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USER'S GUIDE TO THE VENEZUELAN MACROFINANCIAL MODEL

by

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1. Introduction

This paper presents a user's guide and documentation for a macrofinancial model of Venezuela. This model was developed under a DOE International Affairs Division grant (contract no. EX-76-A-01-2295) for the project, "A Financial Model of Oil Supply for an Oil-Producing Country." Also, this work was partially supported by the M.I.T. Center for Energy Policy Research. The theoretical development and results of the model are found in Dailami (1979).[1] The reader is referred to that paper for an in-depth discussion of the model. This present working paper concerns only the technical aspects of the simulation model and the data developed to support the model. The model is described in Section 2 which includes all of the equations of the model, possible uses of the simulation structure, and detailed instructions on how to actually run the model on TROLL.[2] Section 3 concerns the time series data developed for this study. Both the derivation of the data and a guide to their datafile storage on TROLL are included.

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[1]Dailami, M., "Financial Influences on the Behavior of Exporters," forthcoming (Fall 1980) in Papers and Proceedings of the IAEE/RFF Conference on International Energy Issues: June 1979, originally distributed as MIT Working Paper No. MIT-EL 79-035WP.

[2]TROLL is a software package which provides a comprehensive environment for creating, estimating, and simulating economic models. For further information contact the MIT Information Processing Center.

2. The Venezuela Macrofinancial Model

2.1 Introduction to the Model

The objective of this paper is to describe the structure and uses of the macrofinancial model of Venezuela which was originally presented in Dailami (1979).[1] In Section 2.2 a detailed description of the model's structural equations is given. Section 2.3 outlines some possible uses of the model simulations. Finally Section 2.4 discusses some of the technical details of using the model and gives examples of some of the simulations outlined in Section 2.3, including a detailed printout of a computer session.

2.2 Model Description

The behavioral and definitional equations of the Venezuela model are set out in the Dailami working paper discussed above. The model is essentially a Keynesian macro model which has been modified to capture some of the important characteristics of an oil-exporting country. To highlight these characteristics the model has been divided into four sectors: (1) Government Sector; (2) Foreign and Monetary Sector; (3) Oil Sector; and (4) Private Sector and GDP Accounting. These are discussed in turn below. However, since the model is oriented toward simulation its use requires specification of the future paths of certain exogenous variables. These are also discussed below. The complete model equations, by sector, are presented in Table 1 below, followed by a listing of the definitions of the notation used in Table 2.

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[1] Dailami, op. cit.

1. Government Sector

Of the four sectors the government sector is particularly important. A large proportion of the oil revenues accrue directly to the government and hence their economic effect depends to a great extent on how the government uses them. For example, by relaxing budgetary constraints these revenues can be expected to give rise to increased expenditure. They also will affect monetary conditions in the economy through changes in the government deficit. Equations 1 to 8 (listed in Table 1) represent the government sector and they reflect the following relationships.

Equation 1. Government purchases are related to the level of oil export revenues.

Equation 2 Government non-petroleum revenues (net of transfers) are a function of GDP. The presence of the lagged dependent variable indicates that GREVNET adjusts to changes in GDP with time lags.

Equation 3 This equation relates government petroleum revenue to oil export revenues.

Equation 4 This is a definition of the government budget deficit.

Equation 5 Government interest payments are defined as the product of the rate of interest and the level of debt outstanding at the end of the previous period.

Equation 6 This equation describes the evolution of government debt. The government has two options for financing its budget deficit. It can issue debt or it can have the Central Bank finance it by issuing new money. The fraction financed by the Central Bank is λ. The remaining $(1-\lambda)$ is financed by borrowing through the sale of bonds to the public, the banking sector and abroad. Similarly through its decision variable γ the government regulates the proportion of changes in international reserves which becomes part of the monetary base. It carries out this sterilization by accumulating oil revenues and by selling bonds.

Equation 7 Foreign debt is a fraction, β, of total government debt, the paremeter β being under the control of the government.

Equation 8 This equation describes government amortization payments as a fraction of debt outstanding in the previous period.

2. Foreign and Monetary Sector

Given the export orientation of the oil sector, the foreign sector is also of great importance in tracing the effects of oil policy. Equations 9 to 14 deal with the foreign and monetary sectors of the model and are discussed below. Equations 12, 13 and 14 are necessary for simulation purposes and describe the evolution of the exogenous variables concerned.

Equation 9 Imports of goods and services are related to the level of GDP.

Equation 10 This equation is a definition of changes in international reserves--i.e., balance of trade surplus plus net capital inflow plus foreign borrowing less interest payments abroad.

Equation 11 Evolution of the monetary base is described. The coefficients γ and λ were described in discussing equation 6. The only other element is the change in the net credit to the commercial banks from the Central Bank.

Equation 12 This equation sets the growth rate of net private capital inflow.

Equation 13 This equation sets the growth rate of non-petroleum exports.

Equation 14 This equation sets the annual growth rate of net Central Bank credit to the commercial banks.

3. Oil Sector

The oil production sector is represented by equations 15 and 16.

Equation 15 Daily oil production is defined as revenues from petroleum exports divided by the price of oil and 365 (the price of oil in bolivares is the dollar price, POIL, multiplied by the exchange rate.)

Equation 16 This equation sets the growth rate of the dollar price of oil.

4. Private Sector and GDP Accounting

The final group of equations represent private expenditure and the GDP identity.

Equation 17 Total private expenditure is a function of GDP and the monetary base. The inclusion of the monetary base can be justified in a number of ways. It may be acting as a wealth variable, as an indicator of credit tightness, or it may be a means of modelling the effect of excess supply or demand for money.

Equation 18 This equation defines the construction of GDP.

Equation 19 This equation sets the target rate of growth of GDP.

Table 1. Structural Equations of the Venezuela Macrofinancial Model*

Government Sector Equations

1. $\log(GPUR) = g_0 + g_1 \log(XP)$
2. $\log(GREVNET) = n_0 + h_1 \log(GDP) + h_2 \log(GREVNET)$
3. $\log(GREVP) = f_0 + f_1 \log(XP)$
4. $D = GPUR + GEXPINT + GEXPAM - GREVNET - GREVP$
5. $GEXPINT = r\ B(-1)$
6. $B = B(-1) + (1-\lambda)D + (1-\gamma)\ DIR$
7. $BF = \beta B$
8. $GEXPAM = \mu\ B(-1)$

Foreign and Monetary Sector Equations

9. $\log(IMP) = m_0 + m_1 \log(GDP)$
10. $DIR = XNP + XP - IMP + B - (1+r)\ B(-1) + PKF$
11. $MOR = MOR(-1) + \lambda D + \gamma DIR + DELBC$
12. $PKF = PKF(-1) * grpkf$
13. $XNP = XNP(-1) * grxnp$
14. $DELBC = DELBC * grdelbc$

Oil Sector Equations

15. $PRODOIL = XP/(POIL * XRATE * 365)$
16. $POIL = POIL(-1) * grpoil$

Private Sector and GDP Accounting Equations

17. $\log(A) = a_0 + a_1 \log(GDP) + a_2 \log(MOR)$
18. $GDP = A + XNP + XP + GPUR - IMP$
19. $GDP = GDP(-1) * grgdp$

*See Table 2 following for notational definitions.

Table 2. Notational Definitions for Venezuela Model

Definitions

λ	Proportion of total government deficit financed by the central bank.
γ	Proportion of increases in international reserves which becomes part of the monetary base.
β	Proportion of government debt held by foreigners
μ	Proportion of government debt amortized each year.
A	Total private expenditure
B	Total government debt
BF	Government foreign debt
D	Government deficit
DELBC	Change in Central Bank's net credit to commercial banks
DIR	Change in international reserves
GDP	Gross domestic product
GEXPAM	Government expenditure on amortization of its debt
GEXPINT	Government interest payments on its debt
GPUR	Government expenditure on goods and services
GREVNET	Non-Petroleum government revenues, net of transfers (excluding interest) made to the private sector.
grdelbc	defined as $(1 + \frac{\text{percent growth rate of DELBC}}{100})$
grdgdp	defined as $(1 + \frac{\text{percent growth rate of GDP}}{100})$
grdpkf	defined as $(1 + \frac{\text{percent growth rate of PKF}}{100})$
grdpoil	defined as $(1 + \frac{\text{percent growth rate of POIL}}{100})$
grdxnp	defined as $(1 + \frac{\text{percent growth rate of XNP}}{100})$
grdxp	defined as $(1 + \frac{\text{percent growth rate of XP}}{100})$

Table 2 continued

IMP	Imports of goods and services
MOR	Monetary base
PKF	Net private capital inflow
POIL	Price of oil U.S. $/barrel
PRODOIL	Production of oil-millions of barrels per day
XNP	Non-Petroleum exports of goods and services
XP	Exports of petroleum
XRATE	Exchange rate -- Bolivares/U.S. $

2.3 Potential Uses of the Model

In this section some possible uses of the model will be outlined. The model output resulting from these exercises is presented in Section 2.4 which is accompanied by a step-by-step explanation of the appropriate computer commands. In general these exercises will involve specifying an exogenous pattern for each of five of the six exogenous variables: GDP, POIL, DELBC, PKF, XNP and XP. The model will solve for the sixth variable. In the experiments in the Dailami paper this sixth variable is either GDP or XP. Values must also be assigned to each of the government policy variables and to the rate of interest.

It is interesting to consider oil revenue as a policy instrument rather than as a target. Thus oil production adds directly to GDP as well as contributing to the government budget and the balance of payments. As a first example consider the case where the government has a target rate of growth of GDP and the model determines the level of petroleum exports necessary to reach that objective. First, substitute the target rate of GDP growth into equation 19 and also specify assumed rates of growth for POIL, DELBC, XNP and PKF in equations 12, 13, 14 and 16. Given these assumptions the model generates the solution for the other variables of the model including XP, MOR, BF and PRODOIL. The sensitivity of the solutions to the assumed timepaths of target and exogenous variables can easily be examined. For example, one can change the target rate of growth of GDP and see how this affects the solution. Similarly one can change the assumed growth rates of PKF, DELBC, XNP and POIL. Of course any combination of these assumptions can also be altered.

The solutions for oil production generated by the above experiments may not be feasible.[1] In that case the government will have to try to achieve its target by using other instruments available to it (e.g., by altering one of its policy variables or by trying to affect one of the other exogenous variables). If this is not feasible within constraints which may exist such as on the balance of payments and limits on the manipulation of government policy variables, then the growth target will have to be appropriately adjusted.[2] One way of approaching this issue is by specifying rates of increase of oil revenues, which in conjunction with the assumed scenario of oil prices give "feasible" production rates. This allows the user to see what GDP paths are possible. To do this we delete equation 19 from the model and substitute an equation giving the rate of increase of oil revenues [e.g., XP = XP(-1) * 1.15]. We also specify assumed paths for DELBC, PKF and XNP and the model generates the solution for GDP and the other variables. As before we can test the sensitivity of the solutions to our assumed paths for exogenous variables.

The Dailami paper experiments with the model have generally followed the above outlines. However, any other variable may be specified as target provided that one of the previously specified target or instrument variables is left to be determined by the model. Examples of such may be targets for borrowing or the balance of payments. Similarly, provided we specify other exogenous variables, government

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[1]The model does not say anything about feasibility of oil production scenarios. This must be left to user judgment.

[2]Limits on government policy variables are discussed later in this section.

policy variables may then be endogenously determined (i.e., the solution value of the policy variable is that level necessary to achieve the specified targets). A flavor for such issues may be obtained within the context of the exercises outlined earlier. Each of the exercises will generate solutions for, e.g., the trade balance or foreign borrowing, and these can then be compared with the user's notions of what is feasible or desirable. Similarly, one can experiment with alternative values for the government policy parameters and see how the solutions are affected.

In the discussion above the policy parameters λ, γ, μ and β were treated as if they were under the full control of the government. However, there are likely to be limits on feasible values for these policy parameters. Consider, for example, λ, the proportion of the government deficit financed by the Central Bank. A common belief about less developed countries is that because of poorly developed financial markets, the government's ability to finance its deficit through private sales of bonds is likely to be limited. In such cases we would expect the feasible values of λ to be quite high. Similarly, the feasible values for γ will depend on the openness of domestic capital markets to international capital flows--e.g., the more internationally-mobile capital is the less the government is able to sterilize capital flows. In the same way there are constraints which limit the feasible range of μ and β.

The earlier discussion explained the use of growth rates for target and exogenous variables. However, in forward simulations the model needs starting values for these variables. For GDP, XP, XNP and POIL historical series are available. However, the historical values of PKF

and DELBC are residuals and these series were constructed from the definitional equations 10 and 11. Note that in equation 11, to construct DELBC from historical values of the other variables the user must specify values for λ and γ. To be consistent, a new starting value for DELBC should be constructed for each different set of assumed λ and γ. However this would introduce unwarranted complexity and questionable accuracy and so was not undertaken.

Finally, a few general comments about the model. While it does focus on some important links between the oil sector and the rest of the economy, there are a number of issues which are not treated. The model is set out completely in nominal terms. No explicit attention is paid to domestic energy demand. There is no distinction between consumption and investment expenditures. While these issues are not crucial to the use of the model, the user should be aware of them, particularly the lack of distinction between real and nominal factors.

2.4 Detailed Example of a Simulation Exercise

In this section a detailed example of a simulation exercise is presented. Obviously detailed instruction of the use of TROLL cannot be included here. Such information can be found in the relevant reference and instruction books. The printout from a terminal session simulating the model is presented in Exhibit 1. The steps in the computer printout have been numbered so that they can be easily related to the text given here. Note that this exercise also demonstrates some of the uses of the model delineated in Section 2.2.

The first step is to call the model into the working area. This is done by command No. 1. VEN is the name under which the model is stored. Command No. 2 then gets the complete model printed out. The next step is to estimate parameter coefficients.[1] First the regression bounds are set (No. 3). Then the data files are accessed using the 'Search First' command (No. 4). The estimation of the behavioral equations is performed (No. 5) and the regression results are printed out. Command No. 6 files the estimate coefficients in a constant file named VEN. The constant file is then called into the active area (No. 7) and added to it are assumed values for government policy variables, the growth rates of exogenous and target variables, and rate of interest (No. 8). This augmented constant file is then stored under the same name VEN. (The default is to store it under its original name)(No. 9).

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[1]This exercise need only be carried out in the first session and again whenever it is desired to change either the regression bounds or equation specifications.

Next the simulation exercise proper is begun. No. 10 gives the simulation command and sets the dates for the simulation. Since this is the first exercise, a DSET for the simulation exercise must be created and this is done automatically. Command No. 11 tells the computer to store the output of the simulation under a DSET named A. Then the output of the exercise is printed out. This is done by commanding the computer to print the DSET A, specifying the range (time period) and variables to be printed. The argument 'alpha' requests that the output variables be in alphabetical order. The contents of DSET A are then printed out.

The exercise outlined above uses the model as specified in Section 2 including the assumed paths of exogenous and target variables. To see how the results differ if a target rate of GDP growth of 20 percent is specified instead of 15 percent, command No. 13 changes the constant file to incorporate this altered target. Then the simulation exercise is executed again (No. 14), the results are filed under DSET B (No. 15), and these results are printed out (No. 16).

The next example considers the case where a different value for a government policy variable is used. The constant file 'VEN' is called into the active area (No. 17). The original value of λ is replaced with .75 (No. 18), and the altered file is stored (No. 19). The simulation commands are carried out as before (No. 20, No. 21 and No. 22). It should be noted that this last exercise was carried out with assumed GDP growth rate of 20 percent as changed above.

Finally a case is considered where the target is expressed in terms of oil revenues and GDP is solved for by the model. First equation 19 is deleted (No. 23), and replaced by an equation which specifies a rate

of growth of oil revenues (No. 25). There is now a new variable in the model: grxp. On introduction this variable will have been automatically classified as an exogenous variable. Command 25 reclassifies it as a coefficient. The next step is to assign a value for this coefficient in the constant file (Nos. 26, 27 and 28). Since the structure of the model has been changed the DSET VEN which has been used is no longer suitable and must be replaced with one appropriate to the changed model. This is done by command No. 29. Commands 30 to 32 carry out the simulation exercise as before.

EXHIBIT 1

Printouts of Model Simulation

Command Number (Step)

1. TROLL COMMAND: .usemod ven;
2. TROLL COMMAND: .prtmod all;

```
MODEL: CURRENT


SYMBOL DECLARATIONS


ENDOGENOUS:
   A  B  BF  D  DELBC  DIR  GDP  GEXPAM  GEXPINT  GPUR  GREVNET  GREVP  IMP
   MOR  PKF  POIL  XNP  XP

DEFINITION:
   PRODOIL

EXOGENOUS:
   XRATE

COEFFICIENT:
   A0  A1  A2  BETA  F0  F1  GAMMA  GRDELBC  GRGDP  GRPKF  GRPOIL  GRXNP  G0
   G1  LAMDA  MU  M0  M1  N0  N1  N2  R


EQUATIONS

     1:        LOG(GPUR) = G0+G1*LOG(XP)

     2:        LOG(GREVNET) = N0+N1*LOG(GDP)+N2*LOG(GREVNET(-1))

     3:        LOG(GREVP) = F0+F1*LOG(XP)

     4:        D = GPUR+GEXPINT+GEXPAM-GREVNET-GREVP

     5:        GEXPINT = R*B

     6:        B = B(-1)+(1-LAMDA)*D+(1-GAMMA)*DIR

     7:        BF = BETA*B

     8:        GEXPAM = MU*B(-1)

     9:        LOG(IMP) = M0+M1*LOG(GDP)

    10:        DIR = XNP+XP-IMP+B-(1+R)*B(-1)+PKF

    11:        MOR = MOR(-1)+LAMDA*D+GAMMA*DIR+DELBC

    12:        PKF = PKF(-1)*GRPKF
```

EXHIBIT 1 (Continued)

```
13:        XNP = XNP(-1)*GRXNP

14:        DELBC = DELBC(-1)*GRDELBC

15:        PRODOIL == XP/(POIL*XRATE*365)

16:        POIL = POIL(-1)*GRPOIL

17:        LOG(A) = A0+A1*LOG(GDP)+A2*LOG(MOR)

18:        GDP = A+XNP+XP+GPUR-IMP

19:        GDP = GDP(-1)*GRGDP
```

```
3. TROLL COMMAND: .reg 1962 to 1977;
4. REG COMMAND:                    search first data_ven;
5. REG COMMAND: .doeq 1 2 3 9 17;
```

```
1:  LOG(GPUR) = G0+G1*LOG(XP)


NOB = 16      NOVAR = 2
RANGE =  1962 TO 1977
RSQ =    0.95756      CRSQ =    0.95453      F(1/14) =    315.915
SER =    0.1646       SSR =      0.379      DW(0) =   1.25      COND(X) =     31.51
LHS MEAN =       9.50937

COEF            VALUE           ST ER          T-STAT          MEAN

G0            -2.00401         0.64908        -3.08745         1.00000
G1             1.20071         0.06756        17.77370         9.58880


WARNING 2025
DATAMATRIX IS HIGHLY COLLINEAR
```

```
2:  LOG(GREVNET) = N0+N1*LOG(GDP)+N2*LOG(GREVNET(-1))


NOB = 16      NOVAR = 3
RANGE =  1962 TO 1977
RSQ =    0.96279      CRSQ =    0.95707      F(2/13) =    168.187
SER =    0.1198       SSR =      0.187      DW(0) =   2.25      COND(X) =    145.56
LHS MEAN =       8.45434

COEF            VALUE           ST ER          T-STAT          MEAN

N0            -1.85080         0.67528        -2.74077         1.00000
N1             0.53655         0.17785         3.01680        11.00020
N2             0.52728         0.18859         2.79590         8.35044
```

EXHIBIT 1 (Continued)

```
3:  LOG(GREVP) = F0+F1*LOG(XP)


NOB = 16      NOVAR = 2
RANGE =  1962 TO 1977
RSQ =   0.99113      CRSQ =   0.9905       F(1/14) =  1565.210
SER =   0.0812       SSR = 9.221E-02       DW(0) =  1.65      COND(X) =     31.51
LHS MEAN =       9.04930

COEF            VALUE            ST ER          T-STAT          MEAN

F0            -3.58625         0.32003       -11.20600        1.00000
F1             1.31774         0.03331        39.56210        9.58880



9:  LOG(IMP) = M0+M1*LOG(GDP)


NOB = 16      NOVAR = 2
RANGE =  1962 TO 1977
RSQ =   0.94557      CRSQ =   0.94169      F(1/14) =   243.224
SER =   0.1719       SSR =     0.414       DW(0) =  1.18      COND(X) =     40.91
LHS MEAN =       9.38315

COEF            VALUE            ST ER          T-STAT          MEAN

M0            -4.31800         0.87959        -4.90913        1.00000
M1             1.24553         0.07987        15.59540       11.00020


WARNING 2025
DATAMATRIX IS HIGHLY COLLINEAR


17:  LOG(A) = A0+A1*LOG(GDP)+A2*LOG(MOR)


NOB = 16      NOVAR = 3
RANGE =  1962 TO 1977
RSQ =   0.96988      CRSQ =   0.96525      F(2/13) =   209.332
SER =   0.0952       SSR =     0.116       DW(0) =  1.00      COND(X) =    254.25
LHS MEAN =      10.61480

COEF            VALUE            ST ER          T-STAT          MEAN

A0             3.07575         1.15388         2.66556        1.00000
A1             0.33020         0.25699         1.28488       11.00020
A2             0.45870         0.20414         2.24696        8.51697


REG COMMAND: .filecoef ven;
REG COMMAND: .cedit ven;
```

EXHIBIT 1 (Continued)

```
8. CEDIT COMMAND: .add beta .7 gamma .5  lamda  .25  mu  .1  r  .08
   VALUE,CONSTANT NAME,',' OR ';': .grpkf  1.075  grxmp  1.1  grdelbc  1.1
   VALUE,CONSTANT NAME,',' OR ';': . grpoil 1.145  grgdp 1.15;
9. CEDIT COMMAND: . file;
10. TROLL COMMAND: .crdset all;
   SIMULATIONS CAN START FROM 1978 TO 1978 AND MUST END BY 1989
   TROLL COMMAND: .simulate  simstart 1978  dotil 1985;
   ANALYSING MODEL
   GENERATING CODE
   TO SAVE CODE TYPE 'FILEMOD ;'
11. SIMULATE COMMAND: .filesim  a;
12. TROLL COMMAND: .prtdset alpha dset a,  ranse all,variable endogenous definition
```

SIMULATION OUTPUT BY DSET

A

	A	B	BF
1978	126575.	32019.9	22413.9
1979	145436.	38910.6	27237.4
1980	163863.	45691.8	31984.3
1981	182689.	52596.3	36817.4
1982	202099.	59525.2	41667.6
1983	221902.	66101.9	46271.4
1984	241571.	71640.	50148.
1985	260183.	75059.9	52541.9

	D	DELBC	DIR
1978	3669.33	1204.5	10109.8
1979	4393.59	1324.95	7191.04
1980	5109.31	1457.45	5898.55
1981	5737.63	1603.19	5202.55
1982	6162.48	1763.51	4614.05
1983	6205.84	1939.86	3844.79
1984	5600.	2133.85	2676.39
1985	3949.42	2347.23	915.673

	GDP	GEXPAM	GEXPINT
1978	179555.	2421.3	2561.59
1979	206488.	3201.99	3112.85
1980	237461.	3891.06	3655.35
1981	273081.	4569.18	4207.7
1982	314043.	5259.63	4762.01
1983	361149.	5952.52	5288.15
1984	415321.	6610.2	5731.2
1985	477619.	7164.	6004.79

EXHIBIT 1 (Continued)

	GPUR	GREVNET	GREVP
1978	50392.	15534.9	36170.6
1979	59965.9	18108.6	43778.6
1980	73276.1	21161.9	54551.2
1981	90489.1	24763.	68765.3
1982	112255.	28997.2	87117.2
1983	139588.	33968.	110654.
1984	173871.	39798.6	140814.
1985	216948.	46635.	179533.

	IMP	MOR	PKF
1978	46665.3	26857.7	1651.18
1979	55538.6	32876.6	1775.02
1980	66099.1	38560.6	1908.15
1981	78667.7	44199.5	2051.26
1982	93626.3	49810.6	2205.1
1983	111429.	55224.3	2370.49
1984	132617.	60096.4	2548.27
1985	157833.	63888.8	2739.39

	POIL	PRODOIL	XNP
1978	14.3125	1.95297	5485.7
1979	16.3878	1.97153	6034.27
1980	18.7641	2.03472	6637.7
1981	21.4848	2.11843	7301.46
1982	24.6002	2.21397	8031.61
1983	28.1672	2.31839	8834.78
1984	32.2514	2.43118	9718.26
1985	36.9279	2.55312	10690.1

	XP
1978	43768.4
1979	50591.2
1980	58783.5
1981	71268.4
1982	85282.5
1983	102254.
1984	122777.
1985	147631.

13. TROLL COMMAND: cedit ven;replace grgdp 1.2; file;
14. TROLL COMMAND: .simulate simstart 1978 dotil 1985;
15. SIMULATE COMMAND: .filesim b;
16. TROLL COMMAND: .prtdset alpha dset b,range all ,variable endogenous definitio

EXHIBIT 1 (Continued)

SIMULATION OUTPUT BY DSET

B

	A	B	BF
1978	130176.	33127.9	23189.5
1979	154024.	41899.	29329.3
1980	178420.	51087.	35760.9
1981	203811.	60579.1	42405.4
1982	229776.	69666.8	48766.8
1983	255029.	76897.1	53828.
1984	277063.	79771.8	55840.3
1985	291333.	74325.2	52027.6

	D	DELBC	DIR
1978	4220.81	1204.5	11498.6
1979	5486.23	1324.95	9312.91
1980	6685.91	1457.45	8347.09
1981	7612.89	1603.19	7564.91
1982	7902.48	1763.51	6321.8
1983	6938.45	1939.86	4053.19
1984	3713.12	2133.85	179.892
1985	-3383.58	2347.23	-5817.64

	GDP	GEXPAM	GEXPINT
1978	187362.	2421.3	2650.23
1979	224834.	3312.79	3351.92
1980	269801.	4189.9	4086.96
1981	323761.	5108.7	4846.32
1982	388513.	6057.91	5573.34
1983	466216.	6966.68	6151.77
1984	559459.	7689.71	6381.74
1985	671350.	7977.18	5946.02

	GPUR	GREVNET	GREVP
1978	54316.9	15893.8	39273.8
1979	69392.9	19184.4	51386.9
1980	90778.1	23362.6	69006.3
1981	119841.	28584.3	93598.9
1982	158862.	35059.4	127531.
1983	211161.	43057.3	174283.
1984	281487.	52915.9	238930.
1985	376746.	65055.4	328998.

EXHIBIT 1 (Continued)

	IMP	MOR	PKF
1978	49205.7	27690.	1651.18
1979	61750.2	35042.9	1775.02
1980	77492.7	42345.4	1908.15
1981	97248.8	49634.3	2051.26
1982	122040.	56534.3	2205.1
1983	153152.	62235.3	2370.49
1984	192199.	65387.4	2548.27
1985	241196.	63979.9	2739.39

	POIL	PRODOIL	XNP
1978	14.3125	2.07885	5485.7
1979	16.3878	2.22646	6034.27
1980	18.7641	2.43206	6637.7
1981	21.4848	2.67688	7301.46
1982	24.6002	2.95648	8031.61
1983	28.1672	3.27267	8834.78
1984	32.2514	3.6314	9718.26
1985	36.9279	4.04294	10690.1

	XP
1978	46589.6
1979	57132.9
1980	71457.9
1981	90055.8
1982	113884.
1983	144343.
1984	183389.
1985	233777.

17. TROLL COMMAND: .cedit ven;
18. CEDIT COMMAND: .replace lamda .75;
19. CEDIT COMMAND: .file;
20. TROLL COMMAND: .simulate simstart 1978 dotil 1985;
21. SIMULATE COMMAND: .filesim c;
22. TROLL COMMAND: .prtdset alpha dset c,range all,variable endogenous definition

EXHIBIT 1 (Continued)

SIMULATION OUTPUT BY DSET

C

	A	B	BF
1978	129837.	28899.3	20229.5
1979	153034.	32388.2	22671.8
1980	176504.	35402.	24781.4
1981	200716.	38182.1	26727.4
1982	225284.	40725.7	28508.
1983	249027.	42879.5	30015.6
1984	269679.	44404.	31082.8
1985	283240.	45097.5	31568.2

	D	DELBC	DIR
1978	3923.26	1204.5	7410.89
1979	4412.34	1324.95	4771.82
1980	4671.22	1457.45	3691.87
1981	4523.54	1603.19	3298.38
1982	3680.2	1763.51	3247.27
1983	1680.44	1939.86	3467.32
1984	-2193.61	2133.85	4145.87
1985	-9039.8	2347.23	5906.84

	GDP	GEXPAM	GEXPINT
1978	187362.	2421.3	2311.94
1979	224834.	2889.93	2591.06
1980	269801.	3238.83	2832.16
1981	323761.	3540.2	3054.56
1982	388513.	3818.21	3258.06
1983	466216.	4072.57	3430.36
1984	559459.	4287.95	3552.32
1985	671350.	4440.4	3607.8

	GPUR	GREVNET	GREVP
1978	54514.3	15893.8	39430.5
1979	69980.6	19184.4	51864.8
1980	91935.7	23362.6	69972.8
1981	121746.	28584.3	95233.2
1982	161676.	35059.4	130013.
1983	214988.	43057.3	177753.
1984	286277.	52915.9	243395.
1985	382984.	[illegible]	[illegible]

EXHIBIT 1 (Continued)

	IMP	MOR	PKF
1978	49205.7	27533.4	1651.18
1979	61750.2	34553.5	1775.02
1980	77492.7	41360.3	1908.15
1981	97248.8	48005.3	2051.26
1982	122040.	54152.6	2205.1
1983	153152.	59086.4	2370.49
1984	192199.	61648.	2548.27
1985	241196.	60168.8	2739.39

	POIL	PRODOIL	XNP
1978	14.3125	2.08514	5485.7
1979	16.3878	2.24216	6034.27
1980	18.7641	2.45786	6637.7
1981	21.4848	2.71228	7301.46
1982	24.6002	3.00003	8031.61
1983	28.1672	3.32199	8834.78
1984	32.2514	3.68278	9718.26
1985	36.9279	4.09059	10690.1

	XP
1978	46730.5
1979	57535.7
1980	72216.1
1981	91246.6
1982	115562.
1983	146519.
1984	185984.
1985	236532.

23. TROLL COMMAND: .deleq 19;

24. MODEDIT COMMAND: .addeq 18;@
EQUATION: .xp=xp(-1)*grxp;
MODEDIT COMMAND: .

EXHIBIT 1 (Continued)

```
.                    changesym coefficient srxp;
. MODEDIT COMMAND: .cedit ven;
. CEDIT COMMAND: .add srxp 1.15;
. CEDIT COMMAND: .file;
. TROLL COMMAND: .crdset all;
  SIMULATIONS CAN START FROM 1978 TO 1978 AND MUST END BY 1989
. TROLL COMMAND: .simulate simstart 1978 dotil 1985;
  ANALYSING MODEL
  GENERATING CODE
  TO SAVE CODE TYPE 'FILEMOD ;'
. SIMULATE COMMAND: .filesim d;
. TROLL COMMAND: .prtdset alpha dset d,range all,variable endogenous definition
```

SIMULATION OUTPUT BY DSET

D

	A	B	BF
1978	127644.	28557.4	19990.1
1979	145872.	31242.5	21869.8
1980	161668.	33042.1	23129.5
1981	176401.	34421.7	24095.2
1982	190787.	35650.2	24955.1
1983	205144.	36871.	25809.7
1984	219520.	38151.5	26706.1
1985	233766.	39515.7	27661.

	D	DELBC	DIR
1978	3606.72	1204.5	6885.37
1979	3555.25	1324.95	3592.76
1980	3232.73	1457.45	1982.77
1981	2766.01	1603.19	1376.16
1982	2182.09	1763.51	1365.97
1983	1450.15	1939.86	1716.67
1984	504.101	2133.85	2308.88
1985	-747.58	2347.23	3102.12

	GDP	GEXPAM	GEXPINT
1978	182532.	2421.3	2284.59
1979	208862.	2855.74	2499.4
1980	235265.	3124.25	2643.37
1981	263118.	3304.21	2753.73
1982	293339.	3442.17	2852.01
1983	326599.	3565.02	2949.68
1984	363441.	3687.11	3052.12
1985	404343.	3815.15	3161.25

EXHIBIT 1 (Continued)

	GPUR	GREVNET	GREVP
1978	52060.3	15672.6	37486.9
1979	61572.5	18304.9	45067.5
1980	72822.8	21176.7	54181.
1981	86128.6	24283.	65137.4
1982	101866.	27668.3	78309.4
1983	120478.	31397.6	94144.9
1984	142491.	35543.2	113183.
1985	168526.	40179.7	136071

	IMP	MOR	PKF
1978	47630.7	27033.2	1651.18
1979	56334.8	32821.	1775.02
1980	65338.5	37694.4	1908.15
1981	75109.2	42060.1	2051.26
1982	86001.4	46143.2	2205.1
1983	98311.6	50029.	2370.49
1984	112311.	53695.3	2548.27
1985	128265.	57032.9	2739.39

	POIL	PRODOIL	XNP
1978	14.3125	2.00667	5485.7
1979	16.3878	2.01543	6034.27
1980	18.7641	2.02423	6637.7
1981	21.4848	2.03307	7301.46
1982	24.6002	2.04194	8031.61
1983	28.1672	2.05086	8834.78
1984	32.2514	2.05981	9718.26
1985	36.9279	2.0688	10690.1

	XP
1978	44971.9
1979	51717.6
1980	59475.3
1981	68396.5
1982	78655.9
1983	90454.2
1984	104022.
1985	119626.

TROLL COMMAND: .

3. The Database of the Model

3.1 Introduction to the Data

The time series data developed for the Venezuela Macrofinancial Model consist mainly of data for the government sector, with some variables for the private sector. The construction of these time series, the sources used, and the rationale for certain constructions will be described. A directory to the computer storage of the data files will also be presented.

The general philosophy underlying the construction of government data for Venezuela has been to use the same criteria and format developed by the International Monetary Fund in its newly published series, Government Statistics. This series was chosen because of the reliability and credibility attributed to IMF data. The format development by the IMF is also comprehensive and consistent. Unfortunately only two issues were published by the time this research was undertaken and only the years 1972 through 1976 were available. This period was considered to be insufficient to support the intended simulation model, so the IMF data methodology was used as a model to be imitated for the remaining years.

Construction of variables for the remaining years was based on domestic sources. The publication used most frequently was the Informe Economic. Banco Central de Venezuela, an economic report issued annually by the Central Bank of Venezuela. This source is the most extensively used and is considered to be the best pool of information for macroeconomic variables. Data for the model has been drawn mainly from the "Sector Publico" section, which contains all government data.

To construct the complete data series based on the IMF Government Statistics model, a process of item identification and comparison of

official data to IMF data was necessary. As a result of this effort the IMF format has been almost completely imitated for the remaining years. Only a few relatively unimportant items included in the IMF system could not be found in the official reports. Some problems associated with this effort stem from the fact that although the government economic activity data are very rich, they are reported in a completely different format from that used by the IMF. For example, the Venezuelan reporting system distinguishes four levels of government: central government, regional government, municipal government, and administrative entities. The IMF report system is a consolidation of central government plus the administrative entities.

Having only introduced the reporting of the Venezuelan government activity and noting some of the problems associated in translating data from one system to another, it would be useful to provide the reader with a fully detailed translation of both systems. For all the variables used with the model, both government and non-government, the following section, Section 3.2, presents an item-by-item comparison of the two main sources used.

Section 3.3 is a guide to the construction of the primary variables in the database, referring the reader to the relevant parts in Section 3.2. Section 3.4 has two parts: a listing of the variable data file names, in alphabetical order, along with a definition of the variable and a bibliography code number in Section 3.4.1, and an alphabetical index of terms, cross-referenced to the datafile names in Section 3.4.2. Section 3.5 is the Bibliography.

3.2 Comparison of Sources

An item-by-item equivalence between the two data sources used is presented in Table 3 below.

Table 3a. Government Revenues Source Comparison

Government Revenue = Revenue plus Grants

IMF Government Statistics		Informe Economico, Banco Central de Venezuela
Line Number and Item Name		Item Name
1.1	Revenue	
1.1.1	Current	ingresos ordinarios gobierno central
1.1.2	less revenue from operating services	tasas gobierno central
1.1.3	plus surplus from operating services	not available. For the period 1972-1976 taken from IMF-Government Statistics. For remaining years, as 30 percent of revenue from operations.
1.1.4	plus extrabudgetary services, Social Security	ingresos ordinarios de las entidades administrativas. Account of Entidades Administrativas (EA).
1.2	Grants	
1.2.1	Transfers from other grants	Aportes de otros niveles de gobierno. Account of Entidades Administrativas.
1.2.2	Transfers to extrabudgetary services	transferecias corrientes del gobierno central a las Entidades Administrativas. Account of EA.

Table 3b. Government Expenditures Source Comparison

IMF Government Statistics		Informe Economico, Banco Central de Venezuela
Line Number	and Item Name	Item Name
2.1	Total Expenditures	total egresos. Cuenta Gobierno Central
2.2	less transfers to extrabudgetary and Social Security	transferencias corrientes a las Entidades Administrativas. Cuenta del Gobierno Central.
2.3	less lending	inversion financiera interna "otros." Cuenta del Gobierno Central.
2.4	less amortization (see variables GEXPAND + GEXPAMF)	amortizacion del la Deuda Publica (interna y externa). Cuenta del Gobierno Central.
2.5	less operating expenditures minus deficit from operating expenditures	not available. For period 1972-1976, information taken from IMF-GS. For remaining years, estimated using 1972-1976 trend.
2.6	plus extrabudgetary expenses	egresos totales. Cuenta de las Entidades Administrativas.
2.7	plus extrabudgetary transfers	almost equal to the item called transferencias correintes al sector consumidor y al sector productor. Cuenta del Gobierno Central.
2.8	extrabudgetary lending, including Social Security	inversion financiera interna. Cuenta de las Entidades Administrativas.

Table 3c. Lending-Repayment Source Comparison

IMF Government Statistics		Informe Economico, Banco Central de Venezuela
Line Number and Item Name		Item Name
3	Total lending minus accounts	inversion financiera interna "otros." Cuenta del Gobierno Central.
3.1	Lending from budgetary accounts	inversion financiera interna. Cuenta del Gobierno Central.
3.2	extrabudgetary lending, including Social Security	inversion financiera interna. Cuenta del Gobierno Central.
3.3	Deposits in Social Security accounts	not available. For the period 1972-1976, information taken from IMF-GS. Given that not all the years had a figure different from 0 and given that in absolute terms amounts were very small, a 0 (no value) has been assigned for the remaining years.

3.3 Guide to Constructed Variables

Construction of the Variables

1. Deficit Computation

   i) Take Revenues from Table 1

   ii) Minus Expenditures from Table 2

   iii) Minus Lending-Repyament from Table 3

2. Government Purchases of Goods and Services

This variable is to provide a more precise definition of government expenditures.

Computation:

i)	Take TOTAL EXPENDITURES from	Table 2
ii)	Add LENDING minus REPAYMENT from	Table 3
iii)	Less INTEREST ON DEBT (variable GEXPINT) from	Item called: intereses de la Deuda Publica. Cuenta del Gobierno Central.
iv)	Less TRANSFERS TO PRIVATE SECTOR (variable GEXPTR) from	Items called: a) transferencias corrientes al sector consumidor, plus b) tranferencias corrientes corrientes al sector productor, plus c) tranferencias de capital a unidades familiares. All items in the Cuenta del Gobierno Central.

3. Government Revenue

The revenue figure as computed in Table 3a was broken down into two major groups:

i)	Revenue from oil (variable GREVP) from	Items called: a) petroles, plus b) reparos petroliferos, plus c) hidrocarburos, from the Table "Ingresos del Gobierno Central."
ii)	Non-oil revenue (variable GREVNP) from	Total revenue minus oil revenue.

3.4 Datafile Reference

3.4.1 Datafile Names, Definition of Variables and Sources

Government Sector Variables

Archive Name	Datafile name	Definition	Bibliography Code Numbers (Source)
VEN_	B	Total stock of government debt.	A
	BF	Total stock of government foreign debt.	A
	D	Deficit of the government budget. Defined as revenues minus expenditures minus lending plus repayments.	A,C
	GEXPAM	Government total expenditure in amortization.	A
	GEXPAMF	Government amortization of domestic debt. Defined as referred to the central government.	A,C
	GEXPANF	Government amortization of foreign debt. Defined as referred to the central government.	A,C
	GEXPINT	Government expenditure on debt interests. Defined as referred to the central government.	A,C
	GEXPPTR	Government expenditure on Transfers to the private sector. Defined as current transfers from the central government to the consumer's sector plus current transfers to the producer's sector, plus capital transfers to households.	A,C

Archive Name	Datafile name	Definition	Bibliography Code Numbers (Source)
	GPUR	Government purchases of goods and services. Defined as total government expenditures, less expenditures on debt interest (GEXINT), less expenditures on transfers to private sector (GEXPPTR). Notice that amortization of debt is not included in the total government expenditures.	A,C
VEN_	GREVNET	Government net revenue from non-oil sources. Defined as revenue from non-oil sources (GRVNP) less government transfers to private sector (GEXPPTR).	A,C
	GREVNP	Government revenue from non-oil sources. Defined as total government revenue less revenue from oil sources (GREVP).	A,C
	GREVP	Government revenue from oil sources. Defined as the revenue paid to the central government from all oil-related items.	A,C
Non-Government Sector Variables			
	A	Total private expenditure Defined as the gross domestic product (GDP), less exports (XTOT), plus imports (IMP), less government purchases of goods and services (GPUR).	A,C
	DELBC	Change in Central Bank net credit to commercial banks. Defined as a function of the monetary base (MOR). Government deficit (D), and change in international reserves (D(R). Relation is as follows: DELBC=MOR-MOR(-1)-0.25*D-0.5*DIR	A,B,C

Archive Name	Datafile name	Definition	Bibliography Code Numbers (Source)
	DIR	Change in international reserves.	B
	GDP	Government product at market prices. Defined as the gross domestic product at factor prices less net indirect taxes. Millions of bolivares.	A
VEN_	GNI (not used in model)	Gross national income. Constructed by adding up depreciation to the net national income. Millions of bolivares.	A
	II (not used in model)	Wholesale price index for imported goods.	A
	IMP	Imports of goods and services. Defined as the sum of following current balance of payments items: goods, freight and insurance, other services, and travel.	A
	IWPIG (not used in model)	Wholesale price index for all goods (imported and domestic).	A
	IWPID (not used in model)	Wholesale price index for domestic goods.	A
	IWPIGA (not used in model)	GDP deflator.	A
	MOR	Monetary base	B
	PKF	Inflow of foreign private capital. Defined as the change in international reserves (DIR), less exports (XP+XNP), less net increase of foreign debt (BF-BF(-1), less interest paid on foreign debt (EXPINT). Functional form is as follows: PKF=DIR-XP-XNP+IMP-BF+BF(-1) +GEXPINT*BF(-1)/(B(-1).	A,B,C

Archive Name	Datafile name	Definition	Bibliography Code Numbers (Source)
	POIL	Price of oil, in US dollars (used only in forward simulation) assumed in 1977 = $12.5/barrel.	
	XNP	Non-petroleum exports of goods and services. Defined as the total exports (XTOT), minus petroleum exports (XP).	A
VEN_	XP	Petroleum exports. Defined as oil exports as reported in the balance of trade at "realization prices" which is the price finally perceived by the domestic country.	A
	XRATE	Exchange rate: Bolivares per US dollar.	B
	XTOT	Exports of goods and services. Defined as the sum of the following items: goods, freight and insurance, other services, and travel.	A

3.4.2 Cross Reference

Index of Terms

Term	Datafile Name
amortization of debt, government	GEXPAM
domestic	GEXPAMD
foreign	GEXPAMF
Central Bank, credit	DELBG
Commercial banks, borrowing	DELBC
debt, government	B
foreign	BF
deficit, government	D
exchange rate	XRATE
expenditure on interest, government	GEXPINT
expenditure, total government	GPUR
total private	A
exports of goods and services	XTOT
petroleum	XP
non-petroleum	XNP
foreign debt	BF
foreign private capital	PKF
amortization, total	GEXPAM
amortization, domestic debt	GEXPAMD
amortization, foreign debt	GEXPAMF
government deficit	D
expenditure on interest	GEXPINT
expenditure, total	GPUR
foreign debt	GEXPAND

revenue from oil	GREVNET
transfer payments	GEXPTR
gross domestic product	GDP
GDP deflator	IWPIGA
gross national income	GNI
imported goods, wholesale price index	II
imports of goods and services	IMP
interest expense, government	GEXPINT
international reserves	DIR
monetary base	MOR
non-petroleum exports	XND
oil, government revenues from	GREVNET
price	POIL
petroleum exports	XP
private capital, foreign inflow	PKF
total	A
revenue from oil sources, government	GREVNET
transfer payments, government	GEXPTR
wholesale price index for all goods	IWPIG
price index for domestic goods	IWPID
price index for imported goods	II

3.5 Bibliography

A. Informe Economico. Banco Central de Venezuela. Caracas. Issues 1969-1978.

B. International Financial Statistics. International Monetary Fund. Washington, D.C.

C. Government Statistics. International Monetary Fund. Washington, D.C.

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15.412 Spring 1981
S.C. Myers

S. C. Myers

CHECKLIST OF TOPICS AND CONCEPTS

NOTE: This list was compiled from my lecture notes. It is not intended as a summary or outline of the assigned reading.

1. What's wrong, from a financial viewpoint, with assuming that firms maximize profits?

2. Define "perfect," "efficient" and "complete" markets. What problems are encountered in corporate finance when markets are imperfect, inefficient or incomplete? (Distinguish between markets for real and financial assets.)

3. "Value maximiation is clearly the appropriate financial objective for the firm so long as we assume perfect capital markets and a world of certainty. However the real world is risky. Thus the firm must consider not only the value of its shares but also the risks its stockholders must bear." Respond.

4. Derive the formula $P = \sum \frac{DIV_t}{(1 + r)^t}$, stock price = PV of expected dividends per share. What assumptions have you made?

5. Suppose investors forcast r, the opportunity cost of capital, as a constant. Nevertheless, we know it will fluctuate in an uncertain world. Does that upset the formula given in (4)?

6. What happens if you simplify the formula given in (4) by assuming $D_t = D_0(1 + g)^t$? What if you had used continuous compounding? Does the formula make sense if $g > r$? Under what circumstances is it reasonable in practice to (solve this formula for r and) use it as a rule of thumb for estimating r?

7. When is it valid to say P = EPS/r?

8. How do we interpret the formula

$$P = \sum \frac{DIV_t}{(1 + r)^t}$$

for a firm that pays no dividends and is not expected to in the forseeable future? Is the formula likely to be useful in practice in such a case? Discuss.

9. Show that the formula $P = \frac{DIV_1}{r - g}$ gives the same answer regardless of

of whether the right-hand side variables are defined in real or nominal terms.

10. Show how to calculate the risk-adjusted discount rate given a cash flow's expected value and certainty equivalent.

11. What does use of a single risk-adjusted discount rate assume about

a. Risk as you look further out in time.

b. Resolution of uncertainty over time.

12. Suppose a project is likely to become reasonably safe if it survives an initial, high-risk start up period. How is its NPV calculated? How does your answer depend on whether the start-up risk is diversifiable?

13. What was the most basic conceptual error made by the government in valuing Penn Central's assets? See handout for Problem set #1.

14. Can you define and calculate economic income and economic depreciation?

15. What is the relationship between firm growth and steady-state book ROI? How does accelerated depreciation affect steady-state book ROI? Expensing vs. capitalizing R&D or start-up costs?

16. How are depreciation tax shields calculated and valued? How does inflation affect their value?

17. "If investors want a 10 percent rate of return after corporate taxes, and the corporate rate is 50%, then I look for 20% pre-tax." Make up a numerical example illustrating the fallacy in this.

18. "The cost of capital depends not on the source of funds but on their use." Explain.

19. Be able to explain and illustrate the logical faults of the following capital budgeting rules: accounting ROI, payback, discounted payback, IRR, profitability index.

20. Why do people use payback? Be ready to discuss possible reasons.

21. What are reasonable opportunity costs of capital today for risk-free debt, high-grade corporate debt, a stock with $\beta = 1$? You should be able to quote either real or nominal rates.

22. Suppose firms A and B merge. Market value is V_{AB}. Their separate values are V_A and V_B. Under what conditions would V_{AB} differ from $V_A + V_B$?

23. Suppose you had to explain to a HBS graduate why a reduction in the variance of the firm's income due to a corporate diversification program would not increase the value of the firm's shares. NOTE: This is an expositional problem, not just a theoretical one.

24. What do closed-end funds tell us about value additivity?

25. "I'm investing for the long run. I don't have to worry about the short-run volatility of my portfolio." Respond.

26. Can you show that:

a. The variance of a portfolio is the average covariance of the securities included in the portfolio?

b. The contribution of a security to portfolio risk depends on its covariance with the portfolio return?

27. "The CAPM reduces to the statement that the market portfolio is mean-variance efficient." Explain.

28. "We must admit that the CAPM's assumptions are to some extent violated in practice. Also, the CAPM is hard to test. Despite this, beta is a reasonable, objective risk measure." What specific arguments can you advance to back up this statement? What specific arguments contrary to the statement?

29. How would an estimated beta for a stock help you identify abnormal performance for that stock? How would you treat a stock's estimated alpha in a test of abnormal performance? Could your answer depend on the size of the alpha? (Assume alpha and beta estimated from standard procedures from 60 months' data.)

30. How in principle would you use an estimate of a firm's β in evaluating its capital expenditures? What problems would you encounter in practice? (Assume CAPM is true.)

31. Why does value additivity depend on complete markets? Is this a practical problem? Capital markets are obviously not strictly complete.

32. What do you do to guard against biases and noise in cash flow forecasts for capital investment proposals? (Cf. text, Ch. 10-12)

33. Unseasoned new issues tend to be underpriced (n.b. recent Genetech issue). Why is this a puzzle and a problem for corporate finance theory?

34. Suppose it is found that stocks with low price-earnings ratios consistently outperform stocks with average price-earnings ratios but the same beta. Does this indicate that capital markets are inefficient? Explain.

35. "A company whose stock trades at a high P/E enjoys access to cheap equity capital."

a. Show that firms with relatively high P/Es can accept projects with relatively low immediate earnings without reducing EPS.

b. Despite (a) the quoted statement is wrong. Explain why.

36. What does Scholes's study tell us about capital market efficiency? About the elasticity of demand for securities?

37. What is the rationale for private placement debt? What kinds of firms use this issue route?

38. What happens in a rights issue? Can you prove that stockholders' wealth is unaffected by the size of the discount in a rights issue? What is the major advantage of a rights issue?

39. How would you explain to an HBS student that it's OK to sell stock for less than book value per share?

40. What is the bird-in-the-hand fallacy? Why is it a fallacy?

41. Show the following two statements can be consistent.

a. Dividend policy is irrelevant.

b. Stock price equals the present value of future dividends.

42. Why did Bethlehem Steel's stock price fall when it cut its dividend? How would MM interpret this? Their pro-dividend opponents?

43. Why does our present tax system encourage low dividends? What imperfections are there that might pull in the opposite direction?

44. What's wrong with testing the effects of dividend policy by fitting the following equation to price-earnings ratios and dividend-payout ratios for a sample of firms?

$$P/EPS = a + b(DIV/EPS)$$

45. In the Kelor (A) case, why would it have been misleading to calculate an equity rate of return from the forecasted cash flows to equity?

46. Show that MM's Proposition II follows from the CAPM.

47. Why does corporations' limited liability pose a theoretical problem for MM's Propostion I? Why might this <u>not</u> be a problem in practice?

48. "Stockholders don't care about the possibility of bankruptcy as long as it is 'no fault' bankruptcy." Explain.

49. The "corrected" MM theory states $V = V_0 + T_c D$. Derive this. Can you give an example of a firm with $D < 0$? What would you advise such a firm to do, assuming the "corrected" MM theory is right?

50. Personal taxes don't affect the "corrected" MM theory so long as all personal income is taxed at the same rate. Illustrate by a numerical example.

51. Miller, in "Debt and Taxes," claims that investors who are indifferent between taxable and tax-exempt bonds will have marginaltax rates equal to the corporate rate. Explain why this follows from his theory.

52. Suppose the marginal corporate rate is cut from 48% to 44%. What would Miller predict about corporate debt policy?

53. What precisely is meant by "capital rationing?" Is it possible that a firm in financial distress can encounter capital rationing--i.e., just because it guessed wrong and borrowed too much?

54. A firm may encounter costs of financial distress even if it avoids bankruptcy. Explain carefully.

55. What is APV? Work out a numerical example which shows how APV solves problems of the following type. Say you can build a plant in Ireland or the U.S. If you build in Ireland, shipping and labor costs are higher. But the Irish Government will lend you money for 10 years at 2%. (Forget about tax and foreign exchange problems.)

56. The weighted average cost of capital is just a rule of thumb for calculating APV. Explain.

57. What assumptions underlie the textbook formula for r^*? How about the MM and generalized MM formulas?