

***ETHIOPIA: AN ECONOMY IN TRANSITION
-SOME RELEVANT MARKET PARAMETERS-***

**Nathalie TROUBAT (OECD)
Marie Paule VERLAETEN (DIAL)**

JULY 1992



Développement des
Investigations sur
le juste-à
long terme

***ETHIOPIA: AN ECONOMY IN TRANSITION
-SOME RELEVANT MARKET PARAMETERS-***

**Nathalie TROUBAT (OECD)
Marie Paule VERLAETEN (DIAL)**

JULY 1992

Abstract : The paper is an attempt to quantify some macroeconomic behaviours in the Ethiopian economy. The aim is to provide a better understanding of the challenges to the Ethiopian transition from war and command economy to peace and market-oriented one.

*We all are princes in exile.
But for some of us it is Hell.*

TABLE OF CONTENTS

INTRODUCTION	3
I- THE ECONOMETRIC INVESTIGATION	6
I-1) THE DATA BASE	6
I-2) THE MACROECONOMIC STRUCTURE	7
I-3) THE METHOD OF ESTIMATION	8
II- THE RESULTS	8
II-1) PRIVATE CONSUMPTION	8
II-2) INVESTMENT	17
II-3) WORLD TRADE	21
EXPORTS:	21
A- Coffee	21
B- Hides & Skins	22
C- Rest of merchandise exports	23
D- Services	23
IMPORTS :	34
A- Merchandise	34
B- Services	38
THE BIRR PARITY QUESTION	38
II-4) LABOUR PRODUCTIVITY	41
II-5) MONEY	45
II-6) CAPITAL MARKET FLEXIBILITY	52
CONCLUSIONS	55
REFERENCES	57

INTRODUCTION

1. At the eve of the 1990s and the end of the civil war (May 1991), Ethiopia is in dire conditions. Per capita income is lower than in 1965 revealing a population which is one of the most destituted in the world. Further, it has been denied human rights as it is most generally the case within the Third World. The population has suffered from the marxist regime ruling Ethiopia since 1974 and it has been affected by recurrent droughts since 1972-73. Poverty, adverse demographic dynamics and misguided or frankly wrong agriculture policy have increased soil degradation which has become a permanent fact during Haile Selassie's reign and after. As a result of this set of factors food production per capita has dramatically declined. It reaches the value of 88.7 in 1989 (1979-81=100) which has to be compared to 97.6 fifteen to twenty years ago and 109.6 twenty-five to thirty years ago. So, westerners have become accustomed to see on their television screens Ethiopian people dying from starvation.

2. The country has now to be rehabilitated but the government has no more money. It owes a debt of more than US\$ 3 billion to western donors and between US\$ 5 to 6 billion to the late USSR. The government has proposed an Emergency and Reconstruction Program to the international donors community. It has asked its ERP to be financed at a rate of 92 per cent at least. To cure Ethiopia from poverty, food supply shortage, insufficient growth rate, backward technology and methods of cultivation, non competitive and non profitable activities, lack of jobs and so on...the government has published a yellow booklet (November 21, 1991) on Ethiopia Economic Policy during the Transition Period ie from 1991 to 1993. The EPTP is a list of intentions to secure peace and get macroeconomic stabilization. The selected tools are democracy in the first case and market functioning in the second. Up to now (July 1992), the EPTP has not given rise to many measures of implementation. Most likely because the government has to act on two fronts, the political and the economic ones. The first one is the most constraining for the moment. Civil war has indeed come back in some parts of the country. But maybe also because the government is weak. It groups market and marxist reformists, mainly, so that both the EPTP and the political commitments to implement it result from a modus vivendi between the dominant groups. And moreover, although, it resembles winners who have overthrown the late DERG-regime, it lacks from legitimacy in front of the

Ethiopian population. To improve its position, it acts along lines of faith, ethnicity and language rather than that of political cohesion and economic rationality. So, the risks of getting a blue print reform or EPTP are very high till the free elections announced for mid-1993.

3. The international donors community is very much worried about Ethiopian perspectives. Indeed, in case of failure, it would have to provide increased food, medical care etc...to million of people. Already now there are more than 9 million people at risk of famine in the country. There is also a risk of political explosion of the all Horn of Africa if peace cannot be secured in Ethiopia. Economic concern on Ethiopia has led the EC to contract a Paris-based study group to get a better appreciation of what could be further financed by the EC to help the country to recover. To permit the drafting of a pertinent, relevant and consistent analytical report, a mission to Addis Ababa of the working team took place on March 22 to April 3, 1992. Beyond this mission and the information it permitted to collect, the need to "quantify" the behaviour of some economic operators and the influence of some dominant variables revealed. This is illuminated a little bit through the next paragraphs.

4. Market functioning is a bit on expected market-oriented behaviours. It presumes a lot of basic conditions to be fulfilled. For instance, a market requires a surplus of production otherwise there would not be any sellers. And also some saving availability otherwise there are no buyers. These conditions are not satisfied in Ethiopia for the moment given the level of poverty. Indeed, 60 per cent of the population (rural and urban) lives with US\$ 35 per year and person. This is largely beyond the poverty line determined by the World Bank (US\$ 90). With regard to the surplus of production, it is of 18 gr per person and month under normal circumstances (ie rainfalls). So, a market presumes to be beyond some established poverty line and level of basic food supply. This normally leads the analyst of the Ethiopian question to conclude that poverty has to be adressed as such when one asks how to improve the economy of the country. Poverty should then be an issue tackled with through the EPTP as market functioning. Both overlaps as previously indicated. Very surprisingly the EPTP does not advocate the alleviation of poverty as such. It accounts for a change to poverty through a modification to the economy functioning. So, poverty is a residue while it has its own dynamics which cannot be synthetised only through market functioning. It is that of income-demography differentials although the EPTP evacuates from the analysis demographic trends. This is quite paradoxical if one accounts for the budget deficit which likely will hinder growth and the expected market promotion. Taxes are no more collected, contraband and smuggling increase, informal in the sense of unregistered activities dominate the markets of the big and medium cities. The government has not the money to boost growth whatever the functioning of the economy is or is expected to be. So, bad previously introduced (paragraph 1) might well become worse. Then macro stabilization could very well mean at best a zero growth rate

of real GDP. This would mean a decrease of living standard of a population which increases by about 3 per cent per year. The preceding pleads for the estimation of consumption functions where the influence of a lot of factors, population, for instance, are explicitly measured.

5. Another example concerns the Birr parity . The World Bank pleads for a modification ie a devaluation of the Birr linked to the US\$ without any change since February 1973. This with the aim to boost growth either through increased competitiveness (a reduction of Ethiopian price in foreign currency) or an increase of the domestic price of the export-oriented sector compared to the rest of the economy. All this in the framework of rationalized investment decision through import price increase. Although the Ethiopian government has put this question on its agenda, it has delayed it, explaining it needed careful investigation of alternative measures. Such a legitime cautious behaviour given the complexity of the question could have some non negligible costs. For instance, these of private operators remaining on a waiting position being convinced that the government has no other choice but to accept the WB's plea. This controversial issue must normally lead the analyst to carefully look at a set of elasticities linking Ethiopian external trade to world trade and price, domestic income and prices and the exchange rate. Further, it leads him to distinguish between different sorts of convertibility of which an adequate exchange rate is one of the required conditions. To conclude, when coming back from mission, the need to use some econometrics to do the EC contracted work properly appeared. So, an econometric investigation of some economic channels was performed although the time constraint was high. The final report was expected by end of July 1992. The time constraint has not permitted us to apply solutions to the econometric and statistical problems encountered. The result of econometric investigation is not a model to be used at the purpose of a simulation experiment although a model structure more or less appears. Indeed, the statistical sources which were used, published by the IMF and the WB, reveal inconsistencies in real terms when simultaneously referred to. To be precise enough, real terms data show oddness when deflators measured by the WB were applied on IMF's current price data. Further, we have been led to select equations where there was multicollinearity amongst explanatory variables. So, although the results we present may appear to be relevant, some are biased because of the multicollinearity and statistical discrepancies. Very often, nevertheless, we have tried to indicate the nature of the bias encountered. Moreover, we have indicated what could be an econometric solution to the multicollinearity question. To conclude we are aware that our results plead for further research.

I- THE ECONOMETRIC INVESTIGATION :

I-1) THE DATA BASE:

6. To estimate some relevant functions, data in current and constant prices (US\$ and Birr) have been used.

- IMF's data measure (coming from the Yearbook)

- 1- National accounts of Ethiopia (current Birr) ;
- 2- The private consumption deflator (1985 as base-year) ;
- 3- The treasury bill rate (%) ;
- 4- World trade (from the export side) in current US\$;
- 5- World trade (export) unit value (1985 as base-year) in US\$ also ;
- 6- Some relevant commodity price as the coffee one and that of hides and skins, both are in current US\$;
- 7- The international transactions (merchandise only) of Ethiopia, (level in current Birr) and the export volume (1985 as base-year) ;
- 8- The exchange rate : price in Birr of one US\$;
- 9- The level of population (midyear estimate) ;
- 10- Money demand (M1: current Birr) ;
- 11- The reserves (current Birr) ;

- World Bank's data measure (coming from the World Tables)

- 10- The GDP deflator (1980 as base year) ;
- 11- The import prices (1980 as base year) ;

Data coming from the IMF's yearbook with 1985 as base year have been transformed, into data with 1980 as base year so as to be on line with World Bank's data. Inconsistency occurs when comparing GDP in current price (IMF's source) deflated by the GDP price index measured by the WB to private consumption in real terms (where both current price data and the deflator come from the IMF's source). The result was a negative amount for the period 1960-74 contrarily to any economic rationality. To solve this problem, we also computed private consumption in real production terms ie deflated by the GDP price index when estimating some consumption functions.

7. Data used cover the period 1960 to 1990. This not only to benefit from good statistical properties but also at the aim to get some quantitative analysis of the transition in the light of three periods:

- 1- 1960 to 1974 ie during the market regime of Haile Selassie ;
- 2- 1974 to 1990 ie during the marxist regime of the DERG ;
- 3- 1960 to 1990 ie at long run.

The idea was, indeed, to discover what were the market parameters of Ethiopia before 1974 and so the private operators' behaviours, and how they were modified during the non-market period (1974-90). This helps to speculate a little on what could be the new Ethiopian market parameters ie those which could feature the promoted market-based economy after the end of the civil war. The data bank does not cover the period of 1960 to 1990 for the all set of data. Missing data were then generated by the SORITEC software used to estimate the equations. This solution was applied because there was no time enough to wait for more data coming from Addis Ababa. Missing data were for:

- 1- the private consumption deflator : years 1960 to 1964 ;
- 2- the treasury bill rate (%) : years 1960 to 1977 ;
- 3- the import price index : years 1960 to 67 and 1989 to 90 ;
- 4- the coffee commodity price : year 1990.

Machine computed data substituted for missing data were accepted only after cautious investigation.

I-2) THE MACROECONOMIC STRUCTURE:

8. During the estimation process, the focus was mainly on a macroeconometric model for developing countries proposed by an IMF's team conducted by P.J. Montiel(1). It is a small macroeconometric model of the Mundell-Flemming variety with one domestically produced good consumed both at home and abroad and one imported good. It allows for the existence of capital controls, while permitting the degree of effective capital mobility to be tested empirically. The reason to focus on such a model was to enlighten the Ethiopian situation and expected transition in the light of some international community reference framework. But this framework was not always relevant for Ethiopia. This led us to present a set of other results which got more plausibility.

(1) - "A Macroeconometric model for developing countries" by N.U. Haque, K. Lahiri, P.J. Montiel. IMF Staff paper, vol 37, n°3, Sept 1990.

- The model was applied to the following set of countries : Brazil, Chile, Columbia, Costa Rica, Ecuador, Egypt, Ethiopia, Greece, Guatemala, India, Indonesia, Jamaica, Jordan, Kenya, The Republic of Korea, Malawi, Malaysia, Malta, Mexico, Morocco, Nigeria, Paraguay, the Philippines, South Africa, Sri Lanka, Tanzania, Tunisia, Venezuela and Zambia.

I-3) THE METHOD OF ESTIMATION :

9. Parameters were estimated by OLS. They were selected according to a set of statistical criteria including the analysis of multicollinearity very often neglected. In this later case the correlation matrix was referred to to speculate on multicollinearity being well aware that it is much more complex than single correlation analysis. Functions were tested in level, log form, difference in level, percentage and relevant ratios. Both current and constant Birr data were used. Only the most significant and/or promising results are presented and commented. All the results have been transformed into elasticities to ease comparison. They are accompanied by four statistics :

- (i) R^2 adjusted for the number of observations and that of the explanatory variables ;
- (ii) the Durbin-Watson "d" statistics ;
- (iii) the Durbin "h" statistics in case of the lagged explained variable being amongst the explanatory ones(2) ;
- (iv) the significance level of the Student "t" statistics.

When autocorrelation was detected results were corrected using the Cochrane Orcutt method (CO).

II- THE RESULTS

II-1) PRIVATE CONSUMPTION :

10. The consumption functions have been specified via three models : A, B and C. Model B comes from the reference framework although referring to per capita aggregates at the opposite of the reference equation.

$$(A) L(C/pc)_t = \text{Constant} + \alpha_1 L(Y/p)_t + \alpha_2 i_t + \alpha_3 N_t$$

$$(B) L(CN)_t = \alpha_4 L(YN)_t + \alpha_5 L(YN)_{t-1} + \alpha_6 r_{t-1} + \alpha_7 L(CN)_{t-1}$$

$$(C) CN_t = \text{Constant} + \alpha_8 YN_t + \alpha_9 YN_{t-1} + \alpha_{10} r_{t-1} + \alpha_{11} CN_{t-1} + \alpha_{12} (pc/p)_t$$

Where the symbols stand for :

- L : Log form ;
- -1 : Lagged variable ;
- C : Private consumption (current Birr) ;

(2) The reader has to refer to the normal distribution to find the significance level of the test in this case.

- pc : Private consumption deflator ;
- C/pc : Private consumption in real terms ;
- Y : GDP in current Birr ;
- p : GDP deflator ;
- Y/p : GDP in real terms ;
- N : Level of the population (million) ;
- i : Nominal treasury bill rate (%) ;
- CN : Private consumption per capita at production price ie deflated by the GDP price index ;
- YN : GDP per capita in real terms ;
- pc/p : Relative consumption price ;
- r : Real interest rate ie the nominal treasury bill rate (%) minus the inflation one being proxied by the change of the GDP deflator in %.

The three models permit to enlighten the influences on private consumption of permanent income, the liquidity constraint on households, population, the interest rate and open trade. Put it another way the impacts of permanent growth, liquidity, demography, monetary policy and price liberalization. Parameters related to permanent income are biased. Indeed, one should have computed GDP minus income taxes instead of GDP alone. This was not possible given the availability of data related to income taxes. The bias is likely not very high. Indeed, peasants pay a fixed tax of 10 Birr for annual income not exceeding 600 Birr. Income above that amount is taxed on a progressive basis. The taxation cannot very much bias the permanent income effect when one remembers that in 1989 a peasant on average earns only 292 Birr per year with 60 per cent of the peasantry getting only US\$ 35 a year. So, the role of the agriculture tax which influes on the permanent income of 80 per cent of the labour force working within that sector is modest.

11. The results of model (A) are shown in Table 1. The related comments are as follows :

(i) The income elasticity is clearly too high (higher than one) particularly for the periods 1960–90 and 1974–90. This is likely due to the inconsistency noted between the deflators used (pc and p) and the multicollinearity between income and the constant term. Indeed, the bias reduces on 1974–90 period for which there is no more inconsistency between pc and p and no relevant constant term in the equation.

(ii) At long run, the elasticity with respect to population increases from -0.10 to -0.14 as normally expected given the increase of the fertility rate(3a) (1975 : 5.9% ; 1989 : 7.5%), the

(3) -a. Defined as births per woman.

CONSUMPTION

TABLE 1. RESULTS OF MODEL A - PRIVATE CONSUMPTION IN REAL TERMS - RELEVANT ELASTICITIES AND PARAMETER (P)

EXPLANATORY VARIABLES	1960-90	1960-74	1974-90
CONSTANT (P)	-3.83 (0.1%)	-3.12 (3.3%)	-
INCOME	1.60 (0.0%)	1.45 (0.0%)	1.16 (0.0%)
INTEREST RATE	-0.03 (7.2%)	-	-0.03 (16.6%)
POPULATION	-0.14 (0.0%)	-0.10 (9.8%)	-0.13 (0.0%)
R2 (Adj)	0.89	0.97	1.00
D-W	2.14	1.31	2.57
Multicollinearity between:	income & constant (<0) int. rate & constant (>0) int. rate & income (<0)	income & constant (<0) income & population (<0) population & constant (>0)	int. rate & income (<0) int. rate & population (<0)

decrease of the mortality one(3b) (1975 : 151.4 ; 1989 : 133.2) and the real income average percentage change (+1.5% on 1960–74 but –0.8% for 1974–90).

(iii) The influence of the nominal interest rate is low (elasticity of –0.03) and not significant on period 1960–74. This is likely because of the low interest rate values although increasing during this period. So, private operators have adjusted to the interest rate slowly but significantly as time has been running : thus more on 1974–90 than on 1960–74 because of increased inflation and repressed nominal income (frozen wage since 1975).

12. The results of model (B) where both the private consumption and the income values have been deflated by the same production prices are shown in Table 2. The model is very rich in the sense that it permits to test for several theoretical frameworks which may feature the consumption expenditure. The model includes the past value of private consumption. This helps to test the simplest Hall (1978) version of the permanent income hypothesis with no liquidity constraints. The theory of permanent income which is due to Milton Friedman argues that people gear rationally their consumption behaviour. This means people optimize their expenditure on several periods according to their permanent income with this one being defined as the quantity they can consume leaving their wealth unchanged. Then, Milton Friedman distinguishes between permanent and effective income as between permanent and effective consumption. Effective aggregates include some transitory ones to be added to permanent ones. The ratio of permanent consumption to permanent income does not depend on permanent income but it can be influenced by the interest rate, the wealth to permanent income ratio, the age of the consumer, how the incomes are distributed around some average etc...Further, he adds that there is no correlation between permanent and transitory income, as between permanent and transitory consumption or between transitory income and consumption. The later aggregates are nul on average. Milton Friedman's idea is appealing but it leaves two further questions. The first concerns the precise relationship between current consumption and permanent income. The second is how to make the concept of permanent income operational, that is, how to measure it. These questions are resolved in a pragmatic way by assuming that:

(i) effective consumption (ie the permanent one since the transitory aggregate is nul) is permanently proportional to permanent income ($C=CYP$) ;

(ii) permanent income is related to the behaviour of current and past income ($YP=\sum \tau^i Y_{t-i}$; $0<\tau<1$).

In this framework, the simplest hypothesis of permanent income with no liquidity constraint due to Hall is to test that all coefficients equal zero except the lagged consumption one ($\alpha_7 \neq 0$, only). If only the disposable income terms are rejected empirically then the specification

(3) –b. Defined as per thousand live births.

CONSUMPTION

TABLE 2. RESULTS OF MODEL B - REAL CONSUMPTION PER CAPITA - RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1960-90	1960-74	1974-90
CONSUMPTION(-1)	0.91 (0.0%)	0.82 (0.0%)	0.86 (0.0%)
INCOME	1.02 (0.0%)	1.11 (0.0%)	0.97 (0.0%)
INCOME(-1)	-0.94 (0.0%)	-0.94 (0.0%)	-0.83 (0.0%)
REAL INTEREST RATE(-1)	0.0001 (0.0%)	-0.0007 (0.7%)	0.0009 (0.0%)
R2 (Adj)	1.00	1.00	1.00
D-W	2.11	2.42	1.97
D-H	-0.47	-1.15	-0.19
Multicollinearity between:	lagged variables (<0)	lagged variables (<0)	lagged variables (<0)

would be consistent with more general Euler-equation approaches, which predict that, in the absence of new information, consumption grows from period to period at a rate that depends on the interest one (Rossi 1988 ; Giovannini 1985). Model B including the income variable lagged one year permits to test also for the Blanchard hypothesis of finite horizons for private agents. Indeed, as shown in Haque (1988) if the planning horizons of households that do not face liquidity constraints is effectively of finite length $\alpha=0$; otherwise it is negative.

13. Comments are the following :

(i) Estimations indicate that the Hall hypothesis has to be rejected for the three periods. Indeed, the coefficient of current income is always statistically significant. The coefficient of the lagged income indicates that 94 per cent of households were permanently liquidity constrained at long run (1960–90). Very surprisingly this percentage reduces on 1974–90 featured by frozen wage. Although relevant, these results are likely biased for the multicollinearity existing between the lagged variables.

(ii) Another econometrical weakness is the value of current income elasticity which is slightly too high ie greater than one on 1960–74 as it was the case with model (A) for the three periods. Nevertheless some economic rationality could very well explain why to get an income elasticity greater than one on 1960–74 or at least higher than that for 1974–90. The credit market policy and the saving ratio evolution could explain this. On 1960–74, private saving ratio increased creating a permanent wealth effect or a positive transitory income one at about zero real interest rate. On this period, moreover, the credit policy was not prejudicing households. This scenario was reversed on 1974–90 : wages were frozen since 1975 with an acceleration of inflation (average percentage change of the GDP deflator – 1974–80 : +5.7% ; 1980–90 : +2.0%). As a result, real income decreased. Further, the credit market was managed against private interests and the nominal interest rate was not adjusted for inflation. As a result gross domestic saving reduced from 43.6 per cent from 1973 to 80 and still 6.6 per cent from 1980 to 90. The preceding leads to a relation between income and consumption which looks to the relative income hypothesis due to J. Duesenberry. On the basis of this one individuals build up consumption standards that are geared to their peak income levels. If income declines relative to past income, then individuals will not immediately sacrifice the consumption standard they have adopted. There is a ratchet effect and they will only adjust to a small extent to the decline in current income. This theory is even more relevant when being applied to very poor population for which the consumption standard is that of survival. As a result the elasticity of private consumption to past consumption increased at the opposite of that to current income. That can be noticed through the 1974–90 equation compared to the 1960–74 one.

(iii) Contrarily to some studies, for instance that of the IMF already mentioned(4), the interest rate (the real one) positively influes on private consumption per capita except for the period 1960–74. This indicates some potential positive wealth effect when real interest rate is positive on trend. But in the Ethiopian case it is worth indicating that real interest rate is negative on trend. So, private consumption is in fact negatively touched by that variable as found by the IMF's team(4). The change in the elasticity sign on 1974–90 compared to 1960–74 is likely due to a modification of households' adjustment process to the interest rate given the change in the income evolution, the appearing of a trend of negative real interest rate as to the multicollinearity between lagged variables.

14. The results of model (C) where both the private consumption and the income values have also been deflated by the same production prices are shown in Table 3. Here, the ratio of the private consumption deflator to the GDP one has been introduced at the aim to test for something related to price liberalization, pc being an open market measure (of Addis Ababa, only). The results are rather analogous to those of model (B) except in level : income and past consumption elasticities decrease at the opposite of these to the real interest rate. Only the real income elasticity of 1960–74 remains slightly higher than one. Further the parameters related to 1960–90 belong generally (the exception being the interest rate elasticity) to an interval determined by the parameters of the two other periods. The model indicates that:

(i) at long run (1960–90) 70 per cent of the households face liquidity constraints on an horizon of finite length ; this percentage increases slightly to 72 on 1974–90 as would normally be expected given the real income decrease of that period and contrarily to model (B). These percentages are very high compared to the IMF's study (15 percent of consumers in developing countries are liquidity constrained). These percentages are rather closed to the weight of agriculture in the labour force (+80%). This is quite consistent with the income distribution. Indeed, the gross purchasing power in agriculture in 1989 is 292 Birr per year and person to be compared to 922 in the industry sector (10% of the labour force) and 1145 in the services one (also 10% of the labour force). So, 80 per cent of the labour force get only about 40 per cent of GDP further within that group 60% earn only 72 Birr (US\$ 35) per year and person.

(ii) There was a real positive wealth effect or transitory one on 1960–74 at the opposite of 1974–90. As a result the 1974–90 average elasticity to consume increased (from 0.6 to 0.79) at the opposite of that to current income (from 1.03 to 0.93 : ratchet effect of the Duesenberry type).

(4) Refer to (1)

CONSUMPTION

TABLE 3. RESULTS OF MODEL C - REAL CONSUMPTION PER CAPITA - RELEVANT ELASTICITIES AND PARAMETER (P)

EXPLANATORY VARIABLES	1960-90		1960-74		1974-90	
CONSTANT (P)	13.86	(7.7%)	12.29	(13.4%)		
CONSUMPTION(-1)	0.74	(0.0%)	0.60	(0.2%)	0.79	(0.0%)
INCOME	0.91	(0.0%)	1.03	(0.0%)	0.93	(0.0%)
INCOME(-1)	-0.70	(0.0%)	-0.69	(0.8%)	-0.72	(0.0%)
REAL INTEREST RATE(-1)	0.0005	(0.0%)	-0.004	(0.8%)	0.005	(0.0%)
REL. CONSUMPTION. PRICE	-0.03	(1.2%)				
R2 (Adj)	0.97		0.97		1.00	
D-W	2.06		2.27		1.88	
D-H	-0.28		-1.04		0.04	
Multicollinearity between:	consumption(-1) & income(-1) (<0) const. & rel. consumption price (<0)		consumption(-1) & income(-1) (<0) consumption(-1) & constant (<0) income(-1) & constant (>0)		consumption(-1) & income(-1) (<0)	

(iii) The impact of the real interest rate is given by a positive parameter except for 1960–74 indicating some positive potential wealth effect in case of positive real interest rate. So, as long as real interest rate has remained negative (nominal interest rate being not fully adjusted for inflation) private consumption has been negatively influenced by real interest rate in Ethiopia. That influence is particularly high on 1974–90, the related elasticity is indeed multiplied by ten compared to that of 1960–90. The parameters of the interest rate are very low in the light of other studies, the IMF's one, for instance (value of -0.08). This is a reflection of poverty featuring Ethiopia. An interest rate is a monetary indicator, the more it influences on the economy, the more important is the monetary sector of that economy. That is the opposite in Ethiopia where 60 per cent of the population lives in a barter or non monetary economy. This is also due to the fact that the interest rate parameter is the result of two behaviours that of households being liquidity constrained, 70 per cent of households, and that of households (30 per cent) rich enough to get some saving. In the first case, the expected impact of the interest rate on consumption is negative and what matters the most is nominal interest rate. In the second case, it is positive, and real interest rate matters. A potential positive wealth effect is expected as long as nominal interest rate is adjusted for inflation. This reasoning can be illuminated a little more by trying to measure the relevant elasticities for the two groups of households. In this framework, the elasticity of money demand to the nominal interest rate was used to feature households which face liquidity constraints. So, one writes an equation where the elasticity of the relatively rich households to the real interest rate is the unknown departing from the elasticities of the demand for money and consumption to the interest rate and weights featuring the shares of rich and poor households in income in conjunction with that of households being liquidity constrained.

One writes :

$$\tau_3 = (\epsilon_{DM} * IS * HS) + [x * (1-IS) * (1-HS)]$$

Where:

- $\tau_3 = 0.0005$ (from table 3, period 1960–90) ;
- $\epsilon_{DM} = -1.00$: long run money demand elasticity to the nominal interest rate (see on page 52) ;
- IS, 1-IS = poor and rich households' shares in income (40 and 60 per cent respectively) ;
- HS, 1-HS = poor and rich households' shares in front of the liquidity constraint (70 and 30 per cent respectively).

As result one gets a long run consumption elasticity of rich households to the real interest rate of 1.56.

(iv) At long run, there is a negative impact of the relative consumption price on the related households' expenditure. It is almost 170 times higher than that of the real interest rate. It occurred on the 1960–90 period only for a difference between the average change in percentage of the used deflators only occurred in 1974–90:

	p	pc
1965-73	1.9%	1.8%
1973-80	5.7%	14.9%
1980-90	2.0%	4.0%

15. Model (C) ie the equation specified for 1960-90 was selected to simulate very roughly the impacts of adverse demographic dynamics on private consumption assuming macro stabilization would keep constant real income. Under such a circumstance, the population growth of 3 per cent per year would reduce the population living standard by 2.79%. This indicates that poverty is an issue to be treated as such in any policy document. The selected equation also shows that a policy of price deregulation would much more touch the households than that of positive interest rate : a 170 times higher elasticity. So, a policy looking at the poverty issue would favour price stabilization as a first step of any economic reforms in Ethiopia.

II-2) INVESTMENT :

16. The investment equation was specified as follows :

$$I_t = \beta_1 (Y/p)_t + \beta_2 (Y/p)_{t-1} + \beta_3 CSR_{t-2} + \beta_4 i_{t-3} + \beta_5 (Y/pL)_{t-1} + \beta_6 I_{t-1}$$

where :

- I : Fixed investment in capital in constant Birr ;
- -1 : Lagged variable ;
- Y/p : Gross Domestic Product in constant Birr ;
- CSRB : Cumulated Sum of the country Resource Balance (i.e exports minus imports) in constant Birr ;
- i : The treasury bill rate (%) ;
- Y/pL : Labour productivity i.e GDP (constant Birr) divided by total labour force.

It was substituted for the reference one for this one did not fit the Ethiopian data properly. The reference equation was specified as follows :

$$I_t = f\{r_t, (Y/p)_t, K_{t-1}\}$$

and estimated in first differences to eliminate the capital stock, a variable for which no developing country data are available. Our specified equation is a very rich relationship. Indeed, it permits to account for an acceleration effect via the GDP variable, a liquidity one via the cumulated sum of the country resource balance, a credit policy one via the interest rate

and a profit one via the labour productivity. Further, the liquidity variable permits also to cope with export and import policies as with their results both in real and nominal terms (price effects included). And finally, the lagged GDP variable in conjunction with the lagged explained variable reveals an adjustment process through which the country's capital stock is accounted for(5). Data used cover only the period 1968–88 due to the lack of investment data in constant Birr from 1960 to 68. The results are shown at table 4. Given the length of the data series used (1968–88) it was no more possible to study the three periods (1960–90; 1960–74; 1974–90). We then decided to indicate also the results for 1974–90 just to verify whether the estimated relationship was robust enough.

17. Comments are as follows :

(i) As normally expected, results indicate a very high long run elasticity to real current production or income (about 5.4) but it is reduced via the capital stock impact (about –4.5). This leads to an income elasticity of about one which is of the same magnitude as that found by the IMF's team (1.02).

(ii) The impact of the nominal interest rate (with a 3 years lag) is high : elasticity of about –1.5 ie nearly three times as big as the IMF's one. It is higher but with an opposite sign than the liquidity and the profit ones (about +0.5 and one).

(iii) The interest rate and the profitability elasticities are a reflection of a country where smallholders and poverty prevail. Indeed, in such a country, the credit policy is a powerful tool to stimulate investment because poverty is such a very strong constraint that the investment surplus is very low. In this respect, it is not the labour productivity which matters but how it is passed on to purchasing power and then to saving. So, the labour productivity elasticity implicitly accounts for how the State extracts the income surplus. All this is a classical process within developing countries where agriculture smallholders dominate. Ethiopia fits perfectly such a scenario. Agriculture is the dominant activity of 80 per cent of the population. It is "operated" at 94% by smallholders ; 60% of these ones earn only US\$ 35 a year. The State extracted mainly the income surplus through the price paid to the peasants for their produce. Under the DERG–regime (1974–90), the nominal protection rate i.e the ratio of the price paid to the peasants on the world ones has been approximately 40 per cent. So, the surplus extraction was 60 per cent on trend. Then, one had also to account for the various taxes to be paid. In Ethiopia, this lets approximately 16 per cent for the peasants to live and pay for their input costs.

(5) The capital stock was needed for the estimation of the labour productivity equation. It was computed through the perpetual inventory model ie on the basis of the following identities :

$$K_t = K_{t-1}(1-\delta) + I_t$$

or

$$K'_t = K'_t - 1(1-\delta) + I_t - 1$$

where t and t' are time index indicating the end and the beginning of year t respectively. For more details refer to [6].

INVESTMENT

TABLE 4. RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1968-88		1974-88	
	SHORT RUN	LONG RUN	SHORT RUN	SHORT RUN
INVESTMENT(-1)	0.54	(3.4%)	-	
GDP	2.50	(1.5%)	5.43	
GDP(-1)	-2.05	(5.2%)	-4.46	6.53
CSRB(-2)	0.21	(1.0%)	0.46	-5.38
INTEREST RATE(-3)	-0.71	(7.4%)	-1.54	0.69
LABOUR PRODUCTIVITY(-1)	0.50	(9.9%)	1.09	-1.80
			0.43	(18.1%)
				0.93
R2 (Adj)	0.98		0.99	
D-W	1.65		2.08	
Multicollinearity between:	gdp(-1) & gdp (<0)		gdp(-1) & gdp (<0)	
	labour productivity(-1) & CSRB(-2) (<0)		gdp(-1) & investment(-1) (<0)	
	labour productivity(-1) & investment(-1) (<0)		gdp & investment(-1) (>0)	
	CSRB(-2) & investment(-1) (<0)		CSRB(-2) & investment(-1) (<0)	
			labour productivity(-1) & CSRB(-2) (<0)	

(iv) In the light of all that precedes, the labour productivity elasticity appears to be a key one to get an Ethiopian privatized economy. It indicates that poverty to alleviate is a key to market functioning and growth improvement.

(v) The lag of the interest rate variable is the result of the slow modification of this variable. Very often it was kept constant on 2 or 3 years or even more during the 1980s. Further, its changes reduce through the DERG-regime's period.

(vi) The reduced sensitivity (about 0.5) to the cumulated balance of trade (with a 2 years lag) is not only a result of the development constraint. Capital and intermediate goods imports are needed even when the export commodities cannot enough increase foreign reserves to pay for the import bill. In the case of Ethiopia, one has also to account for military imports because of wars (with Somalia and between Ethiopian movements). They reduced the elasticity to the liquidity variable because the government got credit from the late USSR, mainly, for its military expenditure. Within a market economy, the liquidity elasticity would be a key indicator. Indeed, it would help to fix an import ceiling to the government. Going over it would mean to drain the country's foreign reserves or further deteriorate the country's indebtedness position. It would also increase the budget deficit as the risks of money creation and inflation upswing.

(vii) The investment equation reveals an elasticity to the interest rate higher than for real balances (about 1.5 compared to 1.0 in absolute values) at the opposite of the real income elasticity (1.0 compared to 2.0)⁽⁶⁾. This matters particularly in the framework of an IS-LM analysis of the Ethiopian economy. Let us just briefly recall some points of this analysis :

- The LM curve is the schedule of combinations of the interest rate and level of real income such that the money market is in equilibrium. It is positively sloped. Given the fixed real money supply, an increase in the level of income, which increases the demand for money has to be accompanied by an increase in the interest rate. This reduces the real demand for money and thereby keeps it equal to the real supply. The LM curve is steeper when the elasticity of money demand to real income is high compared to the elasticity to the interest rate. When this latter is zero, the LM curve is vertical. It is horizontal when the real income elasticity is very low. The LM curve is shifted out to the right when real money supply increases at given real income.

- The IS curve is the schedule of combinations of the interest rate and level of real income such that the goods market is in equilibrium. It is negatively sloped because an increase in the interest rate reduces planned investment spending, therefore it reduces also aggregate demand and thus the equilibrium level of income. The less sensitive the investment spending is to changes in the interest rate and the lower is the income multiplier, the steeper is the curve. Thus, when a given change in the interest rate produces a large change in income, the IS is very flat. The IS curve is shifted out to the right by changes in autonomous spending.

(6) These results come from the money demand analysis to which the reader should refer to.

The steeper is the LM schedule (low response to the interest rate) and the flatter is the IS schedule (high response to the interest rate) the larger will be the change in equilibrium income in case of a real money supply increase. The opposite is true in case of an austerity monetary policy. The change in equilibrium income is due to the money supply induced change to the interest rate. In Ethiopia, the IS is rather flat (investment elasticity of about -1.5 ; real income one of 1.0) and the LM curve steeper (real elasticity of about 2.0 and interest rate one of about -1.0). This indicates that in case of an austerity monetary policy leading to constrained real money supply there would be a strong depressive effect on real income. So, there could be an improvement to the expected inflation and maybe to the real interest rate but at the cost of increased poverty. Given that, a steeper money demand implies a comparative effectiveness of monetary policy over fiscal policy, the only way to reduce additional poverty would be to get more employment opportunities when austerity monetary policy would have operated. How is the good question. Simply by getting private capital inflows would be the answer. But this does not only presume a consistent economic policy. More fundamentally, this presumes that some credibility gap between the private sector and the government reduces strongly.

(viii) All the preceding results seem very robust. Indeed, the 1974-88 period does not deliver rupture of trends. All elasticities increase but likely because of increased multicollinearity.

II-3) WORLD TRADE:

EXPORTS :

18. Exports functions have been estimated for the two main (export) commodities of Ethiopia i.e coffee (about 66% of the export total under normal rainfalls) and hides and skins (about 15%) as for the rest of the merchandise package (19%) and for the services. The equations have been specified as follows :

A- Coffee :

$$X_{cofv_t} = \text{Constant} + \epsilon_1 X_{world_t} + \epsilon_2 (P_{cof_t} * E_t)$$

$$X_{cofv_t} = \epsilon_3 X_{world_t} + \epsilon_4 (P_{cof_t}/p_t) + \epsilon_5 E_t + \epsilon_6 X_{cofv_{t-1}}$$

$$X_{cof_t} = \epsilon_7 X_{world_t} + \epsilon_8 P_{cof_t} + \epsilon_9 E_t + \epsilon_{10} X_{cof_{t-1}}$$

where:

- X_{cofv_t} : Export of coffee in current Birr ;
- X_{cof_t} : Export of coffee in constant Birr ;

- -1 : Lagged variable ;
- X_{world} : World trade (from the export side) in current US\$;
- P_{cof} : The coffee price (all coffee-New York : US\$ cents per pound) ;
- E : The exchange rate : Birr per US\$;
- p : the GDP deflator (1980 as base year).

These specifications permit either to test for supply behaviour or demand one(7). In the case of the former, one accounts either for the money in domestic currency the supplier would receive for its produce ($P_{cof} * E$) or compared to domestic suppliers ($P_{cof}/p ; E$), at given export price in foreign currency (the coffee price as negotiated under the International Coffee Organization). This leads to an equation in current price at the opposite of the demand one. The expected elasticity with respect to the commodity price has to be positive as that to the exchange rate. The world trade variable is a proxy for the world trade income or the purchasing power of countries consuming Ethiopian coffee. The price elasticity in the demand equation has to be negative. It indicates how importing countries react to the coffee price in foreign currency (US\$). One should normally have made a difference between exports of coffee from the supply side and the demand one. Or put it another way, one should have used potential exports of coffee in the supply equations compared to effective exports of coffee in the demand ones. We have used the same concept but at different prices for the International Coffee Organization tries to define quota so as to adjust supply to demand. So, we apply a very simple rule of thumb according to which the quota was the equilibrium within each producing country.

B- Hides and Skins :

$$X_{hisv}_t = \text{Constant} + \epsilon_{11} X_{world}_t + \epsilon_{12} P_{his}_t + \epsilon_{13} X_{hisv}_{t-1}$$

$$X_{hisv}_t = \epsilon_{14} X_{world}_t + \epsilon_{15} (P_{his}_t/p_t) + \epsilon_{16} X_{hisv}_{t-1}$$

where:

- X_{hisv} : Exports of hides and skins in current Birr ;
- P_{his} : The hides price (United States - Chicago : US\$ cents per pound).

Here, the specified logic is only that of supply because in the case of hides and skins producers attempt to create a market and not to fulfill a demand already revealed. In this framework effective exports have been assimilated to the potential ones.

(7) The demand equation is rather analogous to the reference model.

C- Rest of merchandise exports (oilseeds & pulses ; fruits, vegetables & spices ; flowers olioresin ; sugar & molasses ; tchat ; gum ; cotton textiles ; mining & quarrying ; miscellaneous)

$$X_{rmv_t} = \epsilon_{16} X_{rmv_{t-1}} + \epsilon_{17} X_{cofv_t} + \epsilon_{18} X_{world_t} + \epsilon_{19} E_t$$

where X_{rmv} represents the rest of merchandise exports in current Birr.

The specified equation accounts for an income effect through the world trade variable, an exchange rate one and a substitution one via the export of coffee. The focus is on supply behaviour so that the explained variable is in current Birr.

D- Services :

$$X_{sv_t} = \epsilon_{20} X_{world_t} + \epsilon_{21} (P_{cofv_t}/p_t) + \epsilon_{22} (P_{hist_t}/p_t) + \epsilon_{23} E_t + \epsilon_{24} X_{sv_{t-1}}$$

$$X_{sv_t} = \epsilon_{25} X_{world_t} + \epsilon_{26} X_{cofv_t}$$

where X_{sv} represents the export of services in current Birr.

Here the logic is also to account for some substitution effects between major export commodities and the export of services. The focus remains on the supply behaviour so that the explained variable remains in current Birr.

19. The results for coffee are shown at tables 5 and 6. Before commenting these results let us just briefly mention some information on the coffee market which help to analyze them. Ethiopian coffee is exported under the International Coffee Organization (I.C.O.) in operation since 1962. The I.C.O. covers nearly all producing countries. It covers all imports ones at the exception of the late Eastern countries and North Africa. It allocates annually maximum amount to be exported or quota to each member country according to the levels of the coffee prices and the coffee inventories. The I.C.O. rules trade for two sorts of coffee of which the market evolution is not the same. Arabica coffee gets a market which is expanding at about 2 per cent a year on average since 1970. It accounts for 75 per cent of world production (5.6 million of tons in 1989/90 of which 4.5 are exported). Ethiopia is producing that sort of coffee. On trend, the country's world share is of 4 per cent for all grades of coffee and 14 per cent for unwashed arabica. It does not fulfill its quota on trend. Robusta coffee gets a depressing market since the 70s due to a modification of the consumers' tastes in favour of Arabica (which has more taste and less caffeine than Robusta), unclear African policy related to coffee in the 1970s and increased competition from Asian countries, for instance Indonesia.

The I.C.O. is a way to adjust supply to demand by voluntarily export restraints or quota reductions to account for price movements, mainly. These movements are revealed by the Coffee, sugar and cocoa exchange of New-York (only for Arabica coffees) and the Coffee terminal market of London (Robusta coffee). The I.C.O. was renewed in 1973 and 1986 although since 1980 Brazil (which dominated the market since 1830 although with a decreased share) has been implicitly opposed to any reduction of its quota given its indebtedness position. The I.C.O. has been explicitly blocked since July 1989 up to April 92 by Brazil. In 1991, Brazil and Columbia have proposed a reduction of their quota of 10 per cent to stop the coffee price decrease since 1978. This has led the I.C.O. to come back on its Quota decreases propositions at its London meeting (April 92) arguing that otherwise price would continue to go down. They have been divided by four since 1988. The price decrease since the 1970s is due to an upswing of supply compared to demand. Supply increased because past coffee prices were high relatively to other raw materials. Differences of evolution between supply (strong increase) and demand (a two per cent increase per year) created price decreases and inventories increases. Producing countries have attempted to export beyond their I.C.O.'s quota due to the impacts of price decreases on their development. At the end of the eighties, the market non regulated by the I.C.O. accounted for 15 per cent of the I.C.O.'s market.

20. The supply equations (table 5) for coffee exports illuminate nicely the evolution of the international coffee market previously introduced.

(i) On 1961-74, Ethiopian coffee exports depend on the domestic price of coffee, the suppliers can receive. The quota system is in operation. Domestic coffee supply fulfills the Ethiopian quota at given coffee price in domestic currency. The short run supply elasticity to price is approximately 0.5, its longer term value reaches the unity level (it takes 3 to 4 years to get coffee after planting). There is none appreciable difference between the price elasticity of coffee in current or constant Birr. The effect of the exchange rate cannot be disentangled from that of the dollar. There is a global single price elasticity.

(ii) Compared to 1961-74, the period 1974-89 reveals an increased sensitivity to price either in Birr or in purchased dollar value (the coffee price in US\$ deflated by the GDP price index) (elasticity of about 0.7). The exchange rate being unchanged since February 1973 acts as a negative constant. Some speculation on this result could lead to say that on this period, private exporters i.e smallholders peasants (who operate 98 per cent of the coffee production) were strongly expecting to receive more Birr for their produce. This could be either a way to require from the government a modification of the price really paid to the peasants (at unchanged exchange rate) or really an expectation of a change of the Birr parity (at unchanged paid price) or both. Given the rather low ratio of the price paid to the peasants on the world one (about 40 per cent on average) it is likely to say that the negative impact of the Birr parity on the coffee export was more a way to claim against the Ethiopian regulated coffee price than

EXPORTS OF COFFEE

TABLE 5. RELEVANT SUPPLY ELASTICITIES AND PARAMETER (P)

EXPLANATORY VARIABLES	1961-89 (*)	1961-74				1974-89	
		SHORT RUN	LONG RUN	SHORT RUN	LONG RUN		
CONSTANT (P)	-	-	-	-	-	-163.50 (6.3%)	-
EXPORT(-1)	-	0.52 (4.1%)	-	0.51 (1.1%)	-	-	-
WORLD TRADE INCOME	0.39 (0.0%)	-	-	-	-	0.62 (0.0%)	0.81 (0.0%)
COFFEE PRICE IN BIRR	0.60 (0.0%)	0.47 (6.3%)	1.00	-	-	0.73 (0.0%)	-
COFFEE PRICE IN BIRR ON P	-	-	-	0.49 (1.6%)	1.00	-	-
COFFEE PRICE IN US\$ ON P	-	-	-	-	-	-	0.62 (0.1%)
EXCHANGE RATE	-	-	-	-	-	-	-0.43 (11.3%)
R2 (Adj)	0.98	0.98		0.99		0.81	0.97
D-W	1.57	1.34		1.41		2.15	1.80
D-H	-	0.60		0.43		-	-
Multicollinearity between:	explanatory variables (<0)	explanatory variables (<0)		explanatory variables (<0)		world trade & const (<0) coffee price & const (<0)	world trade & e (<0) coffee price & e (<0)

NOTE :

(*) 1961-89 and not 1960-90 as previously indicated since data for the coffee commodity price were missing.

a way to speculate against the Birr parity. Indeed, the peasants had to sell their coffee to the Coffee Marketing Board at pre-determined selling price. Further, they were strongly discriminated in favour of state farms and producers co-operatives for credit and input services. There was also a purchasing price gap favourable to state farms and co-operatives. Whatever were the explanation of the exchange rate variable, it had a negative impact on the coffee export supply on 1974–89. This is testified by the relevant negative constant term substituted for the exchange rate in another equation for 1974–89. Here likely the impact of drought is also accounted.

(iii) On this period (1974–89) also a world trade effect appears with an elasticity of about 0.6 to 0.8 which seems normal in the light of other studies on the coffee market Bond (1983) for Kenya, for instance. On 1974–89, it is relevant to get an impact from the world trade or international proxied purchasing power. Indeed, the coffee market has entered into crisis, demand is still growing up but at a reduced growth rate. At the opposite, competition has increased between producing countries which have planted very much (too much) because the coffee prices were relatively high compared to other raw materials. By 1978, prices decrease on trend and producers have to accept increased reduction of their quota although some of them exported on the non I.C.O.'s market.

(iv) At long run, (1961–89) the world income elasticity of coffee exports is rather low (about 0.4) but consistent with other long term studies. For instance, B. Daviron and F. Lesin got a value of 0.5 computed on the period 1883–1985(8). The domestic price elasticity is 0.6. The value belongs to the interval of elasticities for the international coffee market indicated by the World Bank in an unpublished document (values from 0.12 to 0.72). As for other periods the impact of the exchange rate cannot be disentangled from that of the coffee price in dollar.

21. The demand equations for coffee (table 6) indicate that :

(i) on 1960–74 the import countries were only sensitive to the exchange rate (elasticity going from 0.5 to 1.0). This is fully consistent with the I.C.O.. Indeed, importing country fully agreed to buy the producing countries' quota at negotiated US\$ price. Lower price in foreign currency led to increased quota ;

(ii) on 1974–90, the foreign currency effect reduces (elasticity from 1.0 to 0.61) and a world trade (income) one appears (elasticity at about 0.4) because demand is growing more slowly than production ;

(iii) at long run (1961–89), some saturation of demand appears, importing countries react then also to coffee price in foreign currency with a low but relevant elasticity (–0.13); the

(8) "Le café", Ed. Economica, Coll Cyclope, 1990.

EXPORTS OF COFFEE

TABLE 6. RELEVANT DEMAND ELASTICITIES

EXPLANATORY VARIABLES	1961-89		1961-74		1974-89		
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	
EXPORT(-1)	0.37	(2.4%)	-	-	0.49	(1.9%)	-
WORLD TRADE INCOME	0.14	(0.4%)	0.22	-	-	-	0.39 (0.1%)
COFFEE PRICE IN US\$	-0.08	(14.1%)	-0.13	-	-	-	-
EXCHANGE RATE	0.57	(0.0%)	0.90	1.00	0.52	(1.6%)	0.61 (0.0%)
R2 (Adj)	0.98		0.99		0.98		
D-W	2.12		2.21		1.50		
D-H	-0.90		-1.20		-		
Multicollinearity between:	export(-1) & exchange rate (<0)		explanatory variables (<0)		explanatory variables (<0)		
	coffee price & world trade (<0)						

world income effect again reduces : elasticity from 0.39 on 1974–89 to 0.22 which is not very far from the supply one to world income ;

(iv) the long run world income elasticity is considerably lower than that from the reference model (1.12).

22. The results for hides and skins are shown at table 7. Comments are as follows :

(i) The last three specified equations indicate :

1- a supply price elasticity of about 0.7 with a world trade one of about 0.3 ;

2- a world trade elasticity slightly increasing through time at the opposite of the supply price one ;

3- a dollar supply price elasticity and not a Birr one ; further, on periods 61–74 and 61–89 it is an elasticity to the dollar purchased values (ie the price in dollar deflated by the GDP price index) which matters ;

4- no exchange rate effect.

(ii) The first specified equation (which is also the one we would select) shows a constant negative influence relevant only on period 1961–89. It renders insignificant the world trade variable at the opposite for the lagged explained variable and increases drastically the effects of the commodity price (in US dollar). Since the lagged variable reveals a push effect rather analogous to the world trade one, it could have been implicitly substituted for world trade in the specified equation. The high elasticity with respect to price (1.66) is fully consistent with WB's analysis showing that for the moment hides and skins is the lonely sector which can be run profitably in Ethiopia. That is also the lonely one for which future perspectives are relatively positive.

(iii) The opposite changes of supply price and world trade elasticities as the level of these elasticities since the first period of analysis and the dollar price elasticity might be explained as follows : the marketing and pricing of hides and skins has undergone a rapid change over a short period of time. Untill 1984, the market operated in a condition of intense competition between private exporters and parastatals such as the Leather and Shoe Corporation (LSC) and the Hides and Skins Marketing Corporation (HSMC). Since prices were influenced by the international market (the Us and Australian ones) (dollar supply price elasticity), the LSC was unable to compete effectively with private exporters (price elasticity was higher than world trade one, that is the purchased value of dollar which matters). In 1984, the government sought to alleviate this problem by assigning the responsibility of exporting raw hides and skins to HSMC, and revoked the export licences of private traders (price elasticity decreases, the dollar supply price elasticity matters). However the government's attempt to shore up these parastatals failed, and the HSMC was dissolved in 1989. The export of raw hides and skins was banned as a rule (a negative constant influence is operating) and the LSC was given the monopoly of purchasing domestic hides and skins, processing them and supplying both the

EXPORTS OF HIDES AND SKINS

TABLE 7. RELEVANT SUPPLY ELASTICITIES AND PARAMETER (P)

EXPLANATORY VARIABLES	1961-89		1961-74		1974-89	
	SHORT RUN	LONG RUN				
CONSTANT (P)	-21.48	(0.0%)	-	-	-	-
EXPORT(-1)	0.50	(0.0%)	0.33	(0.1%)	-	-
WORLD TRADE	-	-	-	-	0.20	(0.6%)
HIDES & SKINS PRICE IN US\$	0.83	(0.0%)	1.66	-	-	0.29 (13.1%)
HIDES & SKINS PRICE IN US\$ ON P	-	-	0.69	(0.0%)	0.80	(0.0%)
R2 (Adj)	0.94		0.98		0.99	
D-W	1.83		1.59 (CO)		1.98	
D-H	0.38		-		-	
Multicollinearity between:	price in US\$ & constant (<0) price in US\$ & export(-1) (<0)		explanatory variables (<0)		price in US\$ & world trade (<0) price in US\$ & world trade (<0)	

domestic and external markets (world trade elasticity increases). Along with this institutional rearrangement, the domestic pricing and marketing mechanisms were also revised. Prices began to be institutionally determined by a committee composed of members from the ministries of agriculture, industry and foreign trade on the basis of international prices (short and long run price elasticity to be accounted for).

23. The results for the rest of the merchandise package are shown at table 8. They reveal :

(i) very high elasticities to world trade and the exchange rate. While the first one is strongly influenced by 1960–74, the second one is the result of 1974–90. Since on that period the exchange rate is unchanged, it plays the role of a constant : a positive one contrarily to the exports of coffee ;

(ii) a strong substitution effect between coffee export and the rest of merchandise export, particularly during 1974–90 (elasticity above -1). This is likely due to the quota system imposed by the DERG–regime. Under this one, peasants were assigned to deliver a fixed amount of production to the Coffee Marketing Corporation (AMC) whatever the producers' situation were, at pre–determined purchasing price. In case of a too low level of production the peasants were required to do their duty by purchasing from the open market. Since there was some positive difference between the open market and AMC prices, they incurred losses in that case. So, the coffee exports institutional arrangement was designing the profitability of the peasants' activities before any other commodity on 1974–90.

24. The results for the exports of services are shown at table 9. They indicate :

(i) a world trade supply elasticity above one at long run (1960–90) with very relevant substitution (or rentability) effect coming from the prices for coffee and hides & skins exports (price elasticities of about -0.3 and -0.5).

(ii) The coffee price substitution effect is carried on by the 1974–90 period. On this period, the substitution effect operates through the coffee quota system and not the coffee price.

(iii) As for the rest of merchandise export there is a positive exchange rate effect which increases at long run (elasticity from about 0.2 to 0.6). The exchange rate effect is not relevant on 1974–90.

25. Now let us just summarize some selected long–run results we get through the estimation of export functions :

1– Ethiopian coffee supply gets a low world income elasticity (about 0.4), their price (Birr) elasticity is higher (0.6).

2– Ethiopian coffee demand gets a low price (dollar) elasticity (about -0.1) and a low world income one (about 0.2) with a high elasticity to the exchange rate (0.9).

REST OF MERCHANDISE EXPORTS

TABLE 8. RELEVANT SUPPLY ELASTICITIES

EXPLANATORY VARIABLES	1961-69		1961-74		1974-89		
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	
REST OF MERCHANDISE EXPORT(-1)	0.37	(2.9%)	-	0.69	(0.5%)	-	-
WORLD TRADE	0.50	(1.7%)	0.79	0.55	(0.2%)	1.77	0.40
EXPORTS OF COFFEE	-0.48	(1.8%)	-0.74	-0.23	(1.3%)	-0.74	-1.10
EXCHANGE RATE	0.57	(4.5%)	0.90	-	-	-	1.69
							(10.5%)
							(0.1%)
							(0.0%)
R2 (Adj)	0.94		0.99		0.94		
D-W	1.54 (C.O)		1.79		1.57		
D-H	1.45		0.68		-		
Multicollinearity between:	world trade & exports of coffee (<0)		rest of merch. export (-1) & world trade (<0)		rest of merch. export(-1) & exports of coffee (<0)		exports of coffee & world trade (<0)

EXPORTS OF SERVICES

TABLE 9. RELEVANT SUPPLY ELASTICITIES

EXPLANATORY VARIABLES	1960-90		1960-74		1974-90	
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN
EXPORTS OF SERVICES(-1)	0.24	(10.5%)	-	-	-	-
WORLD TRADE	0.86	(0.0%)	1.13	-	-	-
COFFEE PRICE IN US\$ ON P	-0.21	(5.3%)	-0.28	0.33	(4.2%)	-
HIDES & SKINS PRICE IN US\$ ON P	-0.35	(10.8%)	-0.46	0.50	(0.1%)	0.75
EXCHANGE RATE	0.47	(0.2%)	0.62	-	-	-
				0.17	(20.9%)	0.25
						1.25 (0.0%)
						-0.26 (0.8%)
						exports of coffee
						-
R2 (Adj)	0.96		0.95		0.95	
D-W	1.77		2.03		1.34	
D-H	0.97		-0.34		-	
Multicollinearity between:	exports of services(-1) & world trade (<0)		exports of services(-1) & world trade (<0)		explanatory variables (<0)	
	exchange rate & world trade (>0)		exports of services(-1) & exchange rate (<0)			
	hides and skins price & world trade (<0)					
	hides and skins price & exchange rate (<0)					

3- Hides and Skins get a world income elasticity of about 0.3 and a dollar price one of about 0.7.

4- For the two main export commodities (i.e coffee and hides and skins) the focus of suppliers is more on the prices they are really paid for than on some expected ones resulting from some hypothetical change to the Birr parity. This is because the State has extracted their income surplus through pre-determined purchasing prices and has no other choice but to continue this policy even if it combined with market liberalization and incentives to the peasantry.

5- Other merchandise exports get an high world income elasticity (of about 0.8) and exchange rate one (0.9). Forced coffee exports has restrained these exports with an elasticity of about -0.7.

6- Services exports get the highest world income elasticity (greater than one) with an exchange rate one of about 0.6. They are very influenced by the domestic purchased value of the dollar exports of coffee (elasticity of about -0.3) and that of Hides and Skins (elasticity of about -0.5). Their exchange rate elasticity is 0.6.

7- Generally, the export exchange rate elasticities are high (from 0.6 to 0.9). This is an indication of very elastic demand or supply curves.

8- These results lead to the following supply figures were price and exchange rate elasticities have been assimilated.

Range values for elasticities

World income	<0.5 -->	Coffee, hides & skins
	>0.5 -->	Other merchandise exports
	>1.0 -->	Services
Price (Birr or \$US)	> 0.5	{ Coffee, hides & skins, Other merchandise exports, Services
Exchange rate		

9- Compared to the reference framework (IMF) the main difference concerns the world income elasticity. Ethiopian exports (ie coffee) have a lower world income elasticity (0.22 compared to 1.12).

10- In case of a modification of the Birr parity to the US\$ the main teaching is that the following scenario could very well be relevant : no real increase coming from the supply side without price liberalization leading to strong price increases in Birr paid to the suppliers. Thus at modified Birr (and high foreign demand elasticity to the exchange rate), all would depend on the nominal and effective protection ratios (i.e that which includes also the input

protection). The protection policy may circumvent any expected supply responses to the Birr parity adjustment.

IMPORTS :

A- Merchandise :

26. The import relations cover merchandise and services respectively. The merchandise relations were specified as follows:

$$(A) \quad L(M)_t = \text{Const} + \phi_1 L(M/Y)_{t-1} + \phi_2 L(pm)_t + \phi_3 L(C/p)_t + \phi_4 L(Rv/Mv)_t + \phi_5 L(p)_t$$

$$(A_{bis}) \quad L(M)_t = \text{Constant} + \phi_6 L(Y/p)_t + \phi_7 L(pm)_t + \phi_8 L(Rv/Mv)_t$$

$$(B) \quad L(M)_t = \phi_9 L(M)_{t-1} + \phi_{10} L(Y/p)_t + \phi_{11} L(p)_t + \phi_{12} L(Rv/Mv)_t$$

where :

- L : Log form ;
- -1 : Lagged variable ;
- M : Total of merchandise import (c.i.f) in constant Birr (1980 as base year) ;
- C : Private consumption in current Birr ;
- Y/p : GDP in constant Birr ;
- Rv : Reserves in current Birr ;
- Mv : Total of merchandise import (c.i.f) in current Birr ;
- pc : Private consumption deflator ;
- pm : Import price (1980 as base year) in domestic currency (Birr) ;
- p : GDP deflator (1980 as base year) ;

These specifications are very conventional. They permit to capture the development constraint either via the import to GDP ratio lagged one year or the real income (GDP) alone, or the lagged explained variable alone ; some substitution-competition effect either via the import and domestic production deflators or the real exchange rate ; some physical competition effect via the lagged production variable (GDP) embodied in the lagged import ratio, the insufficient food production via private consumption and the restricted foreign exchange availability via the reserves to imports ratio. So, the specifications are more sophisticated than the reference model which analyses imports only in terms of GDP, the real exchange rate, the reserves ratio and the lagged explained variable (model B).

27. The results for merchandise are given at tables 10 and 11. The first set of equations (model A at table 10) indicates that as time has been running :

(i) the development constraint (income elasticity of 1.49 on 1960–74) has given rise since mid–1970s to an inertia effect via the explained variable lagged one year (with an elasticity of about 0.2); a reduced physical substitution effect via the real production variable lagged one year (with an elasticity of -0.2 to -0.3) and a high food dependency effect via the private consumption variable (with an elasticity going from 0.4 to 1.0) ;

(ii) the competition constraint reveals a weak price elasticity of demand (and to the exchange rate) (from -0.2 to -0.3) slightly decreasing on 1974–90, contrarily to a rather strong elasticity to domestic price (long run elasticity of between 0.7 to 0.8) which appears on 1974–90 (this later surprising result is likely due to the multicollinearity between import and domestic prices) ;

(iii) the foreign exchange constraint reveals a weak decreasing elasticity (from 0.03 to 0.01). All this is fully consistent with what is known about Ethiopia. For instance, the country has faced (and is still facing) a deep agricultural crisis under which food production per capita drastically decreased (paragraph 1). As a result, the country has imported more and more to feed the population. Political and economical choices favouring industry while neglecting domestic resources and inter–sectoral linkages plus war against Somalia (by 1977) and civil war increased continuously imports (military ones) whatever their prices were at the cost of decreased reserves.

(iv) Ethiopia has become heavily dependent on imports.

The second set of equations (model B at table 11) delivers the same conclusions :

(i) a high import content of growth (elasticity of 1.25)⁽⁹⁾, a weak and decreasing foreign exchange constraint (0.02) but at short run only (it increases but slightly at long–run : 0.04), a weak and constant real exchange rate elasticity (-0.27) leading to a weak and constant elasticity to domestic prices (0.27). This latter as its evolution seems much more plausible given Ethiopian reality of continuous imports because of wrong or misguided policy, war and agriculture shortage. So, model B should be selected for further analysis.

(ii) Compared to the reference framework, Ethiopian imports are more elastic to GDP (1.25 compared to 0.97) , and less elastic to the real exchange rate (-0.27 compared to -0.95) and the reserves ratio (0.04 compared to 0.23). These comparative results are a reflection of a smaller inertia effect (elasticity of 0.48 compared to 0.834) and a greater short run development constraint (elasticity of 0.65 compared to 0.161), the short run reserves constraint being rather analogous (0.02 compared to 0.038).

(9) In that sort of equations, the income elasticity can be viewed as a weighted average of these of private consumption, lagged income and import featuring model A.

IMPORTS OF MERCHANDISE

TABLE 10. MODEL A : RELEVANT ELASTICITIES AND PARAMETER (P)

EXPLANATORY VARIABLES	1960-90		1960-74		1974-90	
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN
CONSTANT (P)	-2.70	(0.8%)	-	-	-	-
GDP	-	-	1.49	(8.6%)	-	-
RATIO(-1) = $\frac{M(-1)}{\text{divided by } GDP(-1)}$	0.20	-	-	-	0.19	-
IMPORT PRICE IN BIRR	0.20	(0.2%)	-	-	0.19	(3.9%)
GDP DEFLATOR	-0.20	-	-	-	-0.19	-
PRIVATE CONSUMPTION	-0.20	(1.5%)	-0.25	(6.9%)	-0.15	(15.8%)
RATIO : RESERVES ON IMPORTS IN CURRENT BIRR	0.56	(2.9%)	0.70	-	0.63	(5.4%)
	0.80	(0.2%)	1.00	-	0.31	(14.0%)
	0.01	(2.2%)	0.01	0.03	(10.0%)	0.02
	0.02	(2.4%)	0.02	0.02	(2.4%)	0.02
R2 (Adj)	0.94		0.92		1.00	
D-W	2.09		1.51		2.24	
Multicollinearity between:	reserves & gdp deflator (>0)		gdp & constant (<0)		reserves & private consumption (<0)	
	constant & private consumption (<0)		reserves & import price (<0)		gdp deflator & private consumption (<0)	
	import(-1)/GDP(-1) & import price (>0)		gdp deflator & import price (<0)		gdp deflator & reserves (>0)	
	gdp deflator & import price (<0)		gdp deflator & private consumption (<0)		import(-1)/gdp(-1) & gdp deflator (<0)	
	gdp deflator & private consumption (<0)		gdp deflator & import price (<0)		gdp deflator & import price (<0)	

IMPORTS OF MERCHANDISE

TABLE 11. MODEL B : RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1960-90		1960-74	
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN
IMPORTS(-1) GDP	0.48	(0.2%)	-	-
REAL EXCH. RATE = $\frac{\text{IMPORT PRICE}}{\text{GDP DEFLATOR}}$	0.65	(0.2%)	1.25	1.23 (0.0%)
RATIO : RESERVES ON IMPORTS IN CURRENT BIRR	-0.14	(3.6%)	-0.27	-0.26 (4.6%)
	0.02	(0.1%)	0.04	0.03 (1.8%)
R2 (Adj)	1.00		1.00	
D-W	1.84		2.14 (CO)	
D-H	0.69		-	
Multicollinearity between:	real exchange rate & gdp (<0) imports (-1) & gdp (<0) imports(-1) & real exchange rate (>0) imports(-1) & reserves (<0) gdp & reserves (<0)		reserves & gdp (>0) real exch. rate & gdp (<0)	

B- Services :

28. The services relation was specified as follows:

$$L(Ms)_t = \phi_{13}L(Ms)_{t-1} + \phi_{14}L(Y/p)_t + \phi_{15}L(Rv/Mv)_t$$

where Ms are the imports of services in constant Birr.

It accounts simply for the imports needed to develop the economy via the GDP variable and the lagged explained one and the financial resources constraint via the reserves ratio. The results given at table 12 indicate the following :

(i) at long run the elasticity to real production which is of about one tends slightly to decrease (0.9). Compared to merchandise imports equations with an analogous structure the development elasticity is slightly lower (about one compared to 1.25) but with the same evolution ;

(ii) there is a long-run elasticity to foreign exchange availability of about 0.09 i.e above the merchandise related to one. Further, it slightly increases. This is due to merchandise which receive priority in terms of reserves requirement, at the opposite of services.

29. The selected results of the import analysis (model B for merchandise) can be synthetised as follows :

(i) At long run, merchandise imports depend strongly on development (elasticity above 1), their price elasticity is low as their real exchange rate one (about -0.3) ; the elasticity of substitution between home produced and import goods is also low (about 0.3) ; the reserves constraint has the lower elasticity (0.04) in absolute values.

(ii) Services imports have also a high development elasticity (about 0.9) although lower than for merchandise ; no detectable effect from either import price or domestic ones is noted ; the reserves constraint is low (elasticity of 0.09) although quite higher (more than doubled) than for merchandise.

(iii) In the eventuality of a Birr devaluation, import would not very much reduce because of the expected price increase. This leads to conclude that there could very well be a J curve effect revealing further deterioration of the balance of trade in this case.

THE BIRR PARITY QUESTION :

30. The analysis made on exports and imports permits us to clarify a little bit the question of the modification of the exchange rate. For this, let us just focus on some conditions which could help to speculate on the macro impacts of the expected (by the World Bank)

IMPORTS OF SERVICES

TABLE 12. RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1960-90		1960-74		1974-90	
	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN	SHORT RUN	LONG RUN
IMPORTS OF SERVICES(-1)	0.45	(0.0%)	-	0.44	(0.0%)	-
GDP	0.50	(0.0%)	0.89	0.56	(0.0%)	1.00
RATIO : RESERVES ON IMPORTS IN CURRENT BIRR	0.05	(2.7%)	0.09	-	-	0.92 (0.0%) 0.08 (2.0%)
R2 (Adj)	0.99		0.99		0.99	
D-W	1.96		2.54		2.28	
D-H	0.11 (CO)		-1.48		-	
Multicollinearity between:	imports of services(-1) & gdp (<0) imports of sevices(-1) & reserves (>0)		explanatory variables (<0)		explanatory var. (>0)	

modification of the Birr parity, being obviously aware that a devaluation is much more complex than the dynamics of a set of equations. Accompanying policies matter, indeed, as much as some mathematical conditions or maybe more. And furthermore, political and social climates are also key determinants. Parameters used to quantify the conditions are those of coffee in the case of export and merchandise in that of imports.

(i) The simplest Marshall-Lerner condition to get an improvement to the balance of trade in foreign currency is :

$$\Omega TCVo + \delta > TCVo$$

where :

- Ω : foreign demand elasticity to Ethiopian export commodity (absolute value : 0.13) ;
- $TCVo$: ratio of export to import, both aggregates in current domestic currency (53.1 in 1990) ;
- δ : domestic demand elasticity to the import price (absolute value : 0.20).

The result is

$$0.27 = [(0.13*0.531)+0.20] < 0.531$$

So, the balance of trade in foreign currency would deteriorate in case of a devaluation of the Birr.

(ii) The simplest condition to get an improvement to the balance of trade in domestic currency is :

$$\Omega TCVo + \delta > 1$$

The result is :

$$0.27 = [(0.13*0.531)+0.20] < 1$$

So, the balance of trade in Birr would also deteriorate.

(iii) Extended condition to get an improvement to the trade balance is

$$E_{tb} = \frac{P_X}{P_M} * \frac{X}{M} * \frac{(dx+1)}{(dx/sx - 1)} - \frac{(sm+1)}{(sm/dm - 1)} > 0$$

where :

- E_{tb} : trade balance elasticity to the exchange rate ;

$$\frac{P_X}{P_M} * \frac{X}{M}$$

- $\frac{P_X}{P_M} * \frac{X}{M}$: $TCVo$ (0.531 in 1990) ;

$$\frac{P_X}{P_M} * \frac{X}{M}$$

- dx, dm : price elasticity of export and import demand (0.13 ; 0.20) ;
- sx, sm : price elasticity of supply export and import (0.60 : coffee ; 0.90) ;

The result is also negative.

(iv) A more exhaustive (but also more sophisticated) set of conditions to appreciate static macro effects is due to Thorvaldur Gylfasson. It gives the macro impact per one per cent change to the parity. It is the following :

$$\begin{aligned}\hat{Y}/\hat{E} &= \{(1-\theta)[(1-\theta)\Gamma(\Omega+\delta-1)+\theta\Omega-\theta(1-\Gamma)(1-\alpha)]-\theta(1-\theta)\} / \triangle \\ \hat{Q}/\hat{E} &= \{(1-\theta)[(1-\theta)\Gamma(\Omega+\delta-1)+\theta\Omega-\theta(1-\Gamma)(1-\alpha)]-\theta(1-\theta)\} / 1-\triangle \\ db/\hat{E} &= (1-\alpha) Y [(Y/E)+\theta]\end{aligned}$$

where :

- $\hat{\quad}$: change in percentage ;
- Y, Q : real income and output respectively ;
- E : the exchange rate ;
- θ : elasticity of substitution between domestic and imported input (0.20) ;
- Ω, δ : price elasticity of exports, imports (absolute values) (0.13 ; 0.20) ;
- α : income elasticity of consumption (0.90) ;
- θ : share of imported input in domestic output (to be computed) ;
- Γ : share of final goods imports in national income (0.65) ;
- β : share of input in total imports (0.63) ;
- db : variation of the balance of trade ;

$$\left| \begin{array}{l} \theta = \beta\Gamma/[1-\beta(1-\Gamma)] = 0.53 \\ \triangle = 1-(1-\theta)(1-\Gamma)\alpha = 0.85 \end{array} \right.$$

The results are a decrease of real income of 0.32 per cent, of real output of 1.80 per cent and a deterioration of the balance of trade of about Birr 200 million per percentage change of the Birr parity. So, again it appears that the Birr parity question needs a lot of investigations particularly from the viewpoint of accompanying policies before being decided.

II-4) LABOUR PRODUCTIVITY :

31. Contrarily to the reference framework the relationship has not been specified as a Cobb-Douglas production function but as a transcendental one which is an extension to the Cobb Douglas case. The transcendental function has the form :

$$V = c * L^{\theta 1} * e^{\theta 2 L} * K^{\theta 3} * e^{\theta 4 K}$$

It has the characteristic of allowing marginal products to rise before eventually falling. This has seemed us more relevant in the case of Ethiopia where agriculture is the dominant activity and where the soil degradation reduces potential land yields by 1 to 2 per cent per year on average. At the purpose to get something relevant for a market-based economy, we estimated the V function under the form of a labour productivity relationship.

$$V/L = c * L^{\theta 1-1} * e^{\theta 2 L} * K^{\theta 3} * e^{\theta 4 K}$$

In log form this leads to :

$$\text{Log}(Y/pL)_t = \text{Constant} + \theta_1 \text{Log}(L)_t + \theta_2 L_t + \theta_3 \text{Log}(K)_t + \theta_4 K_t$$

where :

- Y/pL : Labour productivity i.e GDP in real terms divided by total labour force ;
- L : The labour force ;
- K : The capital stock computed using the perpetual inventory model(10).

Available data (the investment ones in real terms) only permitted to estimate the relation on the period 1968–88.

32. Results are shown at table 13. They indicate :

(i) diminishing returns to capital intensity i.e capital per head. As one keeps raising the amount of capital per head, labour becomes more productive and therefore output rises. However, the increase in output becomes progressively less. Additional capital cooperating with a given labour force is invariably productive but at a diminishing rate. The elasticity to the capital stock is very high (13.4) as that to the labour force (-3.6). This seems a little odd although

a) we have to account for the influences of the exponential terms of the transcendental function (capital elasticity of -1.3 ; labour elasticity of 1.1) and

b) we were not able to find other studies with the same function to appreciate whether our results were convergent or not. The constant term also seems odd although it has to account for the differences of unity between the explanatory variables.

(ii) that although some of the results appear interesting there are biased for there is strong multicollinearity between explanatory variables as it is generally the case with production functions. Due to a time constraint we were not able to correct the function for the mentioned problem. Nevertheless, we have thought to a solution. It would have been to run a factor analysis on the explanatory variables. Then, using their principal components in the regression analysis would have deleted the multicollinearity.

(10) To apply the perpetual inventory model, one needs estimations of a depreciation rate and a departing capital coefficient. A rather simple method is to regress GDP as a function of $GDP(-1)$ and investment : I or $I(-1)$. The $GDP(-1)$ parameter is a rough estimation of one minus the depreciation rate while that of investment gives one divided by the capital coefficient. This method suffers from a lot of economic and econometric imperfections. Nevertheless, it leads to plausible results. For more detailed analysis, the reader should refer to "The determination of a capital stock serie for developing countries : some comments to be sure what one gets is a real cheashire cat and not its grid" by N. Troubat (OECD) and M.P. Verlaeten (DIAL), July 1992.

$$(1) v = a_0 + \sum_{i=1}^n a_i z_i + \epsilon \quad (\text{multicollinearity between the } z_i)$$

$$(2) Z^* = FA \quad \begin{array}{l} (F : \text{principal component factor;} \\ Z^* : \text{standardized } z_i; \\ A : \text{loading factor matrix}) \end{array}$$

$$(3) v = c_0 + \sum_{i=1}^n c_i F_i + \epsilon \quad (\text{It is without multicollinearity since } F_i \text{ are independent from each other i.e the covariance between any two of them is zero})$$

33. We also estimated an equation where a Pascal distribution was introduced to test for the capital coefficient. Let us recall briefly that such a distribution gives the lagged effects of some explanatory variables through a r stage process. When the r stages involve the same lag, the process lag distribution is :

$$\mu(\theta) = \frac{(1-\tau)^r}{(1-\tau\theta)^r}$$

where :

- r : number of stages ;
- θ : lag operator ;
- τ : lag parameter.

For instance, with $r=2$ and one explanatory variable the following model

$$Y_t = \beta \frac{(1-\tau)^2}{(1-\tau\theta)^2} X_t$$

reduces to

$$Y_t = \beta(1-\tau)^2 X_t + 2\tau Y_{t-1} - \tau^2 Y_{t-2}$$

However, one problem in using this lag form is that it involves estimating an equation subject to nonlinear constraints. Jorgenson's approach was to generalise this form such that the roots of the lag polynomial need not to be equal. So, one gets :

$$Y_t = \beta(1-\tau_1)(1-\tau_2)x_t + (\tau_1+\tau_2)Y_{t-1} - \tau_1\tau_2Y_{t-2}$$

to be estimated.

LABOUR PRODUCTIVITY

TABLE 13. TRANSCENDENTAL PRODUCTION FUNCTION :

EXPLANATORY VARIABLES	1968-88	
CONSTANT (P)	-53.00	(0.3%)
Log(LABOUR FORCE)	-3.58	(0.3%)
LABOUR FORCE	1.14	(0.7%)
Log(CAPITAL STOCK)	13.37	(0.2%)
CAPITAL STOCK	-1.25	(0.4%)
R2 (Adj.)	0.93	
D-W	1.63	
Multicollinearity between :	explanatory variables	

TABLE 14. PASCAL DISTRIBUTION :

EXPLANATORY VARIABLES	1968-88		
	SHORT RUN		LONG RUN
Log(LABOUR PRODUCTIVITY)(-1)	0.16	(17.1%)	-
Log(LABOUR PRODUCTIVITY)(-2)	-0.22	(5.5%)	-
Log(LABOUR FORCE)	-0.53	(0.0%)	-0.86
Log(CAPITAL STOCK)	1.59	(0.0%)	2.60
R2 (adj)	1.00		
D-W	1.63		
D-H	0.87		
Multicollinearity between :	labour force & capital stock (<0)		
	Labour productivity(-1 -2) & capital stock (<0)		

34. The preceding has led us to estimate :

$$\text{Log}(Y/pL)_t = \theta_5 \text{Log}(L)_t + \theta_6 \text{Log}(K)_t + \theta_7 \text{Log}(Y/pL)_{t-1} + \theta_8 \text{Log}(Y/pL)_{t-2}$$

Results are shown at table 14. Comments are as follows :

(i) With such a function, the major impact of the explanatory variables no more comes immediately followed by less and less strong impacts. The impacts come through a two stage process, both parts of which take time. So, the lag distribution of the whole process is a function of the two lag distributions of the individual stages. The whole process distribution is the convolution of the stage processes.

(ii) The lag process operates through the following elasticities :

$$-0.53 = \beta_1(1-\tau_1)(1-\tau_2) \quad \text{--> for the labour force}$$

$$1.60 = \beta_2(1-\tau_1)(1-\tau_2) \quad \text{--> for the capital stock}$$

The values of τ_1 and τ_2 are respectively 0.54 and -0.38 so that the long run elasticities are :

1) - 0.86 for the labour force

2) 2.60 for the capital stock

These results seem more acceptable but again we lack from other studies to appreciate whether they are plausible or not. The reference framework shows a unitary elasticity to the capital coefficient of labour i.e the same elasticities but with opposite signs for both capital and the labour force. Compared to the IMF's framework, Ethiopian productivity is more dependent on capital. This seems fully consistent with the poverty level prevailing in Ethiopia compared to the set of countries in the IMF's study(1).

II-5) MONEY :

35. The money demand equation has been specified as follows :

$$(A) \quad M_t = \delta_1 M_{t-1} + \delta_2 (Y/p)_{t-2} + \delta_3 i_t$$

where :

- M : real balances i.e M1 deflated by the GDP price index ;
- Y/p : GDP in real terms ;
- i : the treasury bill rate in % ;

It is a demand for real balances as for the IMF's paper. Indeed, it is the purchasing power of money, not the number of their currency bills that matters to holders of money. The demand for real balances depends positively on the level of real income and negatively on the nominal

interest rate. This later (negative) influence explains because the cost of holding money is the interest that is forgone by holding it rather than interest-bearing assets. Transactions costs to move in and out of interest-bearing assets are an essential aspect of money demand. The existence of these costs makes it optimal to hold some money. The inventory-theoretic approach shows that an individual will hold an optimal stock of real balances departing from the following formula :

$$M = \sqrt{\frac{b * (Y/p)}{2 * i}}$$

where b is the cost of transacting. This formula indicates that the optimal income elasticity of money is 0.5 as that to the transactions costs and that to the interest rate -0.5 . When one accounts for an integral number of transactions it leads to a real income elasticity varying from 0.5 to unity and an elasticity to the interest rate going from -0.5 to zero.

36. The demand for real balances leads easily to an LM curve when equating real balances demand and supply :

$$M(s) = k*(Y/p) - h*i \quad k > 0, h < 0$$

Then solving for the interest rate (i), one gets :

$$i = [k*(Y/p) - M(s)]/h$$

which is the LM curve or the schedule of combinations of the interest rate and level of real income such that the money market is in equilibrium. When the money market is in equilibrium, so too is the bond market. The reason for which one looks at a LM curve departing from a demand for real balances is to permit to appreciate the capital market flexibility of a given country at money market equilibrium. Further details will be given through a specific section devoted to Ethiopian capital market flexibility (II-6).

37. The results of real balances estimation, are shown at table 15 (model A).

(i) They indicate just opposite signs for money demand elasticities with respect to real income (lagged two years) and the interest rate (about 0.3 in absolute values) at long run (1960-90).

(ii) There are no appreciable differences to be noticed for 1974-90 apart maybe that real income and interest rate elasticities are slightly below the long-run ones. The meaning of this change is difficult to explain for no correct estimations were obtained for 1960-74.

(iii) Also to be noticed the too high value (greater than one) for the lagged real balances elasticity.

MONEY DEMAND

TABLE 15. RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1960-90				1974-90			
	MODEL A		MODEL B		MODEL A		MODEL B	
MONEY(-1)	1.05	(0.0%)	1.08	(0.0%)	1.07	(0.0%)	1.10	(0.0%)
GDP(-2)	0.29	(4.6%)	0.36	(4.1%)	0.23	(12.9%)	0.51	(0.9%)
NOMINAL INTEREST RATE	-0.34	(1.8%)			-0.29	(4.7%)		
INFLATION(+1)			-0.43	(1.9%)			-0.61	(0.4%)
R2 (Adj)	1.00		1.00		1.00		1.00	
D-W	2.07		2.12		2.38		1.94 (CO)	
D-H	-0.47		-0.73		-1.01		-0.05	
Multicollinearity between:	gdp(-2) & Int.rate (<0)		gdp(-2) & inflation (<0)		gdp(-2) & Int. rate (<0)		gdp(-2) & inflation (<0)	

38. The preceding results led us to address a set of questions;

– **First** why to get the lagged explained variable in the equations. Economists would say to account for a lag. When the level of income or the interest rate changes, there is first only a small change in the money demand. Then, over the course of time, the change in the demand for money increases, slowly building up to its full long-run change. Reasons for this lag are not yet certain. There are two possibilities. The lags may arise because there are costs of adjusting money holdings or they may rise because money holders' expectations are slow to adjust. If a person believes that a given change in the interest rate is temporary, she may be unwilling to make a major change in her money holdings. As time passes and it becomes clearer that the change is not transitory, she is more willing to make a larger adjustment. From the preceding, it appears that economic rationality can explain why to include $M(-1)$ in the equation but not with an elasticity greater than one. Indeed, the adjustment process would not operate because the implicit differential equation would diverge. An elasticity greater than one can only be economically accepted though always denied mathematically when the lagged explained variable implicitly includes other explanatory variables positively linked to the demand for real balances. Such an assertion is very much relevant since there are reasons to believe that the transactions costs are so accounted for as the expectations related to inflation. So, as long as not all explanatory variables have been identified in the real balances demand equation, probability of getting a too high elasticity for the lagged explained variable remains.

– **Second**, why to get a two years lagged income variable? This could either be a pure multicollinearity result (between GDP and the interest rate) or that of very slow changes to the interest rate in response to the real income ones so as to maintain money equilibrium (by definition of the LM curve). Indeed, at long run (1960–90), it appears that the interest rate remains unchanged several years contrarily to the income variable and further that its changes reduce. The evolution of the interest rate on period 1960–74 differs from that scenario.

– **Third**, departing from the real balances equations one has also to investigate whether the interest rate is the proper variable to account for all sorts of cost to hold money. Indeed, expected inflation also increases the costs of holding money. This raises the question to know whether the expected rate of inflation has a separate influence (from the interest rate one) on the demand for money. In well-developed capital markets, in which interest rates are free to move to reflect expected inflation, the nominal interest rate is the relevant opportunity cost of holding money. That is because individuals could make investment at that interest rate. In markets where interest rates are controlled, and rates do not rise to reflect expected inflation, individuals begin to think of the alternative of buying goods rather than holding money when the expected rate of inflation rises. The expected inflation rate itself then becomes a separate influence on the demand for money. Franco Modigliani has offered the following useful rule of thumb to decide whether the nominal interest rate or the expected rate of inflation should be included as determining the demand for money : if the nominal interest rate exceeds the

expected rate of inflation, the nominal interest rate should be thought of as the cost of holding money. When the opposite is true the expected inflation rate has to be used.

39. The following led us to re-estimate the real balances demand equations by substituting expected inflation for the nominal interest rate. Indeed, in Ethiopia, interest rates were not free to move to reflect expected inflation on 1974–90. So, not all opportunity costs were accounted for through the nominal interest rate variable. The equations were specified as follows :

$$(B) \quad M_t = \delta_4 M_{t-1} + \delta_5 (Y/p)_{t-2} + \delta_6 P_{t+1}$$

where :

- P_{t+1} : the GDP deflator with a lead of one year. This variable is a proxy for the expected inflation rate. This was not the proper way to account for this one but it was the only way for which we got a relevant inflation impact. The results are shown at table 15 (model B). They indicate the following :

(i) At long run (1960–90), the real income (always with a 2 years lag) and inflation elasticities remain nearly the same in absolute values (about 0.4). Differences are not very high compared to equations with nominal interest rate (about 0.3). That is the opposite for 1974–90, the elasticities more than double (0.5 ; -0.6). The 1974–90 elasticities reflect very interestingly the known situation of 1974–90. Indeed, the interest rates were not free to move to reflect inflation (P grew of about 5.7% per year on 1973–80 and 2.0 from 1980–90 compared to a nominal interest rate going from 2.09 : 1973 to 2.8 : 1980 and 3.0 : 1990). So, people became more sensitive to inflation than to interest rate as opportunity costs indicator to hold money. Further, the income elasticity increased (from 0.4 to 0.5) but this could be due to multicollinearity between real income and price. Although economic rationality would tell us that in case of increased inflation and frozen wage (since 1975) people would become more sensitive to real income.

(ii) Again to be noticed the too high elasticities of the lagged explained variable (more than one). Most likely for the same reason as previously i.e transactions costs or other explanatory variables being included.

40. In all the preceding equations, the elasticities to real income seem a little low compared to available studies on developing countries. Indeed, very often values greater than one were found after an adjustment process took place (reference framework elasticity of 1.5). This has led us to modify the equations so as to reduce the lagged money demand elasticity and so to be able to compute the long run adjustment process of money to real income. To get this result the inflation index was introduced with the interest rate. Further, we tried to compute the

transactions costs. To do this we used the formula from the inventory approach. So b was computed as follows :

$$b = [M^2/(Y/p)]*2*i$$

Then, b is a function of money demand, the interest rate and the velocity of money :

$$b = (M/v)*2*i$$

where v is the velocity of money or the $(Y/p)/M$ ratio. Results are shown at table 16. They indicate :

(i) an increase of all elasticities the lagged money demand one being excepted. This one has now an elasticity lower than unity. This leads to an adjustment process through which :

a- real income (always with a 2 years lag) gets a long run elasticity of about 2.1 on 1974-90 and between 1.6 to 2.5 on 1960-90 ;

b- the interest rate gets a long run elasticity of about -0.6 on 1974-90 and slightly above (-)unity on 1960-90 ;

c- the "expected" inflation index gets a constant elasticity of about -1.0 ;

d- the transactions costs (lagged 2 years) get a constant elasticity of about 0.6 ;

e- no correct estimation were obtained for 1960-74.

(ii) The specificity of period 1974-90 compared to that of 1960-90 is the difference between the interest and inflation rates elasticities. Indeed, the inflation one is twice as high as the interest rate one while both get the same value on 1960-90. This indicates that people were aware of increased opportunity costs through expected inflation increase on 1974-90. So, they became less sensitive to the interest rate (being not adjusted for inflation) at the opposite with inflation. Globally, they became much more aware of the costs to hold money on 1974-90.

(iii) Compared to the second equation, for 1960-90 (no $P(+1)$ included), the 1974-90 period would also be featured by an increased real income elasticity. It could be explained by inflation increase and frozen nominal income i.e more sensitivity to real income in conjunction with a change of the money velocity. Indeed, this one decreases on this period. So, the elasticity to real income increases.

41. "Armed" with all the preceding results, we tried again to get a money demand equation for 1960-74 through a modified specification. In the new specified equation, all variables have been converted into index (1980 as base year). In this framework, one gets rather satisfactory results for 1960-74 i.e an income elasticity of about 1.9 and an interest rate one of about -0.9. To notice that the income variable is no more lagged. The comparison of real income elasticities for the three periods (2.5 ; 2.1 ; 1.9) indicates that the 1960-90 elasticity could very well be too high. It should normally be between the related values for the sub-periods. This is likely due to the multicollinearity occurring between real income and the price variable. In this respect the value given by the second equation for 1960-90 (below 2) would seem much more plausible. Then one would get the following values after rounding:

MONEY DEMAND

TABLE 16. RELEVANT ELASTICITIES

EXPLANATORY VARIABLES	1960-90			1974-90					
	SHORT RUN	LONG RUN		SHORT RUN	LONG RUN		SHORT RUN	LONG RUN	
MONEY(-1)	0.79	(0.0%)	-	0.75	(0.0%)	-	0.71	(1.1%)	-
GDP(-2)	0.52	(0.4%)	2.48	0.40	(0.5%)	1.60	0.62	(0.8%)	2.14
NOMINAL INTEREST RATE	-0.22	(10.9%)	-1.05	-0.28	(3.3%)	-1.12	-0.16	(22.8%)	-0.55
INFLATION(+1)	-0.21	(23.6%)	-1.00	-	-	-	-0.34	(18.0%)	-1.17
COST OF TRANSACTING(-2)	0.12	(2.8%)	0.57	0.13	(1.3%)	0.52	0.17	(11.8%)	0.59
R2 (Adj)	1.00			1.00			1.00		
D-W	2.05			2.00			2.37		
D-H	-0.41			-0.22			-		
Multicollinearity between:	cost of transacting(-2) & money(-1) (<0) gdp(-2) & inflation (<0)			cost of transacting(-2) & money(-1) (<0) gdp(-2) & interest rate (<0)			cost of transacting(-2) & money(-1) (<0) gdp(-2) & inflation (<0)		

EXPLANATORY VARIABLES	1960-90	1974-90	1960-74
REAL INCOME	< 2.0	> 2.0	< 2.0
INTEREST RATE	<-1.0	-0.6	>-1.0
TRANSACTION COSTS	0.5	0.6	-
INFLATION	-	<-1.0	-

42. To conclude:

(i) At long run 1960-90 (when mixing the results) real balances could get :

- 1- a real income elasticity of about 2.0 ;
- 2- an interest rate elasticity of about -1.0 ;
- 3- an expected inflation elasticity of about -1.0 (but to notice the low confidence level for this elasticity nevertheless) ;
- 4- a transaction costs elasticity less than one ;
- 5- both the real income and the transactions costs would be two years lagged variables, the exception being 1960-74 for the former.

(ii) Departing from these results, Ethiopia real balances get higher income elasticity than the IMF's study (2.0 compared to 1.5). The interest rate one is lower (-1.0 compared to -0.32).

II-6) CAPITAL MARKET OR FLEXIBILITY

43. As indicated previously the real balances demand equation has been used to get some information on what could be the Ethiopian capital market flexibility. At this aim, a shadow money supply that is with no private capital flows was computed and substituted for money demand in the real balances equation. The resulting equation solved for the interest rate gives a shadow interest one. This means an interest rate that would prevail in an economy where the effects of current private capital flows on the central bank's stock of foreign exchange reserves are removed. The shadow interest is then introduced in a domestic interest rate equation with an international interest rate variable and one for rational expectations on the exchange rate. This specification allows to test for the effective degree of capital mobility in the economy. If capital is perfectly mobile, nominal interest rate is determined by the interest rate parity condition that equates the domestic nominal interest rate to the sum of the nominal rate prevailing abroad and the expected change in the value of the domestic currency (uncovered interest parity). In a completely closed economy, nominal interest rate has no relationship to external rate and is determined purely in domestic markets. Edwards and Khan (1985) proposed to specify the domestic interest rate as follows :

$$i_t = \Phi (i_t^* + \frac{E_t e_{t+1} - e_t}{e_t}) + (1-\Phi)i_t$$

where :

- i : the nominal Ethiopian interest rate ;
- i^* : the international interest rate ;
- $\frac{E_t e_{t+1} - e_t}{e_t}$: rational expectations on the exchange rate (e_t) ;
- \hat{i} : the shadow interest rate.

Within such an equation, Φ is a capital mobility index ranging between zero and unity. When $\Phi=1$ it is implied that the domestic interest rate is determined by the uncovered interest parity condition, and thus corresponds to perfect capital mobility. The opposite is true with $\Phi=0$. Then, the domestic interest rate is the shadow one. As Φ increases from 0 to 1, the degree of capital mobility increases, since the interest rate approaches its uncovered parity value. In these intermediate cases the equilibrium interest rate is determined by a combination of domestic and external factor(11).

44. Our equations were specified as follows

$$i_t - \hat{i}_t = \Phi (i_t^* + \frac{E_t e_{t+1} - e_t}{e_t} - \hat{i}_t)$$

where :

- \hat{i}_t : the shadow interest rate computed from the LM curve derived from the real balances demand equations for 1960-90 and 1974-90 periods ;
- i_t^* : the US rate ;
- $\frac{E_t e_{t+1} - e_t}{e_t}$: Uncovered parity condition linking i_t

and i_t^* or the terminal and spot markets with respect to the exchange rate.

(11) Paragraph quoted from the IMF's paper on p 544.

The estimations show :

(i) a capital flexibility index ranging from 0.75 to 0.85 depending on whether the LM curve was obtained from model A (table 15) or equations from table 16. This suggests that capital flows were not perfectly mobile in Ethiopia at long run. Compared to the IMF's study (index of about 1), Ethiopian capital flows were less mobile. Compared to other studies, for instance that on the Franc zone (index ranging from 0.7 to 0.8)(12) they were on line with capital flexibility in very poor countries.

(ii) no appreciable difference between the three periods. Indeed, the equations from model A show a value of 0.75 both for 1960-90 and 1974-90 while the other ones give 0.85 for 1960-90, 0.89 for 1974-90 and 0.85 for 1960-74.

(iii) a lack of difference between the three periods which indicates that contrarily to what could be expected the marxist regime of 1974-90 did not modify fundamentally the past capital market behaviour in Ethiopia although it could have re-inforced its weakness.

(12) Estimation obtained by N. Troubat being a DIAL's trainee in 1991. References [5].

CONCLUSIONS:

45. Although being biased because of econometric, statistical and economical problems encountered pleading for further research the results one gets are interesting. They indicate that :

1- Poverty is an issue which has to be touched as such through the EPTP for income cannot grow for the present as high as demography.

2- It is relevant to carefully investigate the question of the Birr parity change for expected growth to come could very well be just a dream if peasants cannot get some appreciable and sustainable improvement of the living standard i.e their income.

3- Price stabilization matters much than positive real interest rate when the focus is on poverty, the normal state of 60 per cent of the Ethiopian population.

4- In Ethiopia, the IS curve is flat and the LM one steep. This is because investment is very sensitive to the interest rate (elasticity of about -1.5) and real balances to real income (elasticity of about 2.0). Then, in the eventuality of an austerity monetary policy, nominal interest rate would increase at given real income because a decrease of real money supply shifts the LM curve out to the left. The LM curve would thus cut the IS one at a lower real income level. Given the high elasticity of IS to the interest rate, the real income decrease would be very high. This indicates that the only way to soften this depressing effect would be to get capital inflows in response to the nominal interest rate increase. The preceding should lead the government to carefully investigate:

- (i) the available saving of the informal sector ;
- (ii) how to reach an agreement with this sector (which dominates the Chamber of Commerce) to create private banks leading to positive real interest rate and capital inflows.

5- A steep LM curve also implies some comparative effectiveness of monetary policy over fiscal policy even if a change to the later one is strongly advocated by the private sector.

6- Capital market flexibility is not abnormal in Ethiopia in the light of African studies. It is that of a very poor country, simply. This indicates again that the government should focus on poverty as such.

7- All the preceding pleads for the international donors community being aware that poverty to alleviate should be the main focus of action even if it leads to a regulated market economy, the normal state of the Western ones.

REFERENCES :

[1] N.U. HAQUE & K. LAHIRI & P.J. MONTIEL

"A macroeconometric model for developing countries"

IMF Staff paper, Vol 37, N°3 (Sept 1990).

[2] A. FELTENSTEIN

"Stabilization of the balance of payments in a small planned economy with an application to Ethiopia", Journal of Development Economics 18 (1985), pp 171-191.

[3] A. KIDANE & G. KOCKLHEÜNER

"A macroeconometric model for Ethiopia : specification, estimation, forecast and control"

E.A.E.R. Dec 1985.

[4] D.M. ETHERINGTON & A. YAINSHET

"The impact of income terms of trade for coffee on capital goods imports and investment in Ethiopia", E.A.E.R. 1988.

[5] N. TROUBAT

"Application d'un modèle macro économétrique à des pays de la zone franc", Rapport de stage. DIAL 1991.

[6] N. TROUBAT & M.P. VERLAETEN

"The determination of a capital stock serie for developing countries : some comments to be sure what one gets is a real cheashire and not its grid", July 92, 32 p.

D.I.A.L.'s PUBLICATIONS

November 1990

1. An Endogenous Growth Process, 13 p.

M-P. VERLAETEN

December 1990

2. An Endogenous Growth-Employment Process, 24 p.
Colloque intern : "Nouvelles Théories de la Croissance :
Développements récents et Applications" (April 1992, Marrakech)

M-P. VERLAETEN

January 1991

3. Appréciation des conditions théoriques présumées pour espérer réussir une dévaluation, 156 p.

M-P. VERLAETEN

February 1991

4. Les échanges frontaliers du Nigéria : une dynamique d'intégration régionale en cours, 64 p.

M-P. VERLAETEN

5. Economie non enregistrée par la statistique et secteur informel dans les PED, 40p.

F. ROUBAUD

March 1991

6. Un processus de croissance endogène, 13 p.
Colloque intern : "Restructuration économique et Développement régional et urbain du Maroc" (3/5 octobre 1991 - Rabat)

M-P. VERLAETEN

7. Progrès technique, Tiers Monde et Processus d'Ajustement Structurel : le cas des Biotechnologies, 13 p.

M-P. VERLAETEN

8. Cameroun : Evolution économique rétrospective et perspectives macroéconomiques à l'horizon de 1995, 98 p. Confidential

G.de MONCHY, F.ROUBAUD

9. Le modèle K2000

G. OLIVE

April 1991

10. Influences exercées par le Nigéria sur le Cameroun, 8 p.

M-P. VERLAETEN

May 1991

11. Programme d'Ajustement Structurel (P.A.S.)
Contenu, Appréciation, Instruments de mesure et d'analyse
(Enseignement au FORTBILDUNGSCENTRUM A MUNCHEN,
2-8 mai 1991), 60 p.

M-P. VERLAETEN

June 1991

12. The Ethiopian verses, 39 p.

M-P. VERLAETEN

13. Ethiopie - 1968/1988 : Note rétrospective sur l'évolution macro-économique des deux dernières décennies, 28 p.

S. REMY

14. La politique monétaire et la demande de monnaie :
une comparaison Cameroun-Nigeria, 40 p.

F. LENSEIGNE

July 1991

15. Les aspects théoriques du Commerce international et de la Protection, p. 81

M-P. VERLAETEN

September 1991

16. Ne pleure pas la bouche vide :
Paper for the Paris Conference on Environnement and Growth

M-P. VERLAETEN
A. SOGODOGO

October 1991

17. La protection dans les Echanges Commerciaux : Arguments, Formes, Mesures et Applications aux pays de l'Afrique Subsaharienne, 81 p.

I. DEM
A. SOGODOGO
M-P. VERLAETEN

November 1991

18. Optimum économique et Equilibre écologique :
Quelques réflexions, 43 p.
Paper for the 33rd Conference of the Applied Econometrics Association : Econometrics of Environnement.
Geneva, Jan 8/10, 1992

M-P. VERLAETEN

December 1991

19. Ethiopia in 1991 : a report from Mission, 46 p. Confidential

M-P. VERLAETEN

January 1992

20. Les perspectives d'une intégration régionale en Afrique Australe : Mécanismes institutionnels et économiques. 22 p.

M. RAZAFINDRAKOTO

March 1992

21. Le rôle des prix dans l'agriculture sub-saharienne.
Une question centrale de l'ajustement structurel. 12 p. + annexes 11 p.

D. COGNEAU

April 1992

22. Eclairage de la politique de LOME avant LOME IV par l'analyse structurelle des exportations ACP destinées à la C.E.E. sur longue période : 1970-1986, 35 p.

M-P. VERLAETEN

23. Perspectives macroéconomiques à moyen terme pour l'économie camerounaise. Communication au séminaire OCISCA (27-28-29 avril 1992) DSCHANG. 12 p.

G. de MONCHY

24. Le modèle de développement camerounais 1965-1990 : de la croissance harmonieuse à la crise structurelle. 15 p.

F. ROUBAUD

May 1992

25. Communication séminaire-atelier sur la planification économique
Yaoundé - 6/9 mai 1992, 11 p. G. de MONCHY

June 1992

26. How to pass from a war to a peace economy : the Ethiopian case
(Research Programme contracted by the EC to DIAL) :
- Ethiopia's Economic Policy during the transitional period, 136 p. (Confidential)
- Summary and conclusions, 15 p. M-P. VERLAETEN
27. Les perspectives d'une intégration régionale en Afrique Australe :
Analyse comparative. Etude des structures des PIB et des échanges.
70 p. M. RAZAFINDRAKOTO
28. L'ajustement structurel au Ghana. Eléments de bilan macro-
économique. 15 p. + annexes 6 p. D. COGNEAU

July 1992

29. The determination of a capital stock serie for developing countries:
some comments to be sure what one gets is a real cheashire cat and
not its grid, 32 p. (Prohibited circulation for paper being submitted
to World Development) N. TROUBAT (OECD)
M-P. VERLAETEN (DIA)
30. Ethiopia : an economy in transition - Some relevant market
parameters, 57 p. N. TROUBAT (OECD)
M-P. VERLAETEN (DIA)
31. Comparaisons de compétitivité en Afrique et en Asie. Analyse
macroéconomique de filières agricoles. 65 p. D. COGNEAU