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Explaining Investment in the WAEMU[1]

Prepared by Athanasios Vamvakidis

Authorized for distribution by Peter Wickham

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Abstract

This paper estimates an empirical model for investment in the West African Economic and Monetary Union (WAEMU), a region with relatively low investment shares, using annual data for the period 1970-95. Cross-country and time-series evidence shows that openness to international trade, competition in the domestic market, freedom of international capital transactions, and low dependency ratios are positively correlated with investment in the WAEMU region.

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Author's E-Mail Address: AVamvakidis@IMF.org

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SUMMARY

This paper provides an empirical analysis of investment in the West African Economic and Monetary Union (WAEMU). The WAEMU is a region with relatively low investment share, but shares vary significantly across countries within the region. Cross country and time series comparisons for the period 1970-95 show why some countries within this region invest more than others.

The paper finds that the explanations for the differences in domestic investment within the WAEMU region during 1970-95 are mainly related to economic freedom: 1) openness to free trade is one of the main explanations; high trade shares are positively correlated with high investment shares; 2) freedom to compete in the domestic market is also an important explanation; 3) freedom of capital transactions with foreigners has a positive impact on investment; 4) low dependency ratios (number of dependents per active person) are also positively correlated with investment; and finally 5) a measure of the real exchange rate is found to have a negative, but not always statistically significant, correlation with investment.

I. INTRODUCTION

Both theoretical and empirical studies have documented the importance of investment for long run growth. In fact, capital formation is a necessary condition for growth in almost all growth models. The investment share is a variable that is always present on the right-hand side of growth regressions, coming out with a positive and statistically significant coefficient[2]. This result has motivated a large empirical literature on the explanation of cross country differences in investment shares. Knowing why some countries or regions invest more than others can lead to useful policy implications.

This inquiry is of especially great importance for countries or regions that have experienced relatively low investment shares in recent years. There is the risk that policy makers, under pressure to react to the problem, may follow the wrong policies. For example, governments often try to increase investment shares using trade protection or investment subsidies to specific sectors, even though excessive government intervention is often a reason for low investment shares.

The West African Economic and Monetary Union (WAEMU)[3] is one of the regions that faces the challenge of relatively low investment shares. As the evidence shows, these economies have had lower investment shares than other African economies, developing economies, and advanced economies during the period 1970-1996.

This paper estimates an empirical model for investment in the WAEMU. Cross country and time series comparisons for the period 1970-1995 show why some countries within this region invest more than others, and also how the share of investment moves over time. The results can be useful in designing future economic policies that target higher investment shares in the WAEMU.

The paper finds that the variables that explain domestic investment differences in the WAEMU during the period 1970-1995 are related to openness and economic freedom. We find that: i) openness to free trade is one of the main explanations: high trade shares are positively correlated with high investment shares; ii) freedom to compete in the domestic market is also an important variable: an index that measures the freedom of business to compete in the domestic market and a broad index of economic freedom have both positive and statistically significant coefficients; iii) freedom of capital transactions with foreigners

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[2] See Barro and Sala-I-Martin (1995) and Poirson (1998) for extensive references on this literature. For the impact of investment on growth in Africa, see Ghura and Hadjimichael (1996).

[3] The WAEMU consists of the following countries: Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo. We do not include Guinea Bissau, because it was not a member of the WAEMU in the time period we consider.

has a positive correlation with investment: an index decreasing on the strength of capital controls in each country in the WAEMU region has a positive and statistically significant, coefficient; iv) low dependency ratios (number of dependents per active person) are also positively correlated with investment; and finally v) a measure of the real effective exchange rate, based on relative GDP deflators, is found to have a negative, but not always statistically significant coefficient: an appreciation of the real effective exchange rate is correlated with a lower investment share.

Therefore, the empirical findings show that cross country and time series differences of freedom to compete, internationally and domestically, have a significant explanatory power for domestic investments in the WAEMU. This result confirms what previous empirical literature has found for the importance of economic freedom, broadly defined, on growth and investment.[4]

Previous literature has estimated similar investment models for larger regions, or for the whole world. Even though variation among the WAEMU economies is much lower than in the larger samples of these previous studies, we confirm most of their policy implications.

The paper proceeds as follows: section 2 discusses briefly the methodology of the paper and the data sources; section 3 discusses the evolution of average investment in the WAEMU economies and compares them with other regions; section 4 presents results from the estimation of a random effects investment model; section 5 presents results from the estimation of a fixed effects investment model; and finally section 6 concludes the paper summarizing the results and their policy implications.

II. METHODOLOGY AND DATA SOURCES

Previous literature has estimated empirical models using the investment share as the dependent variable and economic and political factors that determine investment as independent variables. These regressions have typically been estimated for a period of twenty to thirty years, using cross country data. Some studies that are representative of this large literature are Levine and Renelt (1992), Mauro (1995), Barro and Sala-I-Martin (1995), Poirson (1998) and Baldwin and Seghezza (1996a).

The model we estimate has the share of investment over GDP as the dependent variable (source: World Economic Outlook data base) and most of the independent variables that the existing literature has found to determine investment. We are not able to consider private and public investment separately, because there are no data for these variables before 1990.

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[4] See for example, Dollar (1992), Edwards (1992), Mauro (1995), Levine and Renelt (1992), Barro and Sala-I-Martin (1995), Poirson (1998) and Sachs and Warner (1995).

The candidates for independent variables of the empirical model are the following:

i) Trade share: (exports + imports) / GDP (source: The World Bank (1997)).

Previous literature has found a strong positive link between openness and growth (see for example Dollar (1992), Edwards (1992), Levine and Renelt (1992), Barro and Sala-I-Martin (1995), Sachs and Warner (1995), Vamvakidis (1998)). Trade shares have often been used as a measure of openness, controlling, however, for country size, given that small countries tend to have higher trade shares. Some theoretical studies have argued that investment is the main channel through which trade influences growth. For example, Baldwin and Seghezza (1996a and 1996b) have presented models where trade fosters investment because of the following three reasons: i) the traded sector is more capital intensive than the non-traded sector, ii) the production of investment goods uses imported intermediates, and iii) competition in the international market for machinery and equipment lowers the price of capital. Lee (1993, 1994) presented neoclassical growth models where domestic production uses imports of capital equipment as primary inputs. Finally, empirical evidence by Levine and Renelt (1992), Baldwin and Seghezza (1996a) and Wacziarg (1996) support the argument that trade fosters growth through its positive impact on investment.

ii) Growth: GNP per capita growth (source: The World Bank (1997)).

Investment shares are always present as explanatory variables in growth regressions. There are strong empirical results showing that countries with high investment shares grow faster (see for example, Levine and Renelt (1992), Mankiw, Romer and Weil (1992) and DeLong and Summers (1991)). It has been argued however that the relationship may work the other way: fast growth leads to higher investment shares (see for example, Blomström, Lipsey and Zejan (1993) and Barro and Sala-I-Martin (1995)).

iii) Dependency ratio: number of dependents per active person (source: The World Bank (1997)).

This variable has been mainly included in growth regressions. However, its main impact on growth is expected to be through investment. Economies with a high dependency ratio consume more and save less than other economies (see for example Bayoumi, Samiei and Masson (1995)). There is a very extensive empirical literature that started with Feldstein and Horioka (1980), and shows that savings are positively correlated with investment. Therefore, it is expected that countries with a high dependency ratio will have a low share of investment over GDP. This is consistent with the notion that with a larger dependent population relative to the number of workers, the productive capital stock can be lower.

iv) Freedom to compete domestically: an index from 1 to 10, the higher the index, the freer is business to compete (source: Gwartney, Lawson and Block (1996)).

Competition domestically means that only the most efficient firms can survive. This implies that competition leads not only to more investment, but also to more efficient investment. To measures this effect we use an index of the freedom of business and cooperatives to compete in the marketplace. This index is calculated based on a sub-category of the "Freedom in the World: The Annual Survey of Political Rights and Civil Liberties", a survey by the Freedom House, used to rate the political and civil liberties of countries.

v) Freedom of capital transactions with foreigners: an index from 1 to 10, the higher the index, the freer are capital transactions with foreigners (source: Gwartney, Lawson and Block (1996)).

This index is calculated using data from the "Exchange Arrangements and Exchange Restrictions" of the International Monetary Fund (various issues). It measures both the freedom of foreigners to invest within the country and the freedom of citizens to invest abroad (see source for more information).

As we argued earlier, low domestic saving is a constraint for investment if capital markets are not well integrated internationally. Access to international capital markets may ease such a constraint and lead to higher investment. Almost all economies have some form of capital controls, but their extent differs considerably across countries, especially between developing and developed ones. Complete isolation from international capital markets implies that investment is necessarily equal to saving. In contrast, the freer are the residents of a country to engage in capital transactions with foreigners, the less investments are constrained by domestic savings.

In addition, a high value of the index of freedom of capital transactions with foreigners may be evidence of relatively greater efficiency of the domestic capital markets, leading to more investment, foreign and domestic. If, for example, foreign direct investment (FDI) is allowed, more competition should increase market efficiency (the movement of financial resources from savers to investors will be more efficient). FDI may also lead to technology and knowledge spillovers that may increase domestic investment.

vi) Real exchange rate (RER): the ratio of domestic GDP deflator over foreign GDP deflator in domestic currency (estimated using data from the WEO data base).

Since the RER measures competitiveness, it is expected to have an impact on investment. Even when the nominal exchange rate is fixed, in terms of the currency of a foreign country, domestic prices may change relative to foreign prices, causing the RER to change. A misalignment of the RER influences investment decisions. For example, a real exchange rate appreciation causes a deterioration of competitiveness in both the export and the import competing sectors, and this may cause a decline in investment.

The definition of the RER we use is the ratio of the average GDP deflator for WAEMU, over the foreign GDP deflator. We define the foreign deflator as the weighted average of the

deflators in the main trading partners and competitors of the home country, with the trade shares used as the weights (or weights also reflecting competition in world markets). We use weights from the INS database of the IMF.

vii) GDP: in some specifications we include GDP to control for differences in size. This should allow us to estimate the impact of trade on investment more accurately, since small economies tend to have high trade shares.

viii) index of economic freedom: an index from 1 to 10, with the higher the index, the freer is economic activity (source: Gwartney, Lawson and Block (1996)).

This index is broader than the other indices of economic freedom we use. It is an average of 17 indices of freedom and efficiency in different economic activities, including effectiveness of regulation, discriminatory taxation, restraints on international exchange and macroeconomic policies (see Appendix for the list of the 17 indices and the source for more details on the calculation of the broad index). Another advantage of this index is that it varies more across countries and over time than the above indices.

Table 1 presents averages for some of the above variables, over the period 1970-95. The countries in the WAEMU have very high dependency ratios. Trade shares are also high, as it is the case with small economies even when they have high trade barriers. The growth performance of the WAEMU economies has been disappointing over this period. Very slow, or even negative growth increased their gap from the developed world and other developing countries. Finally, their index of economic freedom, equal to 4.06 on average, is relatively low. For example, this index was 6.53 in the USA, 7.6 in Singapore and 9.35 in Hong Kong during the same period.

Our sample consists of annual observations for the seven WAEMU economies, for the period 1970-1995. However, the three indices of freedom, economic, capital transaction with foreigners and competition of business, do not vary annually. The first two are measured every five years, while the last is measured as an average during the whole period.

We estimate both a fixed effects and a random effects models. The difference between the two models is that in the case of fixed effects we allow the constant to differ across countries. Therefore, the random effects model provides estimates which reflect both cross country and time variation, while the fixed effects model provides estimates which only reflect time variation. The Hausman specification test is used to determine which of the two models is the most reliable. In the fixed effects regression we do not include the indices of freedom since they do not vary annually.

Table 1. Average Values for the Variables in the Empirical Model

Country	Age dependency ratio	Growth	Trade share	Index of economic freedom
Benin	94.23	0.22	61.12	4.00
Burkina Faso	90.38	1.27	37.98	.
Côte d'Ivoire	96.15	0.55	69.67	3.99
Mali	96.15	0.73	45.44	5.00
Niger	98.08	-2.54	44.84	3.98
Senegal	90.38	0.03	69.26	3.93
Togo	90.38	-0.70	91.95	3.45

Note: data are averages over the period 1970-1995.
Sources: World Economic Outlook and World Development Indicators databases, and Gwartney, Lawson and Block (1996).

Previous empirical literature has often used five, ten, or even twenty-year averages in cross-country investment regressions, in order to avoid the impact of business cycles. We use annual data because our estimations include only seven economies. Samples that include more countries have the advantage of larger variation, but the disadvantage that the derived policy implications may not be applicable to all countries. Even though our sample includes only the economies of a single region, our results lead to conclusions very similar to previous studies that included more countries.

III. A HISTORICAL PERSPECTIVE ON INVESTMENT SHARES OF THE WAEMU ECONOMIES

Investment shares in the WAEMU economies were very low on average compared to other countries during the period 1970-1996. As Table 2 shows, the GDP weighted average investment share of the WAEMU economies was lower than in the rest of Africa, the rest of developing countries, all advanced countries, and all economies in the world[5]. This is true for the whole period of our data set 1970-1996, for the period 1990-96 and for 1996.

Niger, Côte d'Ivoire, and to an extent Senegal are driving the low average investment share in the WAEMU. Excluding these economies, however, the WAEMU countries still invest less than other developing countries, although the gap is narrower, especially compared to other African countries.

Investment as a share of GDP in the WAEMU economies increased during the 1970s, declined during the 1980s, and rose after 1993. Figure 1 shows this evolution of the GDP weighted average investment share in the region.

Public investment represents a very high percentage of GDP in the WAEMU economies. Tables 3 and 4 present data on private and public investment as shares of GDP for the seven economies in the region and for the region on average. These data are only for the 1990s, because data for earlier years were not available. They also include projections for 1997. The share of private investment appears to follow an increasing trend during the 1990s. It started at 7.5 percent in 1990-93 and reached 10.8 in 1996. In contrast, the share of public investment experienced a smaller increase, from 5.2 percent in 1990-93, to 5.8 percent in 1996.

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[5] The World Development Indicators (1997) classification was used to define a country as advanced or developing.

Table 2. Investment Shares in WAEMU and Other Countries

Investment/GDP	Average 1970-96	Average 1990-95	1995
Benin	23.65	15.00	19.26
Burkina Faso	16.95	21.58	24.00
Côte d'Ivoire	13.20	10.22	12.85
Mali	22.38	23.94	26.00
Niger	12.45	7.99	7.21
Senegal	13.33	14.12	15.64
Togo	20.57	15.56	13.54
WAEMU	15.03	13.39	15.76
Rest of Africa	25.18	20.73	20.90
Developing countries	21.84	22.34	22.92
Advanced economies	22.31	20.91	20.41
World	22.25	21.06	20.68

Figure 1

Table 3. Private Investment as a Percentage of GDP

Country	1990-93 Average	1992	1993	1994	1995	1996 Est.	1997. Proj.
Benin	6.6	6.7	10.1	8.8	9.1	10.6	11.1
Burkina Faso	13.4	13.3	10.7	14.1	14.6	15.0	15.7
Côte d'Ivoire	4.7	1.6	4.6	8.4	10.8	9.4	11.7
Mali	11.9	12.4	12.6	13.0	13.5	14.4	14.0
Niger	2.7	1.9	1.9	3.8	2.1	5.0	5.0
Senegal	8.9	8.8	9.1	9.0	10.8	11.7	11.5
Togo	11.4	11.1	2.8	10.9	10.6	12.1	11.9
WAEMU[1]	*7.5*	*6.3*	*7.1*	*9.3*	*10.6*	*10.8*	*11.7*

Sources: African Department data base; and Fund staff estimates and projections as of end-March 1997.

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[1] Weighted averages using estimated and projected GDP data.

Table 4. Public Investment as a Percentage of GDP

Country	1990-93 Average	1992	1993	1994	1995	1996 Est.	1997. Proj.
Benin	7.1	6.7	4.4	6.9	7.6	6.3	7.7
Burkina Faso	6.9	8.9	8.0	7.0	9.4	10.9	10.6
Côte d'Ivoire	3.6	3.8	3.7	4.1	4.2	4.3	4.3
Mali	10.3	9.5	9.3	13	12.5	12.1	11.5
Niger	4.8	3.9	4.2	6.6	5.4	4.0	8.2
Senegal	4.5	5.1	4.1	4.6	4.8	4.8	5
Togo	4.5	3.5	2.4	2.4	3.5	1.7	3.8
WAEMU[1]	*5.2*	*5.4*	*4.8*	*5.7*	*6.0*	*5.8*	*6.3*

Sources: African Department data base; and Fund staff estimates and projections as of end-March 1997.

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[1] Weighted averages using estimated and projected GDP data.

IV. EXPLAINING DOMESTIC INVESTMENT IN THE WAEMU: A RANDOM EFFECTS MODEL

We next turn to the estimation of the investment model. First we estimate a random effects model and then a fixed effects model. As mentioned above, the fixed effects model includes separate dummy variables for each country. The random effects model, in contrast, assumes that country differences show up as a random error term. The Hausman specification test for our sample showed that the coefficients of the two models do not differ significantly in most cases, but this result depends on the variables the regression includes. Both models, however, lead to similar conclusions.

Table 5 presents results from a random effects regression. The main results are the following:

i) International trade has a positive impact on investment. The coefficient of the trade share is always positive, and statistically significant at least at the 10 percent level. The estimates imply that an increase of the trade share by 1 percent is correlated with an increase in the investment share by between 0.065 and 0.159 percent. In order to determine whether international trade influences investment rather than the reverse, a Granger causality test was run, which confirm that causation runs from the trade share to investment. The coefficient of the trade share remains robust (positive and statistically significant) when we control for differences in size (GDP) in the last regression.

ii) Growth has a positive coefficient in all regressions, but is significant only in regression (2), at the 10 percent level. The estimates imply that an increase of growth by 1 percent is correlated with an increase in the investment share by between 0.069 and 0.153 percent. As mentioned above, this result may be upward biased because investment is one of the determinant of growth.

iii) The coefficient of the dependency ratio is negative and statistically significant in all regressions. The estimates are quite large because dependency ratios do not vary very much across the countries in our sample and through time. The estimates imply that an increase of the dependency ratio by one standard deviation (0.075 percent) is correlated with a decrease of the investment share by between 2.92 and 5.59 percent.

iv) The index of freedom of business to compete domestically has a positive and statistically significant coefficient, at least at the 10 percent level. Therefore, not only openness to foreign competition, but also competition in the domestic market matters for investment in the WAEMU region. The estimate implies that an increase in this index by one unit is correlated with an increase in the investment shares by between 3.56 and 5.49 percent, which is a quite large effect in economic terms.

Table 5. Random Effects Regressions: Explaining Investment in the WAEMU

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
trade share	0.127 (3.033)	0.124 (2.935)	0.159 (4.012)	0.070 (1.847)	0.085 (2.398)	0.104 (3.152)	0.065 (2.025)	0.106 (3.205)	0.069 (2.121)
growth		0.132 (1.931)	0.069 (1.097)	0.111 (1.488)	0.106 (1.330)	0.101 (1.358)	0.153 (2.139)		
dependency ratio			-74.588 (-5.890)	-55.500 (-4.058)	-48.150 (-3.485)	-46.854 (-3.640)	-38.896 (-2.951)	-49.621 (-3.892)	-43.890 (-3.343)
frcm				5.058 (1.907)	3.558 (2.055)	5.494 (3.306)		5.270 (3.178)	
fct					4.322 (4.707)	3.982 (4.640)		4.129 (4.835)	
real exchange rate						-0.172 (-4.823)	-0.154 (-4.613)	-0.173 (-4.829)	-0.158 (-4.662)
economic freedom							2.642 (2.315)		2.894 (2.519)
GDP							-5.416 (-7.012)		-5.249 (-6.748)
observations	177	177	177	152	152	152	152	152	152
R-squared	0.02	0.03	0.08	0.14	0.27	0.37	0.41	0.36	0.40

Note: Dependent variable: Gross fixed domestic investment as a share of GDP.
The sample consists of annual observations, for the eight WAEMU economies and for the period 1970-1995. The definitions of the variables are the following:
trade share: (exports + imports)/ GDP, growth: GNP per capita growth, dependency ratio: number of dependents per active person, fct: index for freedom of capital transactions with foreigners (the higher the index, the freer capital transactions), frcm: index for freedom of business to compete (the higher the index, the more business are free to compete), economic freedom: index of economic freedom, real exchange rate: GDP deflator of WAEMU over a weighted average of GDP deflators of major trading partners and competitors (an increase of this ratio indicates an appreciation of the real exchange rate), GDP: real gross domestic product.

v) Freedom of capital transactions with foreigners has a positive and statistically significant coefficient. Capital transactions with foreigners make possible the realization of investment projects that domestic financial resources could not finance. In addition, as we mentioned earlier, a high value of this index may proxy for the positive impact of FDI, through technology spillovers. The estimates implies that an increase of the "freedom of capital transactions with foreigners" index by one unit is correlated with an increase in the investment share by between 3.98 and 4.32 percent.

vi) The real exchange rate has a negative and statistically significant coefficient. This implies that an appreciation of the real exchange rate has a negative impact on investment. As mentioned earlier, when the real exchange rate appreciates, both the exportable and the import competing sectors experience a deterioration of their competitiveness, and this may cause a decline in investment. The estimates implies that an increase of the real exchange rate by one standard deviation (17.91) is correlated with a decrease in the investment share by between 2.76 and 3.08 percent.

vii) Regressions (7) and (9) include the index of economic freedom (the two other indexes (frcm and fct) are not included in these regressions since they are already included in the index of economic freedom). The coefficient of this index is positive and statistically significant, confirming that economic freedom in a broad sense is one of the main explanations of investment differences in the region. The estimates implies that an increase of the index of economic freedom by one unit is correlated with an increase in the investment share by between 2.64 and 2.89 percent.

viii) Regressions (7) and (9) also include GDP, to control for size differences. The coefficient of GDP turns out to be negative and statistically significant, which is a puzzling result. There is no obvious reason why large economies should have lower investment shares. This result is not robust, however, when we control for fixed effects, as the following section shows.

ix) The last two regressions do not include the GDP per capita growth. The reason is that most other independent variables in the investment regression are growth determinants, and therefore the presence of simultaneity may bias the estimates. However, comparison of regressions (8) and (9) with regressions (6) and (7), respectively, shows that the estimates do not differ significantly, which implies that the estimates are not biased due to the presence of simultaneity.

V. EXPLAINING DOMESTIC INVESTMENT IN THE WAEMU: A FIXED EFFECTS MODEL

Table 6 presents estimates for a fixed effects model. These regressions include only variables which vary annually. Therefore, the empirical model does not include the index of freedom of business to compete domestically, the index of freedom of capital transactions with foreigners and the index of economic freedom, since they are measured only every five years[6]. The main results are the following:

i) International trade has a positive and robust impact on investment. The estimated coefficient of the trade share is statistically significant in all empirical specifications, even when we control for differences in GDP. The estimates imply that an increase of the trade share by 1 percent is correlated with an increase of the investment share by between 0.136 and 0.174 percent.

ii) Growth has a positive impact on investment, but significant only in regression (2) (at the 10% level) despite a possible upward bias in this coefficient due to endogeneity (since higher investment is expected to influence growth). One reason for the lack of significance could be that the impact of growth on investment takes effect in more than a year. In any case, the estimates imply that an increase of the growth rate by 1 percent is correlated with an increase in the investment share by between 0.057 and 0.129 percent.

iii) The dependency ratio has a negative and significant impact on investment. The more dependent people each active person has, the lower the investment share of the economy. A high dependency ratio results in low savings and, if there is no access to international borrowing, in low investment. The estimates are very large because dependency ratios do not vary very much in annual data. The estimate implies that an increase of the dependency ratio by one standard deviation (0.04 percent) is correlated with a decrease in the investment share by 3.11 percent.

iv) The real exchange rate has a negative coefficient, but, in contrast to the random effects model, it is not statistically significant. The reason may be the presence of measurement errors. Better measures of the real exchange rate may be able to show the full impact of competitiveness on investment.

v) GDP has a positive and statistically insignificant coefficient, as the last regression shows. As it was mentioned above, there are no strong reasons to expect a significant impact.

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[6] The first two indexes do not vary almost at all through time, and they are dropped automatically from a fixed effects regression. The index of economic freedom does not turn out to be statistically significant when we include it in a fixed effect regression.

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Table 6. Fixed Effects Regressions:Explaining Investment in the WAEMU

	(1)	(2)	(3)	(4)	(5)	(6)
trade share	0.142 (3.168)	0.136 (3.032)	0.174 (4.228)	0.165 (3.952)	0.166 (3.962)	0.170 (4.080)
growth		0.129 (1.880)	0.065 (1.020)	0.065 (1.026)	0.057 (0.895)	
dependency ratio			-77.671 (-6.035)	-73.389 (-5.502)	-79.978 (-5.167)	-82.914 (-5.484)
real exchange rate				-0.0389 (-1.201)	-0.043 (-1.320)	-0.044 (-1.338)
GDP					2.296 (0.841)	2.644 (0.979)
Benin					7.664	7.879
Burkina Faso					-0.014	0.153
Côte d'Ivoire					-7.501	-7.890
Mali					10.597	10.880
Niger					1.271	1.321
Senegal					-9.155	-9.451
Togo					-2.569	-2.581
observations	177	177	177	177	177	177
R-squared	0.06	0.07	0.24	0.25	0.26	0.25

Note: Dependent variable: Gross fixed domestic investment as a share of GDP.
The sample consists of annual observations, for the eight WAEMU economies and for the period 1970-1995.
The definitions of the variables are the following:
trade share: (exports + imports)/GDP, growth: GNP per capita growth, dependency ratio: number of dependents per active person, real exchange rate: GDP deflator of WAEMU over a weighted average of GDP deflators of major trading partners and competitors (an increase of this ratio indicates an appreciation of the real exchange rate), GDP: real gross domestic product.

vi) The last two columns of Table 6 show the country dummies of the regressions. The results show that keeping everything else constant Côte d'Ivoire, Senegal and to a smaller extent Togo have relatively large negative coefficients, while Benin and Mali have relatively large positive coefficients. The coefficients for Burkina Faso and Niger are relatively small.
vii) Finally, excluding the GDP per capita growth in the last regression, to address simultaneity problems, does not seem to change the estimates significantly, as was also the case with the random effects model.

VI. CONCLUSIONS

This paper has used standard econometric techniques to estimate an investment model for the WAEMU economies. Our results agree with those of previous studies using larger data sets. The estimates show that economic freedom explains a considerable part of cross country and time series differences in investment shares of the WAEMU economies. Openness to international trade, freedom of capital transactions with foreigners and competition in the domestic market all have positive and statistically significant coefficients. Therefore, more competition internationally and domestically should increase investment in the WAEMU region. Demographic changes seem to also be important for investment in the WAEMU economies, as previous literature has also found.

For future research on investment in the WAEMU region, it would be interesting to separate private from public sector investment. Unfortunately, the available data so far do not allow such a test since on private investment in these economies are available only for recent years. However, based on previous studies, we would expect that the main conclusions of our paper will be even stronger if private investment is the dependent variable.

Components of the Index of Economic Freedom

1. Money and Inflation: protection of money as a store of value and medium of exchange
     A. Average annual growth rate of the money supply during the last five years minus
          the potential growth rate of real GDP
     B. Standard deviation of the annual inflation rate during the last five years
     C. Freedom of citizens to own a foreign currency bank account domestically
     D. Freedom of citizens to maintain a bank account abroad

2. Government operations and regulations: freedom to decide what is produced and
consumed
     A. Government general consumption expenditures as a percent of GDP
     B. The role and presence of government-operated enterprises
     C. Price controls: the extent that businesses are free to set their own prices
     D. Freedom of private business and cooperatives to compete in markets
     E. Equality of citizens under the law and access of citizens to a nondiscriminatory
          judiciary
     F. Freedom from government regulations and policies that cause negative real interest
          rates

3. Takings and discriminatory taxation: freedom to keep what you earn
     A. Transfers and subsidies as a percent of GDP
     B. Top marginal tax rate and income threshold at which it applies
     C. The use of conscripts to obtain military personnel

4. Restraints on international exchange: freedom of exchange with foreigners
     A. Taxes on international trade as a percent of exports plus imports
     B. Difference between the official exchange rate and the black market rate
     C. Actual size of trade sector compared to expected size
     D. Restrictions on freedom of citizens to engage in capital transactions with
          foreigners

Source: Gwartney, Lawson and Block, 1996.

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