: SIMPLIFIED LABOR SECTOR DIAGRAM
Figure 3: BEHAVIORAL GRAPHICAL PLOT FOR FUTURE UNEMPLOYMENT
Figure 4: BASE CASE RESULTS FOR THE ECONOMY SECTOR
Figure 5: BASE CASE RESULTS FOR THE POLITICAL SECTOR
Figure 6: BASE CASE RESULTS FOR THE FINANCIAL MARKET SECTOR
Figure 7: BASE CASE RESULTS FOR THE PRIVATIZATION LEGISLATION SECTOR
Figure 8: BASE CASE RESULTS FOR THE ORGANIZATION SECTOR
Figure 9: BASE CASE RESULTS FOR THE LABOR SECTOR
Figure 10: BASE CASE RESULTS FOR THE FOREIGN INVESTOR SECTOR
Figure 11: BASE CASE RESULTS FOR THE ALIGNMENT INDEX CONTROL SECTOR
Figure 12: BASE CASE RESULTS FOR CHANGE IN ALIGNMENT INDEX AND AVERAGE INDEX
Figure 13: CHANGE IN BEHAVIORAL ASSUMPTION FOR INFLATION
Figure 14: OPTIMISTIC CASE SCENARIO RESULTS FOR THE ALIGNMENT INDEX SECTOR
Figure 15: PESSIMISTIC CASE SCENARIO RESULTS FOR THE ALIGNMENT INDEX SECTOR
1. INTRODUCTION

After the privatization in the Great Britain in the earlier 80's and the success its encountered, the necessity for privatization has increased throughout the world; also the collapse of centrally planned economies have enhanced this appeal. The transition to market economies through privatization is expected to become more frequent in the 1990's and beyond. With the total value of assets to be privatized in the world, over the next years worth over US $400 billion, politicians, economists and the population alike are increasingly focusing their attention on the cost and benefits of privatization.

In Ivory Coast, where the state-owned enterprises (SOES) have long been the dominant factor in the national economy, the privatization effort represents a major change to the country's economy, culture and history. While there exist many obstacles to privatization in Ivory Coast, the effort represents an opportunity to revive the economy by reducing its growing external and internal debt and lack of credibility, thereby effectively preparing the country for the increasingly global competition.

The currently available literature and research on privatization generally do not address the privatization of state-owned enterprises as a dynamic process. Current research typically exemplified by the World Bank model described in section 2.4 has been focused primarily on static, transaction based and qualitative descriptions of privatization limited to a specific industry or time period. This static approach restricts the applicability of this model to other cases. We think that privatization is a dynamic process and should be treated dynamically. This thesis develops a basic system dynamics model of the privatization process. Based on the Ivory Coast Privatization Program, the model quantifies dynamically the key sectors, the main infrastructures and the supporting behaviors encountered in privatization. A dynamic modeling approach entails
fundamental changes in the understanding of how government institutions and activities are replaced by the private sector (Humphrey, 1990).

Based on twenty-year simulation runs of three different scenarios, the thesis addresses a major obstacle encountered in privatization: the misalignment of the different goals of the various relevant sectors and actors; section 3.3 analyzes the effect of different SOE ownership structures on alignment goals (Shleifer and Vishny, 1992). Essentially, the challenge is not to reestablish antiquated and inefficient regulatory systems; the challenge is to construct new systems which can achieve the necessary congruence among the objectives and goals, often contradictory, of the key players in the different sectors involved in privatization.

The results derived from the twenty-year simulation, are divided into historical (1980-1994) and projected (1995-2000) components. This division allows for the validation of the behavioral assumptions used in the historical component lending greater validity to the results in the sensitivity analyses. Through sensitivity analysis, different scenarios can be tested to examine how to maximize sectoral alignment in the process of privatizing state-owned enterprises in Ivory Coast and other countries.

The results from this thesis should be of interest to governments, public and private sector enterprises, foreign and domestic investors, labor and academic institutions and students who want to understand the applicability of system dynamics to issues that have been traditionally analyzed using static methods. This thesis contains six chapters. Chapter 1 provides an introduction; Chapter 2 discusses the background to the privatization process including the static approach currently used; Chapter 3 describes the system dynamics modeling approach to privatization; Chapter 4 analyzes the model's base case scenario; Chapter 5 analyzes two alternate scenarios; Chapter 6 provides the conclusion to the thesis. Several appendices outline the model's structure.
2. PRIVATIZATION

This chapter provides a background to the current privatization phenomenon, addressing the key developments that led to the increasing number of privatizations in Ivory Coast today. Following a discussion of the key benefits found in privatizing a state-owned enterprise, the types of privatization commonly used will be introduced. This chapter concludes by depicting a static approach to analyzing privatization that is typical of the literature available today.

2.1 Growth of State-Owned Enterprises

Over the past decades, the increasing importance of privatization and the declining number of nationalization can be observed in Figure 1. The importance of privatization in Ivory Coast today can be better understood by explaining the important developments leading to the current demise of public ownership of enterprises and nationalization policies. The key developments that account for the rise and fall of nationalization in Ivory Coast can be classified into perceived market failure and the oil shock effect.

*Changing fashions

**Worldwide sales of state-owned enterprises**

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>100</td>
</tr>
<tr>
<td>1986</td>
<td>150</td>
</tr>
<tr>
<td>1987</td>
<td>200</td>
</tr>
<tr>
<td>1988</td>
<td>250</td>
</tr>
<tr>
<td>1989</td>
<td>300</td>
</tr>
</tbody>
</table>

**Figure 1: Importance of Number of Privatization**
Perceived market failure: The market of public goods requires lot of capital with a low return. Getting the private sector to invest in these goods required generally subsidies or an agreement to rule a monopoly company.

Other perceived market failure has fostered the rapid growth in the number of SOEs. Overall, these factors are based on the premise that public ownership is a response to the failure of private markets in securing efficient outcomes. Among the key factors are:

1) Economic development and planning: Given the underdeveloped nature of infrastructures and markets, public production and ownership were seen as essential for the economy. It can also be argued that the scale of investment required often exceeded the capital-raising capacity of the private sector.

2) Social benefits: The state-owned enterprises allowed the market to achieve distribution objectives; that is, it provided access to essential goods and services at reasonable prices. Also, public ownership was a mechanism that could be used to create employment or to prevent unemployment.

3) Strategic interests: For Ivory Coast and many African countries or in many developing countries, the state-owned enterprises represented the control of key technologies and industries despite high costs and inefficiencies. Oil, mining, petrochemical, electric power, and telecommunication were some of the key industries protected by the government.

Considering market failure factors, the government expanded its influence over the economy by shifting significant resources into the public sector; this explained the significant growth of the state-owned enterprises during the period 65-75. This spread of state enterprises also provided the government with political stability since the enterprises were managed by local managers.
Overall, a strong government coupled with the perceived market failure factors described above were key drivers that propelled the government into its SOE explosion by the late 1970's.

*Oil shock effect:* During the mid to late 1970's, adverse global developments like the oil shock drastically altered the favorable SOE scenario in Ivory Coast leading to the fall of creation of new companies. It is important to note that while the oil shock had adverse effects on the country, it favored countries like Gabon, Nigeria, Libya etc., that were oil exporters. Due to Ivory Coast's aggressive economic development program that made the country a major importer of oil, the oil price increases resulted in the significant deterioration in economic performance. The slow subsequent recovery led to the conclusion that the state-owned enterprises were limiting the flexibility required to achieve necessary adjustment to external shocks. Today, the government recognizes that the SOE's have not only failed to stimulate growth, but also have required enormous subsidies to remain afloat. Compounding this problem, the SOEs by late 1980's had contracted more than 60% of the country's total external debt which was driven by lending at negative real rates; the high debt level attracted much detrimental attention from foreign officials and private-sector creditors (Vernon, 1988). With the mounting debt crisis, the government turned to privatization as a solution to its widespread problems.

2.2 Benefits from Privatization

Few governments have embarked on a program of privatization because they wanted to; the privatization processes in many countries like Ivory Coast have often been reluctantly undertaken because the existing method of building the economy through SOEs and state control systems was inefficient and costly (Hemming and Mansoor, 1988) and (Humphrey, 1990). Given the inefficiencies of the state-owned enterprises, the benefits associated with privatization have functioned as attractive incentives for
governments to privatize. Among the alleged benefits derived from privatization, the proponents of privatization consider efficiency improvement as the key benefit.

a) Operational efficiency: The failures of many state-owned enterprises have been primarily attributed to factors such as inefficient allocation of resources (an example of productive inefficiency), high level of bureaucracy and poor management (examples of operational inefficiencies). Considered perhaps the most effective method of increasing overall efficiency in the medium and long run, the privatization of a SOE represents the starting point for an "efficiency drive" (Hachette, 1993). A direct short run consequence of privatizing public enterprises is the large scale reduction in employment levels. Addressing the operational inefficiency of public enterprises, the rationalization of employment to an optimum level per unit of output is often the first step in the efficiency drive. It is not surprising, therefore, why labor and labor unions are strongly against privatization; this issue is addressed in Chapter 4.

b) Productive efficiency: Without the financial backing of the government, privatization creates strong incentives for the new management to increase productive efficiency. Among the incentives for management to improve the performance of the enterprise are:

(1) the risks of bankruptcy and takeovers derived from inefficient use of resources; that is, another company may have better use for the newly privatized enterprise's resources and is willing to acquire these resources (Humphrey and Mansoor, 1990),

(2) management's responsibility to shareholders who monitor the company's performance better than the government and

(3) the financial discipline imposed by capital markets creating the need to balance the company's budget (Humphrey and Mansoor, 1990). Overall, the need to rapidly increase both operational and productive efficiencies is especially applicable to newly privatized enterprises in
markets where the degree of competition is very high rather than monopolistically low.

c) Other benefits: Among key benefits associated with privatization are:

- **Reducing complexity:** By decreasing its participation in SOE’S, the government benefits from the cost savings that is derived from the reduced complexity in managing and funding through subsidies its constellation of diverse state-owned enterprises. The direct effects of privatization are the curbing of growth in public spending and the reduction of government debt. An indirect consequence accrued from the decreased role of the state is the return to the private sector of those firms the government had acquired through bankruptcy.

- **Stimulating the private sector.** Stimulating private sector initiative is a very efficient mechanism to achieve economic growth and develop the country's human resources. By allowing the private sector to develop, both local and global business interests will be fostered giving private enterprises a greater role in the country's economic development.

- **Accessing foreign capital:** With the entrance of new competing emerging markets like that of the former Soviet Union and the Eastern European nations, privatization in Ivory Coast could represent a critical magnet for foreign investors to consider Ivory Coast over the others African countries.

- **Benefiting the remaining SOEs:** Since privatization is essentially adding a competitive element to the economic environment, the enterprises that remain owned by the state will also be forced to improve their performance. Thus, privatization acts as an incentive and control mechanism for the remaining state-owned enterprises (Humphrey and Mansoor, 1990).
2.2.1 Industrialized versus developing country:

It is important to note that the benefits above are inherently associated with privatization in Third World countries (Viravan, 1991) where factors like access to foreign capital play a crucial role in a country's development. Contrary to the privatization processes in Western World countries, where higher relative political stability and economic growth have supported privatization efforts, the privatization processes in developing countries like Ivory Coast are more volatile due primarily to the lack of political and economic stability. Governmental volatility leads to uncoordinated policies and unclear privatization agendas which can result in the abandonment of the entire process (Kamel Al Sayyid, 1991).

2.2.2 Complementary policies:

In the 1990's, the government viewed privatization as the solution to all of its economic troubles. While the benefits discussed above are playing a significant role in propelling the privatization process in Ivory Coast, the government also understands that privatization in itself is not the solution; the process should be complemented by other policies directed at the country's overall development. These policies which include: reducing SOE expenditures and employment level, increasing foreign investor access to national markets and reducing mounting corruption and bureaucracy are discussed later; they form an integral part of the privatization model developed.

2.3 Types of privatization:

Privatization is a term that has been commonly used to refer to all developments in which public enterprises and operations are transferred to the private sector. It is important, therefore, to distinguish among the different types of privatization. In describing the different types, the continuum of possibilities classification
scheme (Ramanadham, 1989) provides a useful framework (refer to Appendix A for a diagram of the framework). In this classification, the types of privatization are classified into three categories: ownership, organizational and operational type privatization. The key features of each category are discussed below.

**a) Ownership privatization:** This type of privatization is generally the most common and popular. Essentially, ownership privatization can be classified along two dimensions: degree of privatization (partial to full) and scope of privatization (management buyout to public sale). The three main forms of ownership privatization which involve different combinations of the above dimensions are:

1. **total denationalization:** This involves the complete sale of a SOE to the private sector.

2. **partial privatization:** In a partial privatization, only some of the government's equity is sold to the private sector; the larger the private equity share, the greater will be the degree of privatization.

3. **liquidation:** Usually a response to the financial failure of a firm, liquidation essentially involves the dismantling of the SOE with parts of it sold to diverse buyers.

**b) Organizational privatization:** As it can be observed in the classification structure, there are many forms of organizational privatization. This discussion will focus on two frequently used methods: leasing and competition. (1) leasing: In this form of privatization, the SOE leases out parts of its assets to the highest bidders while retaining the benefits of ownership (like profits). Due to the motivation and expertise of the private investor, leasing is mutually advantageous as the leased assets can improve both labor and productive efficiency (for example, through lower operating costs) benefiting the government and the private investor. (2) competition: Competition can be generated through the breakup of large SOEs into smaller units, deregulation and promotion of internal competition within the large enterprises. Increasing competition, especially
through deregulation, allows private enterprises to compete against the SOEs. Overall, competition may improve efficiency and lower cost structures thereby reducing prices.

c) Operational privatization: There also exist many different forms of operational privatization. It should be noted that this type of privatization is usually the least "dramatic", thereby, gaining little support from governments wishing to use privatization as the starting point for major economic modernization programs. However, the specific methods involved in operational privatization usually precede the more "dramatic" ownership privatization. This section will focus on two types of operational privatization.

(1) **contract out:** This method is the most common form of operational privatization involving the acquisition of inputs from the private sector through competitive bidding instead of self-production of inputs (Hemming, 1988). Contracting out is essentially the privatization of elected activities performed by the state owned enterprise. Its main advantage lies in the ability of SOEs to tap into the economies of scale of the private sector firm supplying the SOE.

(2) **use of capital markets:** By subjecting the SOEs to the disciplines of capital markets, they become effectively regulated by private investors. Since the capital market represents a primary source of funds, the SOEs are forced to "sell themselves" as attractive investment options (Ramanadham, 1989).

Overall, Ivory Coast privatization process has focused on the ownership type of privatization including private goods companies like oil refinery and mining and public goods like urban transportation, high ways and electricity. As the privatization process in Ivory Coast becomes more mature and efficient, organizational techniques like leasing and competition, and operational techniques like contracting out are expected to be used more frequently. Today, these techniques are still considered to be "exotic" and are used in a limited scope. Throughout the discussion and analysis of the privatization
model developed in this thesis, the total or full divestiture framework is assumed to be the primary privatization technique used.

### 2.4 Static approach to privatization

Most of current literature and research available have dealt with privatization in a static and qualitative way (Berg and Shirley, 1987); privatization has been addressed as being a transaction rather than a dynamic process. The World Bank model for privatization is a typical example of the static approach to privatization that is commonly encountered in today's research literature.

The World Bank developed a five-factor model to help developing countries overcome obstacles to privatization; each factor is treated as a separate transaction. While the model does not help devise solutions to the obstacles (a typical limitation of static models), it does propose a structured approach that developing countries can use to implement privatization programs.

1) **Preparing for privatization**: The first factor involves the government's explicit clarification of its objectives and priorities for privatization. Both political and social opposition to privatization can be reduced if the underlying reasons are well understood and the process is impartial and transparent (Berg and Shirley, 1987).

2) **Systematic strategies and classification**: Problems can be anticipated by designing a comprehensive and systematic privatization strategy. This strategy can be accompanied by the classification of SOEs using objective criteria that takes into account economic and social factors. Classifying SOEs is an important factor to prioritize the privatization process.

3) **Preparing the SOEs**: This factor usually involves financial valuation, preparation of legal documents and, in some cases, rehabilitation of the assets to be sold.

4) **Divestiture units**: The World Bank also recommends the establishment of a central administrative unit to manage the privatization process. One key advantage
for establishing such a unit is that the process becomes separated from the interests of politicians and other special interest groups (these "political" effects are captured in the model developed generating results that are discussed later). The divestiture unit is able to objectively analyze and recommend privatizing actions. Organizational and analytical consistency are other advantages associated with centralized privatization units.

5) Foreign assistance: Unlike the policies adopted previously by the government, the World Bank also recommends foreign assistance as a potential solution to overcome obstacles to privatization. While the bias against foreign capital is still strong in many developing countries, these countries can seek other means of foreign assistance like contracting finance experts (associated with investment banks and consulting firms) to advise the government on issues ranging from valuing assets and identifying potential buyers to structuring and negotiating deals (Berg and Shirley, 1987).

This thesis will dynamically expand the structure developed in the World Bank's static model. The basic system dynamics model developed is simple; however, the model addresses many of the limitations found in current literature, including its transaction-focus and limited time and location expandability. Through the system dynamics based model, the Ivory Coast Privatization Program is addressed as an interdependent process; through twenty-year simulations, the understanding of the key sectors and relationships is facilitated through the use of diagrams and graphs. Using sensitivity analysis, the model suggests key solution areas to enhance the efficiency of the privatization program.

3. DYNAMICS MODELING APPROACH

This chapter will provide an overview to the Systems Thinking method utilized in the privatization model. The chapter will also describe the basic model structure and conventions adopted. And finally, this chapter will address the model's key constructs and assumptions.
3.1 Systems Thinking

As mentioned above, the World Bank model is a typical example of a static and one-dimensional description of the privatization process. Current research on privatization has generally followed this model; while effective in providing a qualitative description, the World Bank approach fails to provide a better understanding of privatization dynamics due to two key factors (Charyk, Peterson, and Richmond 1992):

1) Local spatial focus: The economic spatial limitation is demonstrated through two examples: (1) The static model is primarily transaction-based; that is, the World Bank model presents its five factors separately. The model does not consider the interaction, for example, between each factor and the political environment in Ivory Coast and some developing countries, which plays a major role in determining the success of privatization. (2) Static models are generally case-based focusing on particular countries and industries. While the World Bank model has attempted to generalize its applicability, many other static models are plagued by limited spatial usefulness.

2) Local temporal focus: The key limitation associated with static models that it describes the privatization process only in a particular year or short time period. Little attempt has been made to extend the process into the future.

Systems Thinking addresses these two limitations by facilitating the extension of both the spatial and temporal boundaries of the privatization process. Spatially, Systems Thinking focuses on the interdependency of the environment; the key "actors" in the privatization process are highly interconnected. The Organizational Sector is linked to the Labor Sector; the Financial Market Sector is connected to the Privatization Legislation Sector and so forth. Systems Thinking also helps to broaden the applicability of the model to many countries and industries. Temporally, Systems Thinking acts as a privatization "flight simulator" allowing for the compression of time. The ability to simulate and explore different scenarios leads to valuable insights; while attainable using static models, these insights are greatly facilitated using a system
dynamics based model which visually presents simulation and sensitivity results shifting the focus to understanding each sector's structure and sector relationships.

Together, the combination of highly interdependent sectors and scenario planning provided by Systems Thinking results in the development of an operational model of the key aspects of privatization. While static models answer questions like, "What factors will influence the Ivory Coast privatization process?" Systems Thinking-based models answer questions like, "How will the factors within the sectors interact?" and "How can the process be improved to increase its effectiveness and robustness?" (Charyk, Peterson, and Richmond 1992). The system dynamics privatization model considers the internal relationship within an organization, the relationship between the organization and the outside environment, and the relationship among the sectors in the outside environment. It is this process based operational view which makes Systems Thinking an important facilitating tool to analyze privatization.

3.2 Basic System Structure

The privatization model developed in this thesis used the it think software developed by High Performance Systems Inc. The model is based mainly on four structural elements: stocks, flows, converters and connectors. An overview of each element is discussed below based on the simplified version of the Labor Sector used in the model (Charyk, Peterson, and Richmond, 1992).
1) **Stocks**: Stocks are accumulations. In Figure 1, the Labor Pro Privatization Index rectangle represents the stock of labor's view in favor of privatization; the higher the stock, the more labor is in favor of privatization. Initially set to an index of 100 representing the starting "stock", the Labor Pro Privatization Index (LPPI) will vary depending on the input generated by the Flow change in it.

2) **Flows**: Flows are used to depict changes in stock. In the figure above, Change in LPPI is regulating the flow into the Labor Pro Privatization Index stock; the privatization model is based on bi-directional flows; this signifies that the flow can be either positive or negative. The model is set such that all the stocks will range from 0 to 200. In a twenty period scenario, this signifies that maximum index volatility for each period is 5 (assuming that the stock cannot be negative and that each period carries equal weight); that is, in each period, the flow will range from a minimum of -5 to a maximum of 5. It is important to note that the index and flow ranges selected (including the initial
index = 100) are arbitrary and have no effect on the simulation results as long as this selection is consistently used throughout the model.

3) **Converters**: Converters can represent either information or material quantities. Frequently, they are used as "score-keeping" variables; unlike stocks, converters do not accumulate. In the above figure, Future Unemployment and Favorable Labor Legislation are converters that together determine the flow Change in LPPI. However, Future Unemployment is negatively correlated to Change in LPPI; that is, the higher the future unemployment rate due to privatization, the more negative the Change in LPPI will be resulting in a decrease in the Labor Pro Privatization Index. Favorable Labor Legislation is positively correlated to Change in LPPI whereby the more legislation favors labor, the more positive the Change in LPPI will be, thereby increasing the stock of Labor Pro Privatization Index.

A key advantage in using the system dynamics modeling approach lies in its ability to facilitate the analysis of the interaction between negative and positive factors like Future Unemployment and Favorable Labor Legislation; the results of the interaction on the Labor Pro Privatization Index can be immediately graphed.

Underlying each converter in the privatization model developed is a graphical plot of its expected behavior during the simulation period. These graphical plots reflect scenario assumptions based mainly on historical data and reports; the plots range from -5 to 5 "index units". In the diagram above, Change in LPPI receives two inputs; the total weighting for the two inputs is 100%. If, for example, Future Unemployment has a greater effect on the Labor Pro Privatization Index, then the Future Unemployment converter can be assigned a greater weight like 75%. In this case, Favorable Labor Legislation is assigned a lower weight of 25%. Thus, it can be seen that, if each converter's graphical plot ranges from -5 to 5 index units, then given the total weighting limit of 100%, the absolute Change in LPPI can only range from the "index units" as mentioned above.
Sensitivity analysis can be performed by changing the graphical plot of selected converters (sensitivity analysis using this technique is performed and analyzed in Chapter 5). For example, in the simplified Labor Sector diagram, the behavior of the converter Future Unemployment was graphed as follows:

![Graphical Plot for Future Unemployment](image)

**Figure 3: Behavioral Graphical Plot for future Unemployment**

As it can be observed in Figure 3, Future Unemployment is expected to rise with the increasing number of privatizations in Ivory Coast around year 10 which corresponds to 1990. This plot represents one possible scenario for Future Unemployment. If one believes that Future Unemployment will decrease with future privatization, then another graphical plot can be entered whereby the Future Unemployment level decreases after year 10; this would create a different scenario. The impact of this change would be readily observable in a graph of the Labor Pro Privatization Index stock (which, with this change, would increase since labor's fears of future unemployment decreases with a lower Future Unemployment trend leading to a higher stock of Labor Pro Privatization Index). It should be noted that the behavioral
assumptions of several converters were simplified in order to reduce model complexity while still capturing the main effect of the converters' behaviors.

4) Connectors: Connectors link stocks to converters, stocks to flows, converters to flows and other possible linkages. Essentially, connectors do not take on numerical values, they only transmit these values. In the simplified Labor Sector, there are two connectors which link Future Unemployment to Change in LPPI and Favorable Labor Legislation to Change in LPPI.

A final note on basic system structure is the propeller-like symbol opposite to the stock rectangle. This symbol represents the model's boundary; that is, the model does not consider any activity that occurs beyond this propeller symbol.

3.3 Privatization model fundamentals

1) Sectors: The privatization model developed is composed of 7 main sectors. These 7 sectors are classified into "macro" and "micro" sectors. Table 2 lists each sector by classification type:

<table>
<thead>
<tr>
<th>Sector Name</th>
<th>Macro Sectors</th>
<th>Micro Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy Sector</td>
<td>Organization Sector</td>
<td>Labor Sector</td>
</tr>
<tr>
<td>Political Sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Market Sector</td>
<td></td>
<td>Foreign Investor Sector</td>
</tr>
<tr>
<td>Privatization Legislation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: The Sectors in the Privatization Model

2) Simulation period: The simulation period or "time compression" for this model is set at 20 periods covering the years 1980 to 2000. Ivory Coast officially embarked on its privatization program in 1990 through its denationalization policy; the first major successful privatization was the privatization of the National Electric Company in 1991. Former Prime Minister Alassane Ouattara established the government's firm commitment towards privatization at the start of his administration in 1990; after his resignation in 1992, his Financial Minister Mr. Duncan keep going many
of the pro-privatization program and measures as Prime Minister. Given this short history, the simulation period encompassing 1980 to 2000 captures the key dynamics encountered in the Ivory Coast privatization process, allowing both for the validation of a historical component and for the forecast of the projected component; these components are also discussed in a later section. Simulating the privatization process beyond the year 2000 in a volatile country like Ivory Coast might prove to be a futile exercise.

3) Maximizing alignment among sectors: The key index introduced in the model is the Alignment Index contained in the Alignment Index Control Sector. This index calculates the "degree of alignment" among the different sectors; that is, the index aggregates the level of compatibility of each sector's privatization goals. For example, this index will be very high if each of the 7 sectors have different objectives and priorities regarding the privatization program; the alignment index will be zero if all the sectors completely agree on the goals and objectives for privatization program.

As mentioned in the introduction, it is important to note that different SOE ownership structures result in different alignment goals. While in the Ivory Coast privatization (like in the United Kingdom) the government clearly owns the shares that it is selling; privatization in Russia, for example, does not have an unambiguous defacto ownership structure in which the government owns the shares. On the contrary, many stakeholders have existing ownership rights, in the sense of being able to effectively exercise control rights over the SOE's assets (Vernon, 1988). Privatization, therefore, cannot proceed in Russia unless these stakeholders are appeased, bribed or disenfranchised. Since these stakeholders (local governments, branch ministries and workers) perceive privatization as a redistribution of property rights rather than a government sell-off, the alignment objectives are different than those described above for Ivory Coast. Unlike the Ivory Coast case where the objective is to maximize the sectors' alignment favoring the Privatization Program, the alignment objectives in Russia become reconciling the control claims of the multiple defacto owners and reducing the damage
they do while competing for their SOE shares. One solution is to pay off some stakeholders with privatization proceeds and dividends so that they give up control rights that conflict with those of others.

Related to the Alignment Index, another important factor is the Change in Alignment Index. This index measures the change in the index from the previous simulated year to the current simulated year. Therefore, if this Change Index is increasing, then the sectors' privatization objectives are diverging; if the Change Index is decreasing, then the sectors' privatization objectives are converging. It is this convergence (or decreasing Change in Alignment Index) that warrants special attention by privatization policy makers and the sectors involved in privatization where the government is the clear owner of the shares being sold.

Essentially, the Alignment Index is the standard deviation of the indices generated by each sector for each simulated year. During each simulated year, the 7 sectors' indices are aggregated in the Alignment Index Control Sector. The average index is calculated; for each index, the Temp converters measure the index's deviation from the mean and squares this value. The values in the 7 Temp converters are entered into the Alignment Index converter which sums these Temp values and divides the total by the number of indices (7). The square root of this value is taken yielding the standard deviation or Alignment Index. The Change in Alignment Index is calculated by storing a current simulated year's Alignment Index into the converter labeled Previous Year Index; this converter was modeled with a one-period delay function. Therefore, for each simulated year, the Change in Alignment Index is calculated as (Alignment Index - Previous Year Index); this represents the Change in the Alignment Index. The results from this alignment analysis for the base case and other scenario cases are discussed in the next chapters.
4. MODEL ANALYSIS: BASE CASE

The base case privatization model will be analyzed by sectors starting with the four macro sectors. Prior to the discussion of these sectors, it is important to understand the current situation of the "Committee National de Privatization". This importance stems from the fact that the behavioral graph of each variable contains a historical (1980 to 1994) and a projected component (1995 to 2000) as mentioned previously. Therefore, the variation among the different scenarios is primarily based on different projected components, although different interpretation of historical data led to minor adjustments in the validated historical component. Thus, the base and other cases scenario analysis depart from the current situation.

4.1 Current Situation

With economic uncertainties running high and with 2000 being a general election year, the outlook for Ivory Coast may change dramatically over the next years. Together with Ivory Coast's uncertain outlook, the success of the Privatization Program is also unclear.

Although there still is a continued impetus for the Ivory Coast Privatization Program, privatizations have been costly to the government. Coupled with high administrative costs, such as legal costs, consulting fees and publicity costs, the level of capital costs like upgrading facilities and other preparations, have also been high.

The base case scenario analysis models a "middle-of-the-road" set of behavioral assumptions for the outcome of the above measures; it forecasts conservative behaviors for each variable and sub-variable contained in the 7 sectors. For an enhanced visualization of the sector discussions, a full privatization model diagram is included in Appendix B. The complete set of documentation for the base case is provided in
Appendix C; the documentation includes all the equations and relationships contained in each sector, thus providing additional background for the discussions below.

4.2 Economy Sector

The Economy Sector is the first of four "macro sectors." The main infrastructure contained in the Economy Sector is shown below. The Economic Stability Index represents the "stock" of economic stability in Ivory Coast; the higher this index, the more stable the Ivory Coast economic environment.

The Economic Stability Index is regulated by the Change in ESI which is influenced by sub-variable inputs weighted according to the relative importance and effect on the country's economic stability. In the base case, inflation was modeled to account for 40% of the Change in ESI; the other six inputs account for 10% each. A discussion of the behavioral assumptions for each variable and sub-variable ordered by its importance in the simulation is provided below. Italicized numbered entries indicate a main variable, the behavior of which is a function of lettered sub-variables; for example, the variable Budget Surplus is a function of sub-variables Tax Revenues and Public Expenditures. Such classifications, however, do not capture all interactions among the highly related variables.

1) Inflation: Inflation is the key destabilizing sub-variable for the Ivory Coast economy. Generally very high since the mid-1993's, the inflation rate has varied dramatically with the "economic shocks" implemented by new finance ministers. As a result, inflation in Ivory Coast has ranged from 5% to over 25% per month; currently, the inflation rate is averaging 15% per month. The base case scenario assumes that the inflation rate will decline gradually by 2000 but not significantly.

2) Currency devaluation: This sub-variable captures the population's perception towards currency devaluation. Ivory Coast generally views the historically
high devaluation of the Franc (Fcfa) negatively. Thus, high Fcfa devaluation will undermine the country's economic stability.

3) Consumption: The consumption variable combines the effect of Favorable Tax Regulation (to a larger extent) and Middle Class Participation (to a lesser extent). Essentially, consumption is the spending of disposable income by the personal sector. The model assumes that higher consumption levels will increase the Economic Stability Index.

a) Favorable tax regulation: Particular tax regimes may or may not favor privatization. The tax concessions introduced in Chile success privatization included a reduction to the taxable income of investors by 20% of the value of SOE shares purchased as well as tax-free dividends on selected shares. With the increasing deregulation of the once protected market, the Ivory Coast government should be considering to grant tax advantages to investors in its privatization program and also to selected segments of the population despite aggravating the deficit. The base case model assumes that Favorable Tax Regulation will increase significantly in the near future and decline slightly.

b) Middle class participation: The Ivory Coast government is interested in guaranteeing a wide distribution base for its SOE shares. In order to achieve this objective, the presence of a financially strong middle class is fundamental. The Middle Class Participation measures the degree of participation of the Ivory Coast middle class in the privatization process. In this model, the variable is determined by Favorable Tax Regulation. Increased favorable tax regulations will lead to the increased consumption from the middle class leading to the possibility of a more significant participation in privatization. However, this function is modeled with a "decreasing returns" factor since, beyond a given limit of favorable tax regulation, more favorable regulation will not induce more consumption from the middle class.
4) **Investment**: Investment contributes positively to the Economic Stability Index. Modeled as a function of Favorable Tax Regulation, more favorable tax regulations leads to the higher level of investment which is defined as additions to capital stock. As with the Middle Class Participation variable, the investment function is also limited by a "decreasing returns" factor whereby a greater number of favorable tax regulations will not lead to higher and higher investment levels. In some cases, it is interesting to note that following privatization, it is common for investment to increase significantly in the newly privatized companies. This generates a positive feedback loop: high investment level, more privatization; more privatization; higher investment level.

5) **Government subsidies**: The model assumes that heavily subsidized economies are less stable in the long-run than non-subsidized economies. With the increasing deregulation of Ivory Coast markets, the base case scenario forecasts subsidies to decline by the year 2000.

6) **Budget surplus**: This variable aggregates the positive effect of Tax Revenues and the negative effect of Public Expenditures; the model assumes that higher budget surpluses will increase the Economic Stability Index. By privatizing SOE’S, the government is essentially attempting to decrease the financial burden derived from state-owned enterprises on the strained government budgets.

   a) **Tax revenues**: If the Ivory Coast government increases its Favorable Tax Regulations, this will decrease Tax Revenues. However, due to the increased efficiency in the tax collection system and lowering tax rate, the imposition of stricter penalties for tax evasion and the increased tax revenues generated by the newly privatized SOE’S, the base case model forecasts a moderate increase in Tax Revenues despite more Favorable Tax Regulations.

   b) **Public expenditures**: The wide-reaching cost cutting measures initiated by the Finance Minister is expected to reduce the high level of government expenditures
discussed in Section 4.1. Base case scenario models a moderate decline in public expenditures.

7) **Balance of payments**: This key variable combines the positive effect of Net Export with the negative effect of Debt Service Payment. The model assumes that a more positive balance of payments level ensures higher economic stability.

   a) **Net export**: Net export aggregates the effects of Exports, Imports; higher net exports favor the country's Balance of Payments. The post devaluation combine with the substantial rise of commodity prices have increased the exportation value.

   i) **Exports**: This sub-variable represents the total exports from Ivory Coast to other countries; Ivory Coast's primary exports are coffee and cocoa beans, palm oil. Historically, exports decreased in the beginning 1980's due to economic recession and political instability. The base case scenario projects a good increase in exports by 2000.

   ii) **Imports**: The devaluation of the Fcfa by the government in the 1993 resulted in a decline in imports; however, with the opening of Ivory Coast markets, the model projects a surge in imports followed by a gradual decline by 2000; Ivory Coast's primary imports are consumer goods, and fuels and physical plants.

   b) **Monetary union**: WAMU (West African Monetary Union) and WACD West African Community Development, the main goals of these two west African organizations are fourfold:

   (1) free circulation of goods, services, financial resources and workers,

   (2) elimination of non-tariff barriers,

   (3) establishment of common external tariff and

   4) convergence of macro-economics, trade, agriculture, transportation and communications policies. The model assumes that a higher West African
factor will favor Ivory Coast's net exports and overall economic development, thereby fostering economic stability.

c)Debt service payment: Due to Ivory Coast's very high foreign debt level, the base case model forecasts Debt Service Payments to remain high throughout the simulation period despite the possibility of increasingly favorable world interest rates; payments can be expected to decline slightly by the late 2000s.

The following graph shows the 20-year simulation results (1980 to 2000) for the Economy Sector. With the assumptions described above for the base case scenario, the Economic Stability Index ranges from 57.81 to 100.00; the Change in ESI only becomes positive after 1995.

Figure 4: Base Case Results for the Economy Sector

![Graph showing Economic Stability Index and Change in ESI over 20 years]
Given the current situation, the economic stability in Ivory Coast was predicted to worsen steadily until a moderate upturn after 1995. It can be observed that Change in ESI "flattens" in the mid 1980's and in the early 1990's; these were periods of considerable political and economic uncertainty. Growth in Economic Stability increases strongly after 1992 and is predicted to suffer an adjustment in the late 1990's. Overall, the Economy Sector provides support to the privatization program only after 1995.

4.3 Political Sector

The main infrastructure of the Political Sector contains the Political Stability Index which represents the "stock" of political stability in Ivory Coast and the "flow" Change in PSI which regulates the change in political stability.

The magnitude and direction of Change in PSI is determined by several inputs weighted according to their relative importance and effect on Ivory Coast's political stability. In this sector, Legislative Majority was the key variable modeled accounting for 50% of Change in PSI; the other five sub-variables each received an equal weighting of 10% each.

Legislative majority: This key variable represents the interaction between the power of Conservative Parties and Leftist Parties in Ivory Coast's House of Representatives. The currently conservative Congress strongly favors reducing the role of the state, opening the economy to foreign investment and simplifying the tax system. In this model, a dominant Conservative Parties behavior will make Legislative Majority more positive, which will increase the country's Political Stability Index.

Corruption: This sub-variable refers to the publicly exposed corruption rather than the hidden corruption (that might actually increase political stability); the higher the level of visible corruption, the lower the Political Stability Index. Corruption became especially evident during the late 1970's, resulting in the impeachment of some ministers in 1977. The model projects that practices of bribe solicitation, influence
peddling and illegal profiteering in both public and private sectors should decrease with the high profile impeachment process.

Plans index: Economic "shock" programs have been very prevalent during 1987 and early 1990's in a futile attempt to control the debt crisis. This index represents the frequency of these destabilizing "shocks"; the more frequent the economic "shocks", the lower the Political Stability Index as the failures of these economic plans seriously undermine political credibility.

Executive branch stability: This sub-variable models the stability of the Presidency and its cabinet members. Executive stability was very high during the first years of the Houphouet-Ouattara Administration, but fell dramatically after the death of Houphouet Boigny and the impeachment of Ouattara. The current executive stability is relatively good due to the new President’s tenure and his will to open the government to the opposition parties represented at the Assembly. The base case scenario forecasts a gradual increase in Executive Branch Stability which increases the Political Stability Index.

Localized interests: This variable is a function of Lobbying Group Power; the model assumes that higher Lobbying Group Power results in more Localized Interests; increased Localized Interests reduces the Political Stability Index.

Lobbying group power: This sub-variable represents the degree of influence by special interest groups on the government. Addressing this issue, the government has already proposed to centralize the control of SOE’s under one department in order to avoid these localized interests. Overall, Lobbying Group Power and Localized Interests play an important role in the country's political stability.

The figure below shows the 20-year simulation results for the Political Sector. With the base case behavioral assumptions described above, the Political Stability Index varies from 84.57 to 111.03; the Change in PSI declines between 1985 and 1996 as a result of significant political change.
The base case results indicate a clear cyclical pattern for the Political Stability Index; it can be observed that in the early 1980's, optimism was high regarding the change from a single to multiple elective candidates for the parliament and cities as the Political Stability Index peaked in 1985. However, several political "shock" failures undermined the population's credibility in the new form of government. This resulted in a significant decrease in the country's political stability. Similar to the Economy Sector, the Political Sector provides support to the privatization program only after 1995. Overall, this points to the strong positive correlation between economic and political stability in Ivory Coast.
4.4 Financial Market Sector

The Financial Market Sector is based on the main factors shown below. The Financial Market Efficiency Index (FME) is the stock of efficiency in the Ivory Coast financial market; the higher this index, the more efficient is the financial market thereby favoring the privatization program.

The Financial Market Efficiency Index is regulated by the Change in FME; this change is affected by six inputs given 20% weight each except for Local Bank Stability and Global Integration Index, which were assigned 10% weight each.

1) Cost of privatization: This variable aggregates the effect of 4 inputs; the model assumes that higher privatization costs lead to less efficient financial markets. Each of the inputs into Cost of Privatization were given 30% weight except for Allowable Currency Base which was given 10% weight.

a) Transaction costs: The cost of privatization transactions involves one or more of possible expenditures: administrative costs, financial restructuring, physical rehabilitation and settlement of employment claims (Vuylsteke, 1988). Modeled as a function of privatization Complexity, Transaction Costs decrease as the complexity of the privatization process decreases.

i) Complexity: This sub-variable refers to the degree of complexity in planning and implementing privatization; the model assumes that as the country gains more experience in privatizing state-owned enterprises, the degree of complexity will decrease due to "learning curve" effects. This decrease in Complexity can also be interpreted as the increased capacity of the Ivory Coast government to handle more sophisticated privatization.

b) Residual costs: Residual Costs are defined as debt, pension fund losses and other long and short term liabilities associated with privatization. The base case
scenario assumes that the quality of assets to be privatized will increase leading to a moderate decrease in Residual Costs by 2010 (Vuylsteke, 1988).

\textit{c) Allowable currency base:} This key sub-variable is often a hot topic for discussion among Ivory Coast involved in the privatization process. Essentially, Allowable Currency Base is the number of "privatization currencies" allowed by the government to pay for the state-owned enterprises being sold.

The key objective is to avoid being paid "rotten currency." An example of "rotten" are notes with low liquidity in the market. The base case scenario forecasts an increasing Allowable Currency Base due to the government's attempt to support its privatization program; the model assumes that the increased usage of a wider base of privatization currency will increase the overall privatization cost especially if the Ivory Coast government compares to being paid in cash.

\textit{d) Labor opposition:} The basic assumption is that increased Labor Opposition increases the cost of privatization. Since labor has traditionally opposed privatization policies, costly arrangements with the labor unions are expected in order to privatize critical SOE'S; Labor Opposition is modeled to gradually increase and then decline by 2010.

\textit{2) Valuation accuracy:} This variable represents another key factor; it combines the positive effect of Fair Assumptions and the negative effect of Pricing Error. Higher Valuation Accuracy is assumed to make the financial market more efficient.

\textit{a) Fair assumptions:} Aggregating the combined effects of assumptions commonly used in valuations like discount rate, country risk, growth rate and book versus market value, Fair Assumptions is modeled as a function of Valuation Bias where higher bias corresponds to lower Fair Assumptions.

\textit{i) Valuation bias:} Bias in valuations can be due to a plethora of factors like lobbying from special interest groups, political motives and profiting for personal gains. The model assumes that valuation bias will decline as experience is gained with the
privatization program leading to a more transparent privatization process by more transparent election process.

b) Pricing error: This variable combines the effects of Overprice and Under price; Valuation Accuracy declines as Pricing Error increases.

i) Overprice: During the early years of privatization in Ivory Coast, the government tended to overprice its SOE'S fearing that the population might perceive a "sell-out" of the country's assets to the private sector. Lack of experience and the "profit-motive" compounded the overpricing which contributed to the Pricing Error index. Eventually, overpricing was corrected since it undermined the investors' credibility in the privatization program due to significant declines in SOE value after the privatization.

ii) Under price: Having perceived the problems of overpricing, the government decided to under price its SOEs in an attempt to boost its privatization program. While moderately successful in supporting the privatization process, under pricing attracted many unwanted arbitrageurs and short-term profit seekers. The base case scenario forecasts an overall correction to under pricing leading to more accurate pricing by 2000.

c) Facilitating regulation: An increased number of regulations favoring the privatization process improves the Ivory Coast financial market efficiency; a combination of four inputs, this variable is explained in more depth in the next sector.

d) Stock market development: This sub-variable tracks the development of the Ivory Coast stock markets' capitalization, namely Abidjan's stock exchanges. As the stock market develops and become increasingly sophisticated, the Financial Market Efficiency Index increases. The model projects this index to increase significantly by 2010 after suffering a minor decline in the early 1995 due to the recessionary economy and political instability.

e) Global integration index: This index represents the degree of integration between the Ivory Coast financial markets and the world markets. This
integration can be measured through factors like: profit and dividend remittance, foreign paper issue by domestic institutions, foreign investment in the stock markets and export backed bond issues. The base case scenario forecasts a gradual increase in Ivory Coast's global integration index. Higher global integration signifies more efficient financial markets.

f) *Local bank stability*: This variable is modeled as a function of Savings Account Stability. While domestic bank stability is highly dependent on its savings accounts, the banks are also involved in other operations; therefore, the Local Bank Stability is modeled with a "decreasing returns" to increased Savings Account Stability. Local Bank Stability enhances the efficiency in financial markets.

3) *Savings account stability*: The government is aware that these savings accounts often represent an average Ivory Coast's lifetime earnings thus signifying a highly sensitive economic and social issue.

![Figure 6: Base Case Results for the Financial Market Sector](image)

*Figure 6: Base Case Results for the Financial Market Sector*
Having declined during the period of change from right wing to left wing government in France earlier in the 1980s, the Financial Market Efficiency Index has increased moderately from 1987 to 1993 and is expected to increase significantly after 1997. The 1986 decline in Change in FME can be primarily attributed to the exchange control by the French Government and the refuse of the Ivory Coast’s government to pay its debts.

4.5 Privatization Legislation Sector

The final "macro sector" is the Privatization Legislation Sector; the main structure contained in this sector is illustrated below whereby the Pro Privatization Legislation Index represents the "stock" of legislation favoring privatization in Ivory Coast; the higher this index, the more favorable legislation is towards the privatization process.

The Pro Privatization Legislation Index is regulated by Change in PPLI which is influenced by inputs weighted according to their relative importance and effect on Ivory Coast privatization legislation. In the model, Facilitating Regulation was given the highest weight (25%) followed by Privatization Accessibility (15%). The other six inputs were weighted equally at 10% each.

1) Facilitating regulation: This variable aggregates four sub-variable inputs of which Foreign Ownership Quota is weighted most heavily at 70%; the others are weighted 10% each. The model assumes that more privatization facilitating regulation will lead to a higher Pro Privatization Legislation Index; clear and specific legislation together with mandatory rules also facilitate privatization regulation.

a) Foreign ownership quota: This key sub-variable represents another very sensitive issue for the government. While allowing a greater ownership quota for foreign investors will provide support to the privatization program, this increase will also give the government the image of "selling-out" to foreigners. The base case simulation forecasts a significant increase in this quota by 2010.
b) Profit repatriation: Together with the increased Foreign Ownership Quota, the model expects the government to concurrently facilitate profit and dividend repatriation thus increasing foreign investors' interest in the Ivory Coast privatization program due to more favorable regulation.

c) Long term commitment: This sub-variable represents the government's adherence to its privatization program. The Long Term Commitment towards the privatization program is expected to increase moderately. The best management of the budget announced by the President in 1995 shows the government's determination to restructure its SOEs preparing them for future privatization.

d) Allowable currency base: This sub-variable was already discussed in the Financial Market Sector; the increased number of "privatization currencies" allowed facilitates privatization regulation.

2) Privatization accessibility: This variable represents the "reaching ability" of the privatization program to small and middle class-type investors. Assuming the government is attempting to secure a wide distribution basis for its SOE'S, higher accessibility signifies more favorable legislation towards privatization. Privatization Accessibility aggregates the effects of four inputs weighted according to their impact on the variable.

a) Private sale: Private sales were primarily used in the mid to late 1991's. Restricting the access of small investors to the privatization program, private sales were considered to be very non-transparent and thus quite unpopular with the population since the door was wide open to a wide range of irregularities (Vuylsteke, 1988). The number of privatization conducted through private sales is modeled to decrease as investors and the population participate more actively in the privatization program.

b) Auctioning: Modeled as a function of Pre Qualification, the frequency and efficiency of using Auctioning as a privatization mechanism increases with more Pre Qualification; as the Pre Qualification procedure becomes more and more stringent,
however, the Auctioning frequency and efficiency is expected to start decreasing. The base case model assumes that more auctioning increases (although to a limited extent) the accessibility of the privatization program to smaller investors.

\[ i) \textit{Pre qualification:} \] The Pre Qualification of buyers and other factors is expected to decrease as the privatization process becomes more transparent and efficient over time. Among the key Pre Qualification criteria are: owners' experience, financial capacity to purchase and restructure the enterprise and, if necessary, the technical or scientific capacity of the buyers; pre qualified candidates are usually allowed to visit the company, examine its books and audit its reports (Vuylsteke, 1988).

\[ c) \textit{Public share offering:} \] This sub-variable is expected to increase by the year 2000 as the Ivory Coast financial market becomes more developed and sophisticated and the SOE’S become better prepared for stock market flotation (Kikeri, Nellis,and Shirley1992). It is important to note that through Public Share Offerings, small investors have good access to privatization in a well functioning financial market.

\[ d) \textit{Time constraints:} \] This constraint tracks the degree of "pressure to meet the scheduled timetable" to privatize selected SOE’S; the model assumes that the higher the time pressure to privatize, the less accessible privatization becomes to many investors as the privatizations are canceled, postponed or mismanaged. Targets and deadlines for the completion of SOE sales have been historically shown to be counterproductive to the privatization process. Deadlines often give unfair bargaining advantage to either the buyer or seller prompting hasty sales that rely too heavily on concessions and other "sweeteners"(Kikeri, Nellis,and Shirley,1992).

\[ e) \textit{Transparency:} \] A high degree of transparency is crucial for a successful privatization program. Transparency can be ensured through the clear and simple selection of criteria for evaluating bids, clearly defined competitive bidding procedures, disclosure of purchase price and buyer, well-defined institutional responsibilities and adequate monitoring and supervision of the program. Lack of transparency can lead to
political backlash and is often associated with poorly structured and very costly sales (Kikeri, Nellis, and Shirley, 1992). While the process in Ivory Coast was less transparent in the 1990's due to the dominance of Private Sales, it is expected that transparency will be one of the government's primary goals in order to attract both foreign and domestic investment.

c) **Bureaucracy:** This sub-variable significantly reduces the Pro Privatization Legislation Index. The government is committed to its "debureaucratization program" signifying administrative reform to simplify procedures and methods, rationalization of the state machinery and red tape, implementation of cost-effective procedures, technological modernization and organizational change. Thus, it is expected that more of the bureaucratic processes existing today will decrease by 2005.

3) **Privatization critical mass:** This variable combines the effects of First Generation, Second Generation and Crown Jewels\(^1\) sub-variables; the model assumes that as the critical mass of privatizable companies increase, legislation towards privatization becomes more favorable.

a) **Critical mass sub-variables:** In the earlier 1990's, the First Generation of privatization like EECI (Energy Electric Cote d'Ivoire, Electric Power Company) provided the initial critical mass for the young privatization program in Ivory Coast. The Second Generation of privatization under the new government is expected to provide the continuing mass in support of the program. The Crown Jewels "generation" of expected privatization in Ivory Coast involving strategic industry SOEs such as SIR (Societe Ivoirienne de Raffinage, oil refinery) CITELCOM (telecommunication Company), and some infrastructure projects would consolidate the Ivory Coast Privatization Program.

---
\(^1\) This nomenclature indicates the importance of privatizable companies to the government, from less protected to more protected.
4) Centralization of functions: The model expects that the government will increase the degree of centralization for its privatization-related functions; a slight decline in centralization is modeled by late 2000's.

5) SOE's GNP share: This sub-variable refers to the share of GNP attributed to SOEs; the higher this share, the greater the incentives for the government to implement privatization favoring legislation in an attempt to reduce its burdensome share. Since the early 1980's, the SOEs’ share of Ivory Coast GNP has been declining steadily; the model expects this decline to continue through 2000.

Figure 7 depicts the base case simulation results for the Privatization Legislation Sector. The base case assumptions yield a Pro Privatization Legislation Index that ranges from 100.00 to 127.29; of the four macro sectors, this represents the strongest index increase. Change in PPLI is constantly on the positive side with one significant decline from 1986 to 1988 due to the lack of definition by the government regarding its privatization policy.

Figure 7: Base Case Results for the Privatization Legislation Sector
While the Pro Privatization Legislation Index is expected to suffer an adjustment in the late 1990's, overall, privatization Legislation Sector has been strongly supporting the privatization program. Given the base case assumptions, this support is expected to continue beyond 2000.

4.6 Organization Sector

The first of the three "micro sectors" is the Organization Sector. The Organizational Readiness Index represents the "stock" of how ready the state-owned enterprises are for privatization; that is, the higher this index, the more ready the SOEs are for privatization.

The Organizational Readiness Index is regulated by Change in ORI which is affected by inputs weighted according to their relative importance and effect on organizational readiness. Technology Priority was given primary weight at 20%; the remaining eight factors were assigned 10% weight each.

1) Technology priority: This key variable combines the effect of four sub-variables of which Technology Transfer Priority and Obsolete Technology are the most important with 40% weight contributions each. The model assumes that higher Technology Priority given by SOEs corresponds to greater Organizational Readiness for privatization.

a) Technology transfer priority: This important sub-variable represents an underlying motive behind the expansion of SOEs in Ivory Coast during the 1970s. A key objective of the government was to transfer technology to its strategic firms in the petrochemical, mining, telecommunications and transportation sectors. Through the control of the key technologies, the government was assured of continued power and influence (Kikeri, Nellis, and Shirley, 1992). Currently, this objective has changed; the government is interested in using the SOEs' technologies as attractive "baits" for the
private sector including foreign investors. The government is leveraging on its SOEs' technology base to support the privatization program. The model assumes that the Technology Transfer Priority to the private sector will increase through the year 2010 resulting in the greater Organizational Readiness for privatization.

b) **Obsolete technology:** Not all of the technologies controlled by the SOE’s are attractive. Unfortunately, many governments have failed to realize this as they continue to divert a considerable part of their resources to rescuing SOE’s with obsolete technologies or in obsolete industries (Vernon, 1988). The Ivory Coast government is expected to liquidate its outdated SOEs thereby giving modern technologies higher priority.

c) **Strategic industries:** This sub-variable represents the importance of Strategic Industries to the country. Several SOEs were considered strategic due primarily to political control factors discussed above. While the Strategic Industries index declined during the late 1980’s and early 1990’s because of considerable economic and political turmoil, the government has refocused its attention on Strategic Industries.

d) **SOE diversification:** Some of the larger SOEs in Ivory Coast like Petroci (oil company), Citelcom (communication company) have created some specialized subsidiaries to focus on specific technologies and industries. This has been a typical strategy adopted by larger SOEs; in the mid 1970’s, Petroci was a single domestic company whose primary activity was exploration. Today, it controls or is a dominant partner in over 5 other companies many of which are slated for privatization like SIR. Increased SOE diversification has been modeled to increase Technology Priority. The base case scenario assumes that the SOE diversification index will increase after the mid 2000s due to the newly privatized companies' renewed focus on technology, although former SOE subsidiaries like CITELCOM now use technology as a competitive tool.

2) **Labor union influence:** A high degree of labor union influence over the workforce reduces the organizational readiness of the SOE especially since labor unions
have traditional opposed privatization. The base case assumption forecasts continued high Labor Union Influence through 2000.

3) **Product desirability:** Organizations (including SOEs) responding to the increasingly important customer demands will develop more desirable products and services; the model assumes that Product Desirability will increase due to the greater competitiveness found in the marketplace; increased Product Desirability increases the Organizational Readiness Index.

4) **Managerial autonomy:** The top management of many large Ivory Coast SOE's is commonly depicted as politically-backed puppet managers; therefore, they are restricted in their managerial role to maximize profits and shareholders' wealth. The model suggests that greater Managerial Autonomy and flexibility will lead to a higher degree of organizational readiness. As SOEs become increasingly privatized, it is expected that Managerial Autonomy will increase significantly by 2000.

5) **Incentives to privatize:** The Ivory Coast government has overall provided strong incentives to privatize (since the implementation of its privatization program). The model assumes that Incentives to Privatize will increase through the year 2000.

6) **Access to infrastructure resources:** Investors' concerns about whether they can raise sufficient capital to modernize and expand a SOE may be a stumbling block to the sale of large public enterprises. From a foreign investor's perspective, this is particularly true when dealing with infrastructure, where sales income is in local currency, thereby raising worries about convertibility and exchange risks. The model assumes that the easier it is to improve the SOE's or privatized SOE's infrastructure, the more privatizable the organization becomes. Base case scenario forecasts a gradual increase in Access to Infrastructure Resources in Ivory Coast (Kikeri, Nellis, and Shirley, 1992).
7) **Profitability:** The basic assumption behind Profitability is that more profitable SOE's are more easily privatized. Loss incurring public enterprises suffering from debt overhang require significant pre-privatization "cleanup" and intense marketing to make it desirable by the private sector. Together with the Ivory Coast economy, overall profitability is expected to recover by 2000 after a significant decline the 1980's and early 1990's. It should be noted that the added financial discipline resulting from the absence of government financial backing should help propel companies to maximize efficiency leading to greater profitability (Hemming, and Mansour, 1988).

   a) *Debt subsidy:* The government has often subsidized the debt of "strategic" SOE's. This variable is modeled as function of Profitability; the model assumes that more profitable organizations require less Debt Subsidies.

8) **Market competition index.** This variable aggregates the effect of Monopolistic Market and Competitive Market. The model assumes that a greater Market Competition Index results in a higher Organization Readiness Index. It is important to note, however, that in any developing country setting, privatization of SOE's that operate as natural monopolies is more difficult than privatization of firms in competitive markets due to factors like: larger size enterprises, higher stakes and more sensitive foreign ownership issues. The privatization of these monopolistic enterprises can also yield significant benefits if a well developed regulatory framework that clarifies the new competitive environment is established (Kikeri, Nellis, and Shirley, 1992).

   a) *Monopolistic market:* Essentially, with the increased impetus of the privatization program, the existence of monopoly-based markets is expected to decline in Ivory Coast by 2000.

   b) *Competitive market:* On the other hand, the model assumes that the markets in Ivory Coast will become increasingly competitive as industries are deregulated and SOEs are privatized.
The graph indicates the simulation results for the Organization Sector. Given the base case forecasts described above, the Organizational Readiness Index varied (ORI) from 91.60 to 106.38; Change in ORI only becomes significantly positive after 1993.

![Graph showing ORI and Change in ORI over years.]

*Figure 8: Base Case Results for the Organization Sector*

The results are very similar to those of the Financial Market Sector indicating that organizations in Ivory Coast are very sensitive to the highly inflationary financial market conditions; the Change in ORI exhibits similar behavior as Change in FME with two significant declines: in 1986, the decline was due mainly to the debts crisis and its consequences; and in 1992 was due to the president illness and his death in December 1993, and the anticipated devaluation in January 1994. It is interesting to note that both the Organization Sector and the Financial Market Sector recover from the 1986/1994 economic recession and political turmoil faster than the Economy Sector and the Political Sector. Both the Organization and the Financial Market Sectors seem more adept and efficient at adapting to changes in a country dominated by continuous change. Overall,
the Organization Sector provides support for the privatization program starting in 1994-1995.

4.7 Labor Sector

The main components in the Labor Sector are illustrated below. The Labor Pro Privatization Index represents the "stock" of labor favoring privatization in Ivory Coast; that is, the higher this index, the more favorable labor is towards the privatization program. The Labor Pro Privatization Index is regulated by the Change in LPI which is influenced by eight inputs weighted according to their relative importance on the stock of labor favoring privatization. In the base case, the prospect of Future Unemployment was modeled to account for 25% of the Change in LPI; Labor Union Influence, Public Support, Favorable Labor Legislation and Pro-SOE Position each accounted for 15% of Change in LPI; the other three inputs received 5% weight each.

1) Future unemployment: This key sub-variable is often referred to as the primary obstacle to privatization. Labor and labor unions strongly favor lower Future Unemployment whereby the post privatization scenario is characterized by comparable pre-privatization employment levels and job security. However, due to the private sector's Efficiency Drive factor (discussed below), the new owners are primarily interested in improving productivity which often signifies employment reductions in the over staffed SOE’s. The base case scenario assumes that Future Unemployment will gradually increase as privatization intensifies; this increase will significantly reduce the Labor Pro Privatization Index.

2) Labor union influence: This sub-variable was already discussed in the previous Organization Sector. The model expects greater Labor Union Influence to decrease the Labor Pro Privatization Index due to the labor unions' opposition to the privatization program.
3) **Public support**: Public support has been modeled as a function of Pension Fund Usage; the higher the usage of pension funds as "privatization currency"\(^2\), the greater the Public Support for privatization. However, excessive use of pension funds is modeled to decrease Public Support whereby the opposition to this excessive use will come mainly from the business community. Overall, higher Public Support for privatization will increase the labor favoring privatization index.

4) **Employee ownership option**: This variable was also modeled as a function of Pension Fund Usage; as pension funds become an increasingly common type of privatization currency, the Employee Ownership Option index increases. As with Public Support, the increased use of pension funds will start decreasing Employee Ownership Option as the "supply" of pension funds become greater than the "supply" of Employee Ownership Option allowed.

   It is interesting to note that the employees's reaction to the Employee Ownership Option has not varied significantly from the high enthusiasm displayed in the privatization at the beginning.

5) **Pension fund usage**: The legalization of pension funds as accepted "privatization currency" will increase labor's support for privatization as the possibility of becoming an employee-owner of the company is enticing for labor. Pension Fund Usage is forecasted to increase gradually in the base case scenario.

6) **Favorable labor legislation**: This sub-variable represents labor-favoring job termination legislation including severance package, unemployment benefits, retraining, job search assistance and includes the employee ownership option discussed above. Favorable Labor Legislation, however, creates a situation that is potentially "messy" and costly for private investors thereby reducing the attractiveness of privatization to the private sector. The government can balance this reduced attractiveness by solving these messy and highly visible labor disputes prior to privatization (Kikeri, \(^2\) Usage of worker pension funds as equity to invest in privatization projects.)
Nellis, and Shirley, 1992). Overall, Favorable Labor Legislation is modeled to increase moderately; this increases the Labor Pro Privatization Index.

7) Pro SOE position: This variable refers to how favorable the SOEs are to remaining a public entity; Pro SOE Position combines the effect of three sub-variables whereby High Salary was assigned 40% weight and the other two factors were assigned 30% weight each. The model assumes that higher Pro SOE Position results in lower Labor Pro Privatization Index.

a) High salary: High salaries in public enterprises increase labor's satisfaction with their employment thereby increasing the Pro SOE Position. Since the mid 1980's, SOE labor costs have been increasing significantly warranting a closer look by government officials. The government has announced in 1990 several measures to reduce labor costs in SOE's and government. Among these measures are: (1) a downward adjustment to the "inflation plus " salary stability, (2) the implementation of incentive mechanisms for managers negotiating salaries with their SOE employees; currently, no formal incentive mechanisms exist for SOE managers to lower their labor costs and (3) the reduction in the total SOE employment level. The model expects that these measures will result in a moderate decline in High Salary by 2000.

b) Strategic industry: The Administration's desire to release some Crown Jewels in strategic industries favors the private ownership of enterprises; this policy is releasing the Pro SOE Position. The model expects that the Crown Jewels will all eventually be privatized thereby reducing the Strategic Industry index and undermining the Pro SOE Position.

c) Management cooperation to privatize: The model assumes that stronger Management Cooperation to Privatize results in a weaker Pro SOE Position as top management's cooperation in the privatization process is crucial for success; management can provide support to prepare and to implement the privatization plan and to provide
extensive assistance and facilitating knowledge (Vuylsteke, 1988); this sub-variable is expected to increase by 2010.

8) **Efficiency drive:** The privatization process is often viewed by the public and private sectors as an "Efficiency Drive" to lower costs and improve productivity in SOE’s. A direct consequence of these Efficiency Drives is employment reduction. Therefore, a higher Efficiency Drive index leads to a lower Labor Pro Privatization Index. The model expects Efficiency Drive to increase significantly by 2000 due to the increased competitiveness in the market, forcing organizations to lower costs.

9) **Labor force size:** This demographic sub-variable models the dynamics of the Ivory Coast labor force size. The Labor Force Size in Ivory Coast is expected to increase by 2000 as the result of higher birth rates, larger population size and increased frequency of Efficiency Drives.

The graph below shows the results of the base case simulation for the Labor Sector. Given the assumptions described above, the Labor Pro Privatization Index ranges from 100.00 to 115.90; initially positive through the mid 1980's, the Change in LPI becomes "flatter" after a significant decline in 1986-1988.

It is interesting to note that the results displayed are relatively similar to the results obtained in the Privatization Legislation Sector; this suggests the high correlation and strong relationship exist between labor and privatization legislation in Ivory Coast; that is, as legislation became increasingly favorable towards privatization between 1982-1986, Change in LPI experienced a sudden decline in 1986, signifying labor's dissatisfaction with the accumulating pro-privatization legislation. Since 1988, the Change in LPI has been "neutral" primarily the result of the counterbalancing effects of pro-labor and against-labor factors.

The overall positive Labor Pro Privatization Index illustrates labor's support towards the privatization program despite strong labor union opposition which, as mentioned, is expected to intensify, leading to the "flattening" of the Index by the late 1990’s.
4.8 Foreign Investor Sector

This last "micro sector" contains the main components illustrated below. The Pro Foreign Investment Index represents the "stock" of factors attracting foreign investment into Ivory Coast's privatization program; that is, the higher this index, the higher the attractiveness of the Ivory Coast Privatization Program for foreign investors.

The Pro Foreign Investment Index is regulated by the Change in PFII which is influenced by several inputs weighted according to their relative effect on the Index. Government Regulations with 25% weight and Foreign Direct Investment with 15% weight are the most important factors modeled to affect Change in PFII.

1) Committee of Privatization Regulations: As discussed previously, the Committee plays a prominent role in the Ivory Coast Privatization Program; as the privatization process gains momentum, the model forecasts Committee Regulations to become increasingly favorable to foreign investors. The proposal to increase the
maximum foreign ownership quota to more than 50% in some industries is an example of attractive regulation for foreigners.

2) Foreign direct investment (FDI): This sub-variable represents the level of foreign investment in the country. After a sudden decline, FDI is expected to increase gradually by the year 2000. The inclusion of debt-equity swaps into the allowable set of "privatization currencies" can ease financing constraints and help improve Ivory Coast's overall investment climate.

Swaps represent a method used by heavily indebted countries to bring foreign investors, including commercial banks, into transactions (that might not go without the bank's participation). A significant proportion of swaps under privatization are believed to have involved the original commercial bank lenders. While swaps can be beneficial, governments should use them carefully as critics of swaps argue that governments may be better off selling SOE's and using the proceeds of the sale to repay or repurchase the debt on the secondary market (Kikeri, Nellis, and Shirley, 1992). Nonetheless, this model assumes that debt-equity swaps facilitate foreign participation in Ivory Coast's privatization.

3) Domestic investor power: It is expected that greater Domestic Investor Power results in lower Pro Foreign Investment Index since the existence of powerful domestic investors will deter excessive foreign presence in Ivory Coast. However, Domestic Investor Power is highly correlated with the economic and political well-being of the country. While Domestic Investor Power has fluctuated recently, the base case scenario forecasts a gradual increase by 1998 together with the Ivory Coast economy.

4) Global growth saturation: This sub-variable represents the level of growth saturation in the world's markets; it is modeled to increase steadily as new growth market opportunities are becoming increasingly extinct. The model assumes that increased Global Growth Saturation will increase the attractiveness of the Ivory Coast market to foreign investors.
5) **Information efficiency index:** This index measures the amount and quality of information on Ivory Coast available to foreign investors; information can include general market data, historical data and financial data like spread curves for Ivory Coast bond issues. With the increased globalization of the world's markets and the increased Global Growth Saturation, the model expects that this index will increase significantly by 1998 thus also increasing the attractiveness of Ivory Coast to foreign investors.

6) **Foreign government incentives:** From a domestic perspective, an increase in the incentives given by foreign governments to invest abroad threatens national sovereignty as the population and governments of less developed countries (LDCs) fear foreign control. It has been suggested that the best way for foreign governments to avoid this defensive perception is for them to "lead by example" through the implementation of an "ideal privatization process" in their countries (Vernon, 1988). However, this model assumes that higher Foreign Government Incentives are welcome in LDCs needing foreign investment (which are most of the LDCs). The incentives are expected to grow moderately by the year 2000.

7) **Adherence to the IMF plan:** The model expects the adherence to increase in the future thereby leading to the increased attractiveness of Ivory Coast's privatization program to foreign investors.

8) **World Bank participation:** Given the World Bank's pro-privatization philosophy, an increased level of World Bank Participation in the Ivory Coast privatization program lends more credibility to the program, thus increasing the attractiveness of privatization in Ivory Coast. The World Bank's primary role in privatization has been to help establish an appropriate policy environment in which ownership change will produce efficiency gains (Kikeri, and Shirley, 1992). The model forecasts a decline in the World Bank's advisory support as the country gains experience with privatization.
9) **Asset quality:** Initially, the Ivory Coast government privatized smaller and less attractive SOE's with relatively low asset quality (high amount of debt, outdated equipment and strong unions); however, the government has been consistently increasing the quality of assets to be privatized. As discussed previously, it is expected that the government's Crown Jewels with the highest asset quality will be privatized in the future.

The graph below illustrates the results of the base case simulation for the Foreign Investor Sector. Given the behavioral assumptions discussed above, the Pro Foreign Investment Index varies from 83.34 to 112.23; the Change in PFII only becomes positive after 1988-1989.

The results are similar to the results obtained in the Economy and Political Sectors indicating a strong relationship among the three sectors; however, whereas the Economic and Political Stability Indices reached a low in 1998, the Pro Foreign Investment Index "bottomed" earlier 1988-1989. One possible explanation for this difference is that although the Ivory Coast government's economic and political environments are still quite unstable, the government has, nonetheless, perceived the importance of foreign investment into the country and has initiated an effort directed at attracting these investments. While foreign investment has decreased due to the country's currently uncertain future, the government expects that the growth in foreign investment will support Ivory Coast's economic and political recovery. With the stabilization of the economic and political sectors forecasted for 1998, the Foreign Investor Sector will play a critical role in supporting the Ivory Coast Privatization Program through 1998 and beyond.
Figure 10: **Base Case Results for the Foreign Investor Sector**

This control sector aggregates each sector's yearly index into an Alignment Index (discussed in section 3.3). The results below indicate three key conclusions that can be derived from the privatization model's base case simulation.

**Conclusion 1:** The results shown in Figure 1 are for Alignment Index and Change in Alignment Index; Previous Year Index is the graph of a one-year lag in Alignment Index. The model assumes that the initial Year 0 scenario is perfectly aligned; therefore, starting from zero.
The results indicate the overall growing misalignment among the sectors; the Alignment Index starts at 0.00 and increases to almost 20.00 by the year 2000. As it can be observed by the "flattening" in the Index, the rate of alignment divergence among sectors decreases twice: in 1987-1990 and after 1996. This reduced divergence is supported by the results in Change in Alignment Index whereby it declines significantly in 1996-1999 indicating the decreased misalignment among the seven sectors. This decreased misalignment is more significant after 1996 whereby the decline in Change in Alignment Index approaches zero; from the above results, it is expected that Change in Alignment Index will become negative in the early 2000's; this would signify the start of true convergence among the sectors' goals towards privatization.

**Conclusion 2:** By analyzing Change in Alignment Index together with Average Index, a better insight can be gained from the alignment results. Average Index is the average of all the sectors' indices calculated for each simulated year.
Figure 12: Base Case Results for Change in Alignment Index Average Index

The results above indicate that as Change in Alignment Index declines from 1983 to 1989 indicating a convergence of "thought" among sectors, the Average Index is also declining. This signifies that the sectors are converging in their dissatisfaction with the privatization program. The converging dissatisfaction "peaks" in the early 1990's; this is the period when the Administration began to implement bold measures to privatize the SOE's. The positive results of 1990 aggressive privatization agenda are only expected to start in the mid 1990's when the Average Index begins to increase (indicating the increasingly favorable environment for privatization in Ivory Coast) and Change in Alignment Index begins to decrease (indicating convergence of the sectors' increased satisfaction with the privatization program). Given the current situation discussed and the base case assumptions described, the model forecasts the Ivory Coast Privatization Program to "take-off" starting in early 1995.
Conclusion 3: By analyzing the individual sectors’ results, it is interesting to note that, other than the macro and micro classification given, the sectors can be clustered by "results similarities" whereby three clusters can be proposed:

- **Cluster 1:** Economy Sector, Political Sector and Foreign Investor Sectors
- **Cluster 2:** Financial Market Sector and Organization Sector
- **Cluster 3:** Privatization Legislation Sector and Labor Sector

As supported by the model results, the relationships within the clusters have been traditionally very strong in Ivory Coast. The Ivory Coast economy is highly sensitive to the political situation; Ivory Coast's economic and political stability are primary concerns for foreign investors. The performance of Ivory Coast public and private organizations are highly dependent on financial market stability. And finally, Ivory Coast labor and labor unions are highly concerned that privatization favoring legislation will reduce employment and consequently job security.

4.10 Validation

The importance of validation has been stressed throughout the thesis. By validating the results of the historical component (1989-1995), a more effective policy sensitivity analysis can be conducted. The validation process contained two components: comparison and adjustment.

**Comparison:** The base case results discussed in this chapter have been primarily validated based on "key events" whereby the simulation results were compared to the significant economic, political and legislative occurrences in Ivory Coast during the historical component period. Among the key events used for validation were:

1. **economic events:** the devaluation in 1994, 2. **political events:** democratization and the 1995 election of the new president, 1990 political crisis. The results obtained for each index and change in index were compared to the general trend
created by these key events. External indices from sources like the Economist Intelligence Unit were also used to confirm the simulation results.

Adjustment: Based on the comparison of the results to actual historical data, adjustments to the behavioral assumptions were occasionally made where it was deemed that the simulation was not capturing the main effect of a key event. Because the set of factors included in the model is unique, the model's historical component is not expected to track perfectly historical data. However, this validation process inherits a fundamental role to generate greater validity and accuracy to the results discussed in the next chapter.

5. MODEL ANALYSIS: ALTERNATE SCENARIOS

This chapter will identify the key sensitivity factors to run alternate privatization scenarios, answering questions such as, "What if the Ivory Coast Inflation rate increases beyond the current 20% monthly rate?" or "What if the Labor Union Influence decreases instead of increases?" After analyzing two specific scenarios, the chapter will also address the relevance of sequencing in privatization.

5.1 Key Sensitivity Factors

This section will identify the variables and sub-variables that are the key factors underlying two alternate scenarios: an Optimistic Case scenario and a Pessimistic Case scenario. Table 9 will list each factor that was adjusted in the sensitivity runs and will describe how their behavioral assumptions have been changed when compared to the base case behavior. The figure below illustrates an example of a change in behavioral assumptions.
In the Optimistic Case, Inflation will decrease when compared to the Base Case behavior described in the previous chapter; in the Pessimistic Case, Inflation will increase and remain high through the year 2000.

### Economy Sector

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Exports</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Imports</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Tax revenues</td>
<td>Increases</td>
<td>Increases</td>
</tr>
<tr>
<td>Public Expenditures</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
</tbody>
</table>

### Political Sector

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative parties</td>
<td>Majority increases</td>
<td>Majority decreases</td>
</tr>
<tr>
<td>Leftist parties</td>
<td>Majority decreases</td>
<td>Majority increases</td>
</tr>
<tr>
<td>Corruption</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Executive branch stability</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
</tbody>
</table>

### Financial Market Sector

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
</table>
Table II: Assumptions for Key Variables/Sub-Variables in Sensitivity Analysis

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction costs</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Residual costs</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Labor opposition</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Valuation bias</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Stock market development</td>
<td>Speeds up</td>
<td>Slows down</td>
</tr>
<tr>
<td>Global integration index</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
</tbody>
</table>

**Privatization Legislation sector**

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Optimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable currency base</td>
<td>Base increases</td>
<td>Base decreases</td>
</tr>
<tr>
<td>Long term commitment</td>
<td>Strengthens</td>
<td>Weakens</td>
</tr>
<tr>
<td>Private sale</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Public share offering</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Transparency</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Bureaucracy</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Centralization of functions</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
</tbody>
</table>

**Organization Sector**

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology transfer priority</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Labor Union influence</td>
<td>Decreases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Access to infrastructure Ressources</td>
<td>Decreases</td>
<td>Increase</td>
</tr>
</tbody>
</table>

**Labor Sector**

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future unemployment</td>
<td>Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>Labor union influence</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>Favorable labor legislation</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
</tbody>
</table>

**Foreign Investor Sector**

<table>
<thead>
<tr>
<th>Variable/Sub-variable</th>
<th>Optimistic Case</th>
<th>Pessimistic Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banques regulations</td>
<td>More favorable</td>
<td>Less favorable</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>Increases</td>
<td>Decreases</td>
</tr>
</tbody>
</table>

5.2 Dual Scenario Analysis

This section will summarize the results obtained in the Optimistic Case and Pessimistic Case scenarios; the key differences are concentrated primarily in the years after 1993.
5.2.1 Optimistic case scenario
The alignment results for the optimistic case scenario is illustrated in Figure 14. Given the adjustments described in the table above, the key result derived from these adjustments is that Change in Alignment Index becomes negative after 1995. As seen in the upper graph, this leads to the decrease in Alignment Index which peaks in 1995 signifying actual convergence among the sectors in the model after 1995. Since Average Index is rising quickly starting in 1993-1994, this convergence is "positive"; that is, the sectors are actually converging in their satisfaction and goals for the privatization program, unlike in the base case where the convergence was primarily a decrease in divergence rate. In this best-case policy scenario, the privatization program is a success with increased sector alignment and increased sector satisfaction.

5.2.2 Pessimistic case scenario
Especially in the post-1993 years, the differences between the two scenarios are clear in Figure 15; in the upper graph, the Alignment Index is continuously increasing through 2000 as the cyclical pattern of the Change in Alignment Index seems to stabilize around +0.75 to +1.00. Therefore, the alignment among sectors is constantly decreasing. In this pessimistic case, it is interesting to note that while the alignment is decreasing, the Average Index also declines from 100.0 to 85.0 by 2000 representing a worst-case policy scenario of decreased sector alignment and increased sector dissatisfaction at privatization. Two possible effects can result from this worst-case combination: (1) the continued "spiraling down" whereby the Alignment Index continues to increase and Average Index continues to decrease leading to the possible abandonment of the privatization program or (2) the decreased alignment and average index might spur a reaction from the government to take bold measures that could result in an Optimistic Case scenario outcome.

While an actual future scenario for the Ivory Coast privatization program might involve a combination of adjustments from both the Optimistic and Pessimistic
Case scenarios, this section isolated the positive from the negative factors allowing for a clearer understanding of the specific best-case and worst-case policy dynamics involved in privatization despite the subjective limitations of modeling. Overall, the sectors involved in privatization and especially the government should understand that while the Optimistic Case scenario should be the primary goal, a final scenario between the Optimistic and Base Case scenarios represents a more realistic short to medium run target given the current situation in Ivory Coast.
Figure 14: Optimistic Case Scenario Results for the Alignment Index Sector
Figure 15: Pessimistic Case Scenario Results for the Alignment Index Sector

- **Alignment Index Scenario Results**
- **Previous Year Index**
- **Change in Alignment Index**

<table>
<thead>
<tr>
<th>Year</th>
<th>Change in Alignment Index</th>
<th>Previous Year Index</th>
<th>Alignment Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.26</td>
<td>2.26</td>
<td>22.00</td>
</tr>
<tr>
<td>2</td>
<td>1.13</td>
<td>2.26</td>
<td>11.00</td>
</tr>
<tr>
<td>3</td>
<td>0.00</td>
<td>1.13</td>
<td>92.50</td>
</tr>
<tr>
<td>4</td>
<td>0.00</td>
<td>0.00</td>
<td>85.00</td>
</tr>
</tbody>
</table>

**Graphs**

- **Graph 1:**
  - **Y-axis:** Years
  - **X-axis:** Years
  - **Legend:**
    - 1: Change in Alignment Index
    - 2: Previous Year Index
    - 3: Alignment Index

- **Graph 2:**
  - **Y-axis:** Years
  - **X-axis:** Years
  - **Legend:**
    - 1: Change in Alignment Index
    - 2: Average Index
5.3 Sequencing Privatization

One final caveat to the Ivory Coast privatization model involves the specific sequencing to be utilized in the process; that is, is there a particular sequence of steps that is most effective in privatizing SOE’s? This section will address some of the sequential approaches suggested that may result in more effective privatization.

1) *Deregulate and then privatize:* Maximizing short-run government revenues should not be the primary consideration. This can lead to privatization that are detrimental to the economy like sales of competitive or potentially competitive SOEs as monopolies in order to raise the selling price and thus revenues. The economy will be best off if the government first deregulates potentially competitive activities, establishes adequate tariff regulation and then privatizes, even if this means a lower sale price. In the long run, the privatization program and therefore all sectors involved in privatization will gain (Kikeri, Nellis, and Shirley, 1992).

2) *Privatize small and medium-size SOE’s before large SOE’s:* When initiating its privatization program, governments should give first priority to small and medium-size SOEs in competitive sectors. Such sales are usually quick and simple requiring little prior restructuring and institutional capacity, minimal political risk and reduced foreign ownership controversies since small SOEs are more easily absorbed by domestic investors. Experience with small sales helps prepare the government for the privatization of larger and more complex SOE’s (Kikeri, Nellis, and Shirley, 1992).

3) *Partial sale before full privatization:* Sales of minority shares can have positive effects on efficiency provided that: (1) managerial control is transferred to competent core investors and (2) the government’s voting rights are limited so as to curtail its day-to-day interference. Partial sales are particularly beneficial when competition is introduced and management is strengthened, thus preparing the SOEs for full privatization, since partial share offerings are often a prelude to a majority share offering at a later stage. In the initial years of a privatization program, partial sales also
provide a "cushion" for the absorptive capacity of domestic investors (Vuylsteke. 1988, Kikeri, Nellis, and Chirley 1992).

4) Step-based approach to privatization: A review of today's literature (Dhiratayakinant1989, Procianoy 1993, Shleifer and Vishny 1992 ) on privatization often suggests a step-based approach to privatization. Although this approach, as discussed, is dynamically limited, the following transaction-based steps are typically recommended:

- Diagnosis of an SOE through examination of its finances and operations
- Satisfaction of legal requirements
- Financial restructuring like debt restructuring and recapitalization
- Physical rehabilitation and modernization (by the public or private sector)
- Cooperation of management and employee commitment

It is clear that an effective privatization sequencing would involve a combination of the approaches described above. The cluster-based conclusion derived from this thesis's model results (described in section 4.9) suggests another possible sequence for privatization. Through this approach, the government should focus on: (1) the **Economy and Political Sectors**, since these govern foreign investment, (2) the **Financial Market Sector** since this largely determines organizations' success in Ivory Coast and (3) the **Privatization Legislation Sector**, since this governs the conditions for privatization and the well-being of labor. Since the Financial Market and Privatization Legislation Sectors are inherently dependent on the Ivory Coast Economy and Political Sectors, the model developed suggests the following priority-based sequencing for privatization in Ivory Coast:

I. Economic and political sectors

II. Financial market and privatization legislation sectors

III. Foreign investor sector

IV. Organization and labor sectors
Although some gradual progress can be made simultaneously in all sectors, this cluster-based sequencing suggests that the Ivory Coast government should focus on improving the country's economic and political situation since these two sectors are the driving forces behind the privatization process. The government should implement policies directed at containing the runaway inflation and reducing the growing level of corruption and bureaucracy. Most importantly, however, the Ivory Coast government needs to restore its credibility vis-a-vis the population who have lost faith in the government and in themselves due to the country's continued disarray. Without a solid credibility foundation, the government cannot expect its stability restoring measures to succeed.
6. CONCLUSION

The Ivory Coast Privatization Program represents a great opportunity for the country to regain its competitiveness by reinstating economic growth, political credibility and overall country stability. Driven by the benefits of privatization, the country has nonetheless encountered many obstacles in privatizing its state-owned enterprises. In developing solutions to these obstacles, the public and private sectors have been limited by the static approaches developed to date.

This thesis briefly traced the growth of state-owned enterprises in Ivory Coast, the key benefits derived from privatization and the types of privatization. After discussing the limitations of the static World Bank type models for analysing privatization, the thesis proposed the utilization of a system dynamics modeling approach that expands both the economic -spatial and temporal dimensions involved in the privatization process. This approach led to the development of a base case model whereby the key sectors and variables involved in a privatization process were introduced and discussed. Validation of the results contained in the model's historical component lent greater validity to the simulation results obtained in the two alternate case scenarios. This thesis concluded with a discussion of the possible sequencing mechanisms that can be used in privatizations.

The model developed facilitates the understanding of the behavioral dynamics involved in the privatization process. Through the development of model diagrams and sector mappings, Systems Thinking helps focus the analysis on relationships and time-varying behaviors. Using this modeling approach, a deeper knowledge of the importance of sector alignment in privatization could be gained.

The creation of alternate scenarios through sensitivity analysis probed the impact of Ivory Coast's future on its privatization program, enhancing the understanding of the overall process. The applicability of sensitivity analysis can be broadened to
include other country scenarios in Africa, Latin America or in their regions where privatization is gaining increased importance and visibility; the door is open for future follow-up studies to this thesis.

Given the current situation in the country, the model concluded that the Ivory Coast Privatization Program will improve its success starting in 1995. Although economic and political instability are expected to hamper the privatization process through 2000, the simulation results indicate that privatization in Ivory Coast will be increasingly supported by factors like favorable legislation, financial market efficiency and organizational readiness. Restoring credibility in the government remains the initial step to be taken in order to consolidate the privatization process in the country.

In a global economy that is becoming increasingly dominated by economic clusters, this thesis hopes to facilitate the privatization effort of developing countries like Ivory Coast; successful privatization in these countries may signify the creation of a new order in tomorrow's global economic balance.
APPENDIX B: PRIVATIZATION MODEL DIAGRAM

The following is the complete system dynamics model diagram using the *Ithink* program for Ivory Coast privatization process. (Charyk, Peterson and Richmond, 1992)

The Economy Sector

![Economy Sector Diagram](image)
The Financial Market Sector

Financial Index Growth

- Transaction costs
- Residual costs
- Allowable currency base
- Complexity
- Cost of privatization
- Labor opposition

Change in FME

Valuation accuracy

- Stock market development
- Fair assumptions
- Pricing error
- Facilitating Regulation
- Global integration index
- Valuation bias
- Overprice
- Underprice
- Local bank stability
- Savings account stability
The Privatization Legislation Sector

Privatization Legislation Sector

Legislation index
Pre qualification
Auctioning
Public share offering
Private sale
Time constraints
Banks ownership
Transparency
Pro Privatization Legislation Index
Change in PPLI
Bureaucracy
Banks efficiency index
Centralization of functions
Allowable currency base
Facilitating Regulation
SOEs GNP share
Long term commitment
Privatization critical mass
Crown jewels
Profit repatriation
Foreign ownership quota
First generation
Second generation

78
The Organization Sector

Organization Index Graph

Organization Sector

Obsolete technology
SOE diversification

Technology priority
Technology transfer priority

Organizational Readiness Index

Change in ORI

Labor union influence
Product desirability
Managerial autonomy

Incentives to privatize
Access to infrastructure resources

Market competition index
Competitive market
Monopolistic market

Debt subsidy
Profitability
The Labor Sector

![Labor Index Graph](image)

- High salary
- Strategic industry
- Management cooperation to privatize
- Efficiency drive
- Pro SOE position
- Change in LPI
- Labor ProPrivatization Index
- Favorable labor legislation
- Future unemployment
- Labor force size
- Employee ownership option
- Labor union influence
- Pension fund usage
- Public support
The Foreign Investor Sector

Foreign investor Graph

- Domestic investor power
- Privatization Commitment regulation
- Pro Foreign Investment Index
- Change in PSI
- Foreign direct investment
- Global growth saturation
- Information efficiency index
- Asset quality
- World Bank participation
- Foreign government incentives
- Adherence to IMF plan
The Alignment Index Control Sector

Alignment Index Control Sector

Political Stability Index
TempPSI

Economic Stability Index
TempESI

Financial Market Efficiency Index
TempPFME

Organizational Readiness Index
TempORI

Labor Pro Privatization Index
TempLPPI

Pro Privatization Legislation Index
TempPPLI

Pro Foreign Investment Index
TempPFII

ALIGNMENT INDEX

Alignment Analysis Graph 1
Previous year index
CHANGE IN ALIGNMENT INDEX

Alignment Analysis Graph 2
REFERENCES


