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Growth and structural change in the Mozambican provinces: what do the INE data say?

Paulo Luciano Dias and Piero Esposito*

ABSTRACT

The present paper focuses on the regional dimension of economic growth and structural change in Mozambique. Our purpose is to complement the country level assessments of economic development and structural change by considering the province specific determinants of structural change and the different relation between the latter and the growth record of each province. We use the province level data on the structure of the economy and on the GDP provided by the Istituto Nazionale de Estadistica. These data are available for the period 2001-2006, hence they cover a period of rapid growth in which the biggest investment project, i.e. the Mozal, was already implemented and the country was recovering from the flood in 2000, which caused a severe reduction in economic activity, especially for agriculture and traditional food industry. This makes the analysis less dependent on specific shock, whether they are new megaprojects or climatic catastrophes.

The structure of the paper is as follow: in charter 1 we provide descriptive evidence on the regional evolution of the country in terms of structure of the economy and growth, both in absolute and per capita terms. In chapter 2 we test first whether a convergence among provincial GDPs is taking place and, second, the significance of structural change within each province. In chapter 3 we estimate a quadratic relation between growth and structural change and reconsider the regional evolution in light of this relation. Chapter 4 concludes.

INTRODUCTION

Since the end of the civil war in 1992 the Mozambican economy started to experience a phase of strong and continuous growth associated with the consolidation of a democratic political system and reductions in the levels of both poverty and inequality [Clément and Pairis, 2008]. GDP growth in Mozambique has been considered to be of primary importance in reducing poverty and inequality overall the country. Further, the Human Development Index experienced remarkable increases passing from 0,380 in 2000 to 0,458 in 2006 indicating that together with rise in per capita income also life expectancy and the average educational level of adults increased.

Economic growth in the country has been associated with a certain extent of structural change, away from traditional sectors to industrial and service activities. The policy of megaprojects - with the particularly encouraging conditions for the entrance of foreign investors - favoured the development of resource related

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activities like aluminium, natural gas and electricity. These activities, although important, are capital intensive so that the spillovers to the population are actually low compared to their contribution to overall growth. Among service activities there has been a development of capital intensive branches like transport, communication and business activities, but also of more labour intensive activities like construction and tourism.

1. GROWTH AND STRUCTURAL CHANGE IN MOZAMBIQUE: DESCRIPTIVE EVIDENCE

In this chapter we shortly describe the main features of the Mozambican provinces in terms of growth and structural change. The country is divided into 10 provinces which become 11 if we divide the biggest province Maputo into the capital city area (Maputo City) and rest of the province (Maputo Province). The northern provinces are Niassa, Cabo Delgado and Nampula; in the center there are Zambezia, Tete, Manica and Sofala; finally, southern provinces are - together with Maputo City and Province - Inhambane and Gaza. The southern area is the richer part of the country, thanks to its closeness to developed South Africa and to the presence of the capital city. In Maputo GDP per capita is more than twice the national average (column 4 in Table 1) and alone the area (the city plus the province) produces more than one third of the national income, accounting for 20% of the population. Sofala is also relatively better off, with the highest per capita income after Maputo (392\$ in 2006) and a high density of population; it accounts for 11% of total GDP¹.

The Northern provinces and Zambezia are the less developed ones. In 2001 Niassa and Cabo Delgado had the lowest GDP per capita, together with Zambezia, but while the former are relatively small - accounting together for less than 8% of total GDP - the latter is the most populated region of the country, with widespread poverty and the lowest growth rate.

The differences among provinces slightly shrank over time. According to Table 1 (third column) on average the northern and central provinces grew relatively more than southern ones. Considering yearly averages, Niassa, Tete and Inhambane recorded the highest growth rates, all above 10% over the period, while a relative low growth - below 7% - has been recorded in Zambezia, Manica, Sofala and Gaza. The evolution of GDP per capita follows closely the differences in absolute growth. The population increased on average by 2,4% every year, with relatively higher increases in Niassa and Manica (between 2,7% and 3%) and in Maputo (2,8%). In any case, the latter result is due to the regional migration flows toward the area with the highest opportunities in the country.

The structure of the economy (cfr. Tab. 11 and Tab. 12 in the Appendix), although similar in all provinces, shows interesting differences. While at national

¹ See Table 8 to Table 9 in the Appendix for a detailed description of the regional total and per capita GDP.

level the agricultural sector accounts on average for 24,7% of GDP (cfr. Tab. 13), this sector is relatively more concentrated in northern provinces, Zambezia, Inhambane and Gaza, all with share between 35% and 56% (cfr. Tab. 11). The Manufacturing industry represented in 2001 14.7% of total GDP, but most of the activities are concentrated in the province of Maputo (40,5%), Manica (12,6%) and Sofala (16,4%).

Tab. 1 - Contribution to GDP, average growth and per capita GDP by province (US\$, 2003 prices). Authors' calculations on INE data.

	CONTRIBUTION %		AVERAGE GROWTH %	PER CAPITA GDP	
	2001	2006	2001-2006	2001	2006
Niassa	2,91	3,37	11,2	130	193
Cabo D	4,73	4,99	9,2	127	178
Nampula	13,5	13,53	8	162	212
Zambezia	11,98	11,26	6,7	142	175
Tete	5,75	6,39	10,3	170	243
Manica	4,77	4,52	6,8	164	196
Sofala	11,73	11,17	6,9	315	392
Inhambane	5,13	6,13	12	163	256
Gaza	4,78	4,41	6,3	160	195
Maputo Prov.	14,75	14,94	8,3	633	821
Maputo City	19,96	19,3	7,3	724	914

Despite the numbers indicate an important role for industrial activities, this is mainly the result of few big investment projects. Manufacturing production is concentrated into a small number of products and the evidence so far still reports a lack of diversification in industrial activities [Ingrao, 2009]. Commerce, with an overall share of 10,6%, is uniformly distributed among provinces. Transports and Communications and Real Estate, Renting and Business Activities are the other two important branches of the country, with shares of 10,5% and 11,7% respectively, but being strictly connected with industrial activities and especially with big investment projects, they are concentrated mainly in Maputo, Sofala and Nampula.

Turning to the structural change, in Niassa, according to Table 12, a major transformation is given by the increase in the importance of Construction and Restaurant and Hotels, which passed from 1,3% and 0,6% in 2001 to 6,9% and 3,1% in 2006 respectively. The manufacturing industry increased its share from 6,7% to 8,5%. In any case, it must be stressed that due to the small size of the province, even a small investment project may cause huge variations both in the growth rates and in the economic structure. A potential resource for the province is the large amount of fertile and arable lands, suitable for the development of commercial agriculture, especially in the production of tobacco and cotton. A major impediment to this development is the low population density and the lack of basic infrastructures. An important part of the province does not even have electricity or roads to connect to potential markets.

In Tete, the hydroelectric plant of Cahora-Bassa - which produces and distributes electricity to the SADEC countries - is the main player behind the strong growth record of the province, accounting for 42.8% of the GDP in 2001, which increased to 48.2% in 2006. The province in 2008 became the destination of a big investment project for the extraction of coal in Moatize. The project is implemented by the Brazilian company *Vale do Rio Doce* and its economic size overcomes that of Mozal, meaning that in the next years the province is going to increase its importance for the country-wide growth.

The strong growth record of Inhambane is due to the discovery of gas sources (*gas de Pande*) and to the construction of a pipeline which transports gas to South Africa. A major structural modification is given by the increase in the share of Agriculture which passed from 40,1% in 2001 to 43,6% in 2006. This increase is caused by the recent investments in industrial agriculture both to produce inputs for bio fuel and to satisfy the domestic demand.

Among the other provinces, in Cabo Delgado Manufacturing increased its importance, passing from 7,2% in 2001 to 9,6% in 2006 while the other traditional sectors like Construction and Commerce reduced their contribution to the provincial GDP. This province has attracted investments in tourism and petrol prospecting, giving good perspectives for future growth, as confirmed by government projections². As for the neighbouring Niassa, the extent of both growth and structural changes are influenced by the small economic size of the province.

In Nampula, major structural modifications are given by the changes in Transport and Communications - down from 13.1% to 10.7% - and Financial and Insurance services - from 3,6% to 6,3%. The latter is due to the diffusion of these services into rural areas. In Zambezia there have not been major changes in the structure of the economy, while in Manica a major modification is given by Manufacturing, which passed from 12,6% in 2001 to 14,5% in 2006.

In Sofala, according to Tables 11 and 12, Transport and Communications is the most important activity, accounting for 21,8% of the provincial GDP in 2006, thanks to the presence of one of the most important ports of the region in Beira. This port is a part of the Corridor of the Centre, where pass most of the cabotage flows in and out of the region, especially those directed to Zimbabwe. Between 2001 and 2006 the structure of the economy changed significantly, above all in the Manufacturing Industry - which increased its share from 16,4 to 18,1% - essentially because of the development of the sugar industry (*Cena Sugar*) - and Financial and Insurance Services, which passed from 3,9% to 7,2% between 2001 and 2006. The latter's growth is probably a by-product of the harbour traffic.

In Gaza major structural changes are given by the increases in Manufacturing (from 10% to 11,2%) and Commerce (from 10.4% to 11.2%). Despite the reduction in the importance of Agriculture (from 37,2% to 35,2%), similarly to Inhambane industrial agriculture investment projects are taking place in recent years both to

² *Plano Económico e Social para 2008*, source www.govnet.gov.mz

produce inputs for bio fuel and to satisfy the domestic demand for food. These investments are part of the government's strategy - the so called *Revolução Verde* - to reduce hunger and poverty in the country.

The City of Maputo is the richer area of the country; it concentrates most of the investment projects taking place in Mozambique. According to Table 9, the principal sectors of activities in 2006 were Manufacturing (14,9%), Commerce (15,5%), Transport and Communications (17,8%) and Financial and Insurance services (16,1%). The structure of the economy did not change much in our sample period because major changes took place before 2001, when the first mega projects localised in the country. A major modification is given by Financial and Insurance Services which almost doubled between 2001 and 2006, reaching a share of 16,1%.

Finally, in Maputo Province the principal sectors of activity in 2006 were Manufacturing (42,3%), Commerce (12,4%), Construction (12,4%) and Transport and Communications (10,1%). The high share in Manufacturing is due to the presence of the Mozal - which until 2008 was the biggest investment project in the country - and to the localisation of the majority of Foreign Direct Investment. This concentration of manufacturing activities stimulated also the growth of Construction, which passed from 10,2% in 2001 to 12,4% in 2006.

Summing up, the descriptive evidence suggests that a small catching up of the less developed provinces is taking place and that there has been a small structural change - although with different intensities - in almost all provinces. In the next sections we will further investigate these topics and assess the significance of both provincial catching up and structural change within provinces by using a regression framework. Further, we will investigate the relation between growth and structural change in order to assess which provinces are on a virtuous development path and which not.

3. GROWTH, CONVERGENCE AND STRUCTURAL CHANGE: REGRESSION ANALYSIS

In this chapter we will use province level data for GDP growth and the structure of the economy within each province in order to assess the direction and extent of changes taking place over the period 2001-2006. We will basically provide a suggestive answer to the following questions: first, whether a convergence in absolute and per capita GDP is taking place between provinces; second, whether structural change within each province is starting to be systematic or it is just the result of specific events, like mega-projects or country wide shocks.

Starting from the convergence among provinces, the descriptives from the former section suggest that poorer provinces experienced higher growth rates but this difference in the pattern of growth may be the result of specific shocks or may not take into account province specific characteristics. Here we use a regression framework in order to sort out partial correlation between growth rates and lagged level of GDP, in this way we can purge the effect of time specific or province specific shocks. Unfortunately the number of observations is low, having only 11

provinces over 5 year, so that the results must be interpreted only as suggestive evidence and not as a rigorous econometric test³. Further, the reduced data availability leaves us with almost no other indicator available for additional controlling. Consequently, we included only a set of time dummies and - alternatively - the initial Human Development Index (HDI) and the share of urban population (UP), the only indicators having a series available for each province. The HDI is provided by INE while we built the UP using household data from the second IAF⁴ performed in 2002, which gives information on the number of individuals living in urban areas and on total population. The estimated equation is the following:

$$\Delta \ln \text{gdpj},t = \alpha + \beta \ln \text{gdpj},t-1 + \gamma 1 \text{UPj},0 + \gamma 2 \text{HDIj},0 + \eta t + \epsilon j,t \quad (1)$$

where the lhs represent the provincial growth rate in year t; on the rhs there is the lagged logarithm of the GDP, the two additional controls and the set of time dummies ηt . The equation is run alternatively on absolute and per capita GDP.

According to the literature⁵ a convergence in growth rates is achieved when the coefficient β has a negative and significant sign - the so called beta convergence - but for the beta convergence to actually verify, a sigma convergence - that is the reduction in the standard deviation of sectoral GDPs - must hold. The results are shown in Table 2, with the upper panel showing coefficients for the convergence in absolute GDP and the lower panel showing the same estimates for per capita GDP. Starting with the former, without controlling for time specific shocks there is a significant (at 5% level) and negative correlation between growth and the lagged level of GDP. The coefficient is stable around -0.014 in all the specification, but loses significance when controlling for the urban population share. When we add the time dummies (columns 4 to 6 in Table 2) the significance declines slightly in columns 5, where the Hdi is added, and it becomes insignificant when the urban population share is introduced. All in all, these results suggest that convergence in absolute GDP is mainly the result of economy-wide and year specific shocks and, to a lower extent, to changes in the degree of urbanisation of the provinces. The standard deviation of provincial logGDP shrank over time, passing from 0.618 in 2002 to 0.596 in 2006, hence the results suggest that a slow convergence is taking place in total GDP. Turning to the per capita GDP growth (lower panel of Table 2), although the coefficient for the lagged GDP level is negative in most of the cases,

³ A rigorous estimation of equation (1) would require not only a higher number of observation and a longer time span but also the necessity to control for the endogeneity of the lagged logGDP once a causal relation is assumed.

⁴ Inquérito Nacional aos Agregados Familiares Sobre Orçamento Familiar. It is the Mozambican household survey.

⁵ For the concepts of beta and sigma convergence see Barro and Sala-i-Martin [1991], Sala-i-Martin [1996] and Quah [1993].

it is not statistically different from zero, thus population growth seems to hamper even a slow convergence in living standards, keeping regional differences practically unchanged.

Turning to the second part of the analysis, in order to estimate the extent of structural change our strategy is to run a ‘convergence’ equation - similar to equation (1) - on sectoral GDPs within provinces. We use brackets because we are not interested in whether in the long run all sectors will have the same share. What we want to investigate is whether there has been a switchover in the ranking of each sector’s share. In this case we should expect sectors with a lower initial share to grow faster (the beta convergence), but in addition the standard deviation of sectoral GDP should increase over time (which means a lack of sigma convergence).

Tab. - 2 Convergence regression on GDP levels (upper panel) and in GDP per capita (lower panel) between provinces.

	DEPENDENT VARIABLE $\Delta \ln \text{GDP}_t$					
$\ln \text{GDP}_{t-1}$	-0,014**	-0,015**	-0,014*	-0,014**	-0,015*	-0,014
HDI2001		0,011			0,011	
Urb Pop %			0,004			-0,001
R2	0,09	0,09	0,09	0,17	0,17	0,17
	DEPENDENT VARIABLE $\Delta \ln \text{GDP}_{\text{pct}}$					
$\ln \text{GDP}_{\text{pct}-1}$	-0,008	-0,012	0,002	-0,008	-0,011	0,004
HDI2001		0,023			0,018	
Urb Pop %			-0,028			-0,033
R2	0,03	0,03	0,05	0,11	0,11	0,13
Time dummies	No	No	No	Yes	Yes	Yes
Obs.	55	55	55	55	55	55

*** significant at 1% level, ** significant at 5% level, *significant at 10% level

We constructed the GDP of every sector of activity by multiplying total GDP at province level for the share of each of the 16 sectors as provided by INE. Following this procedure, data have three dimensions: a sectoral dimension, given by the sixteen sectors in which we divide the economy; a geographical dimension - the eleven provinces - and a time dimension because we have yearly observations between 2001 and 2006. We use a bi-dimensional panel of sectors and provinces and regress the overall growth of each sector’s GDP between 2001 and 2006 on the initial log level of GDP. This allows us to exploit the bi-dimensional nature of the data and avoid problem of serial correlation and endogeneity of the regressors - the latter problem being particularly severe for the initial GDP. The sector specific fixed characteristics are controlled via fixed effects. We decided not to add province fixed effects because specific shocks to each province are generally related to megaprojects, hence incorporated in the sectoral fixed effects⁶. Formally, the test for structural change is conducted by estimating the following equation:

⁶ We tried a specification with province fixed effects, but they are never significant both individually and jointly.

$$\Delta \ln gdp_{i,j} = \alpha + \beta \ln gdp_{0,i,j} + \gamma_1 UP_{0k} + \gamma_2 HDI_{0k} + \varepsilon_{i,j} \quad (2)$$

Structural change means a change in the importance of each of the i sectors in the j provinces, where less important sectors grow more than the most important ones and vice versa. When this is the pattern, the coefficient β has a negative sign (the beta convergence), while in the opposite case of a positive β there is a consolidation of the initial ranking with increasing differences between sectors. The additional controls are - as for equation (1) - the share of urban population (UP) and the Human Development Index. To our purpose, UP is particularly important because in urban areas the structure of the economy is different, with little or no agriculture and a higher share in services, hence the extent of change as well as the sectors involved may differ. We estimated equation (2) with and without fixed effects and the results are shown in Table 4 and Table 5. Both specifications return a significant negative β , higher in the specification without fixed effects. The standard deviation of sectoral GDPs increased over time in almost all provinces, indicating the lack of sigma convergence and - consequently - suggesting that a structural change is actually taking place. The coefficient β is nevertheless rather small - between 0,033 and 0,054 over a 5 years period - suggesting that at this pace a complete structural change (the switchover in the sectors ranking) will need some decades to take place. The sector specific fixed effects are calculated in relation to the agricultural sector for which the effect is captured by the constant term. Most of these dummies are positive and particularly high for Mining, Financial and Insurance Services, Hotels and Restaurants and Manufacturing, while lower value added activities like Construction, Repairs and some public services (Education, and Other Services) experienced permanently lower growth rates. These results suggest that growth has been driven by higher value added activities and by a sector - Tourism - which can be very important for the future development of the country because it needs lower investments and has a high labour content.

Tab. - 3 Estimation results of equation (1) using weighted least squares and no fixed effects.

	CUMULATIVE GDP GROWTH BETWEEN 2001 AND 2006					
Lngdp2001	-0,054**	-0,053**	-0,054**	-0,053**	-0,055**	-0,055**
HDI2001			-0,09	-0,018		
Δ HDI2001-2006					1,111	1,008
PopUrb(%)2001		-0,043		-0,036		-0,01
Constant	0,76***	0,769***	0,795***	0,775***	0,701***	0,709***
Observations	176	176	176	176	176	176
R-squared	0,07	0,07	0,07	0,07	0,08	0,08

*** significant at 1% level, ** significant at 5% level, significant at 10% level

Tab. - 4 Estimation results of equation (1) using weighted least squares dummy variables.

	CUMULATIVE GDP GROWTH BETWEEN 2001 AND 2006					
Lngdp2001	-0,034*	-0,031**	-0,033**	-0,031**	-0,034**	-0,032**
HDI2001			-0,110	0,036		
Δ HDI2001-2006					1,029	0,632
PopUrb(%)2001		-0,060		-0,074		-0,039
Fisheries	0,168***	0,163***	0,166***	0,162***	0,170***	0,165***
Mining	0,289***	0,298***	0,292***	0,299***	0,286***	0,293***
Manufacturing	0,099***	0,100***	0,099***	0,100***	0,098***	0,099***
Electricity, water	0,153***	0,157***	0,155***	0,158***	0,152***	0,155***
Construction	-0,092**	0,087***	-0,09***	0,087***	0,094***	-0,09***
Commerce	0,001	0,002	0,001	0,002	0,001	0,001
Repairs	0,432***	0,421***	0,427***	0,420***	0,435***	0,427***
Hotels & Rest.	0,185***	0,192***	0,188***	0,193***	0,183***	0,188***
Transports, comm.	0,02	0,022	0,021	0,023	0,019	0,021
Financ., ins. Services	0,518***	0,524***	0,520***	0,524***	0,516***	0,521***
Real estate, rent...	0,300***	0,297***	0,299***	0,297***	0,300***	0,299***
PA, defence	-0,041	-0,038*	-0,040*	-0,038*	-0,042*	-0,040*
Health serv.	0,060**	0,064***	0,062**	0,064***	0,059**	0,062***
Education serv.	-0,112**	0,106***	0,110***	0,106***	0,114***	0,109***
Other serv.	0,307***	0,302***	0,305***	0,302***	0,308***	0,305***
Constant	0,611***	0,615***	0,649***	0,603***	0,558***	0,581***
Observations	176	176	176	176	176	176
R2	0,47	0,47	0,47	0,47	0,47	0,47

*** significant at 1% level, ** significant at 5% level, significant at 10% level

The other controls are insignificant in all specifications. In any case, the share of urban population has the expected negative sign, while the coefficient for the Hdi is negative in levels and positive and close to one in differences. The important result is the significant - although small - beta convergence, associated with an increase in the dispersions of sectoral GDPs. This validates the assumption that Mozambique is undergoing a slow but significant structural change.

3. THE RELATION BETWEEN STRUCTURAL CHANGE AND GROWTH IN THE PROVINCES OF MOZAMBIQUE

Once we found suggestive evidence of significant structural change, the following exercise aims at assessing the short run relation between regional growth and structural change. We do so by constructing a simple measure of the latter. The chosen indicator is built as the sum of within provinces absolute changes in each sector's share in total GDP. This index has been used for similar purposes in Dewurst [2002], who estimated the relation between growth and structural change in the UK regions over the 1990s. The formal expression is the following:

$$SCI_{j,t} = \sum_{j=1}^{11} [S_{i,j,t} - S_{i,j,t-1}] \quad (2)$$

where $S_{i,j,t}$ denotes the GDP share of sector j in province i at time t . This measure gives equal importance to increases and reduction in each sector's share within provinces. The index ranges between 0, in case of constant structure, and 2 in case of complete switchover in the sectors' ranking⁷. Many studies consider a long run structural change, which is well described by employment movements. However, short run dynamics are better captured by production growth. This is true especially in a less developed country like Mozambique, where growth comes mostly from specific investments with low employment content and from the increase in labour productivity stimulated by the introduction of relatively more advanced technologies⁸.

In Table 5 we report the values of the indicator in every province/year combination, where the last column reports the period average. The latter data reveal us that between 2002 and 2006 Inhambane, Niassa and the two provinces of Maputo experienced the higher changes in their structure. If we look at their structure over time (cfr. Tab. 8 and 9), we find exceptional increases in Construction and Tourism - although starting from very low levels - in PA and Defence and in Financial Services. Most of these activities are relatively labour intensive; hence income increases in principle should spread to the population. The province of Inhambane saw a recovery in the agricultural sector and substantial increases in Transports and Communication and Finance. In addition, the development of an agreement for the exploitation of natural gas fields in Pande and Teneme gave another boost to the region. In the two provinces of Maputo, Financial Services expanded by over 60%, followed by Electricity, Water and Manufacturing activities, mainly created by the expansion of Mozal. In this province also tourism facilities increased their importance and probably stimulated the expansion of Construction. Relatively low structural change, on the opposite, took place in Zambezia, Sofala and Tete. In the first one, the explanation lies in its high share in agriculture (55%) and in the decline of manufacturing and construction activities. The latter dropped significantly in Tete too, where most of the production comes from the electricity sector thanks to the hydroelectric plant in Cahora Bassa. In addition, important developments have been recorded by the financial sector while labour intensive industries like commerce and tourism, declined. If we consider the average growth rate (cfr. Tab. 1), Inhambane and Niassa are also two of the three best growing provinces, with the third one being Tete - which is a low structural change province - where most of growth is accounted by a megaproject with a low employment level.

⁷ The index ranges between 0 and 200 when the structure of the economy is expressed on a 0-100 scale.

⁸ For example, in Mozambique the MOZAL created only 8000 jobs for the local population, while its importance in terms of GDP reached 7% in 2006. In our case the choice of GDP data is forced by the lack of a series of employment data at province level.

This descriptive evidence shows us that the relation between growth and structural change is not univocal and behind the documented evidence of an economy wide structural change there can be different patterns of change among provinces. A combination of high growth and high structural change can be observed when the economy is on the phase generally preceding a take off. Such a pattern may also be due to the small size of the province, as in the case of Niassa, where small absolute increases generate strong percentage variations. Growth with little or no structural change represent the case of balanced growth, while structural change associated with low growth can take place when the modification of the structure is due to negative shocks or to single major changes, like in the case of megaprojects. In this latter case the benefits to the population in terms of increases in the income per capita and in other socio economic indicators can be, if positive, of little importance. In general the result could be the development of a dual economy, where some provinces still experience high poverty rates thanks to the low and uneven distribution of GDP increases and other are set on the road to development, giving a primary contribution to the overall take off.

The econometric estimations aim at assessing the relation between growth and structural change in the provinces of Mozambique. We follow the analysis of Dewurst [2002], which found a quadratic relation between the two variables using British data for the 1990s. Given our descriptive evidence, the quadratic relation appears to be a good description of the Mozambican case because of the different combinations of growth and structural change. The interest in this exercise lies in the possibility to rank the provinces according to their position in the scatter-plot and assess whether there can be evidence of ‘pre-conditions to take-off’ in some of them⁹. The estimated equation is then the following:

$$SC_{i,t} = \alpha + \beta_1 GR_{i,t} + \beta_2 GR^2_{i,t} + \Upsilon_t + \delta_{i,t} \quad (3)$$

where SC is the measure of structural change (2) in province *i* at time *t*, GR and Gr2 are the growth rate and the square growth rate of GDP. The latter is introduced in order to capture non-linearities in the relation between structural change and growth. Υ_t are a set of time dummies, which capture economy wide shocks, hence they account for the growth path at national level and other characteristics of the national economy. In Table 7 we show the estimates for equation (3). The quadratic relation between growth and structural change (column 2) is strongly confirmed and fits much better the model compared to the linear specification in column 1. The R2 passes from 0.57 to 0.68 when the quadratic term is introduced. In addition, the sign of the linear coefficient is negative, which implies that the minimum of the relation, corresponding to a null marginal impact, is reached for

⁹ This definition refers to the Rostow’s stages of growth - see Rostow [1960] - but it can be interpreted also as requirements to exploit the ‘advantage of backwardness’ described by Gerschenkron [1962].

positive values of the growth rate. This quadratic relation is plotted in Figure 1 using the coefficients of column 2 in Table 5. With these coefficients, the marginal impact (the slope of the curve) at each point is $-1.099+15.982*g$ where g is the growth rate.

Tab. - 5 Indexes of structural change by province (scale 0-200). Author's calculations on INE data.

	2002	2003	2004	2005	2006	Avg 2002-2006
	SC	SC	SC	SC	SC	SC1
Niassa	4.3	5.2	14.4	4.6	5.1	6.7
Cabo D	4.4	5.4	7.0	4.5	3.9	5.1
Nampula	5.6	6.0	5.7	6.2	3.2	5.3
Zambezia	2.9	3.1	5.0	5.2	2.7	3.8
Tete	3.1	2.6	7.5	5.9	1.9	4.2
Manica	4.1	5.3	7.1	6.2	2.9	5.1
Sofala	3.7	5.1	5.2	6.4	2.4	4.5
Inhambane	7.1	6.4	15.4	6.9	4.8	8.1
Gaza	5.3	4.5	9.1	5.4	2.5	5.4
Maputo P	7.2	9.2	5.7	3.6	2.2	5.6
Maputo C	4.5	6.1	5.7	9.7	3.9	6.0

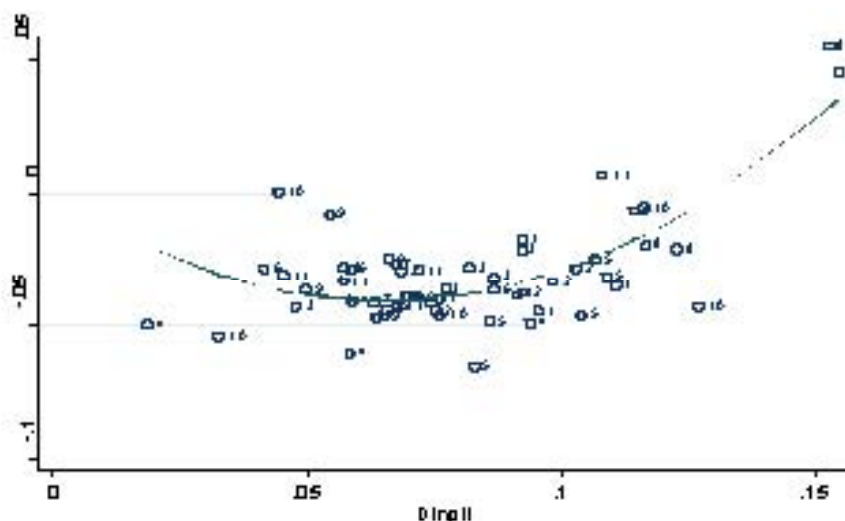
Tab. - 6 Estimation results of equation (3) using Ordinary Least Squares.

	SC	SC
GDPgr	0.385	-1.099
	[0.124]***	[0.511]**
GDPgr ²		7.991
		[2.532]***
Time dummies	Yes**	Yes*
Constant	0.026	0.088
	[0.011]**	[0.025]***
Observations	55	55
R-squared	0.57	0.68

The minimum point of the relation (where the impact of growth on structural change is null) is reached at a growth rate of 6.9%. For higher growth rates the marginal impact (the slope of the curve) is positive and increasing, while a lower growth causes a reduction in the extent of SC. In any case, if we look at the distribution of the observations around the curve, it is clear that only few cases lie in the decreasing part of the curve, while the bulk of the observations lie on the centre-right part of the curve. This shows us that there have been two different patterns of growth in the provinces of Mozambique: one with high growth rates and high structural change and one with lower - but positive - growth and reduced

structural change. From Figure 1 we can see the pattern already depicted in the descriptive part, with Niassa, Cabo Delgado, Tete and Inhambane¹⁰ being on the increasing part of this relation, while Maputo Province appears to behave as an outlier because it shows all possible combinations of structural change and growth. To give a clearer picture we calculated the marginal impact of growth on SC evaluated at each province average growth rate as shown in Table 7. In the best growing provinces Niassa, and Inhambane the marginal impact is strongly positive but again, for the former (as well as for Cabo Delgado) the small size of the economy influenced the outcome.

Figure - 1 Relation between structural change (vertical axes) and growth (horizontal axes). Note: structural change is expressed on a 0-1 scale.



Tete has a relative high marginal impact too, thank to the consolidation of the production of electricity. A slightly negative or null impact is accounted for the lagging provinces Zambezia, Manica, Sofala and Gaza. The remaining areas experienced a positive, although modest, impact of growth on structural change.

Summarising, we found the northern provinces plus Tete and Inhambane experiencing a combination of high growth and high structural change, while the other experienced a reduced and rather balanced growth. Contrary to the descriptives of the previous section, the province of Maputo does not show a clear pattern of change. This result does not allow concluding that Maputo performed worse than other provinces. Actually, the higher level of development in Maputo, where most of the high value added activities are located, and per capita GDP

¹⁰ See the Appendix for the numerical codes of the provinces.

almost three times higher than the national average, explains both the lower sensitiveness of the economic structure to specific shocks and the relatively lower growth rate. If any, Maputo is the only province that should be considered on the road to a take off.

Tab. - 7 Average growth rate between 2001 and 2006 and marginal impacts of growth on structural change.

	AVG gr	MARG imp
Niassa	11.16	0.685
Cabo D	9.17	0.367
Nampula	8.01	0.181
Zambezia	6.66	-0.035
Tete	10.27	0.543
Manica	6.81	-0.011
Sofala	6.92	0.007
Inhambane	11.93	0.807
Gaza	6.26	-0.099
Maputo P	8.24	0.219
Maputo C	7.26	0.061

4. SUMMARY CONCLUSIONS

In this paper we provided an overview of the regional dimension of the growth pattern in Mozambique. By using the province level data provided by Ine we tried to answer three different questions: first, whether a convergence of GDPs is taking place among provinces; second, whether a significant structural change takes place within each province independently of sector and time specific shocks; third, what is the observed relation between growth and structural change. The small number of available observations hampers us to address causal relations or to run rigorous econometric tests. Therefore we used a regression framework as instrument to sort out partial correlation and gather suggesting descriptive evidence for our research questions. According to our results, a small convergence in absolute provincial GDPs is taking place, with the poorer northern and central provinces slowly filling the gap with the more advanced south. However, the convergence does not take place in capita income, for which differences between provinces show little or no reduction. Further, we found that a significant structural change is taking place within each province independently of sector or time specific shocks. Finally, from the analysis of the relation between structural change and growth we found that a quadratic form fits better this relation than a linear one, implying that the effect of growth on SC is stronger the higher the growth rate. This is the case for almost all provinces, being Tete the only exception, and finding lower coefficients for Maputo because of its higher initial level. All these results are in line with the picture of a small convergence (in absolute terms) of northern and central provinces to the levels and structure of southern provinces.

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APPENDIX

Provincial codes:

1. Niassa;
2. Cabo Delgado;
3. Nampula;
4. Zambezia;
5. Tete;
6. Manica;
7. Sofala;
8. Gaza;
9. Inhambane;
10. Maputo Province;
11. Maputo City

Tab. - 8 GDP per capita in constant 2003 USD. Author's calculations on INE data using the exchange rate published by the Banco de Mozambique.

	2001	2002	2003	2004	2005	2006
North	147,9	159,2	169,6	177,4	188,1	200,1
Niassa	130,2	141,7	148,8	169	180,9	193,1
Cabo Delgado	127,2	137,6	148	155,3	164,1	178,3
Nampula	161,8	173,5	184,8	189,4	200,6	211,5
Centro/Centre	185,3	197,4	205,8	211,7	224,3	234,2
Zambézia	141,9	152,4	157,9	157,3	168,5	174,7
Tete	169,6	183,4	194	210,2	228,4	242,5
Manica	163,7	173,2	180,5	182,6	188	195,7
Sofala	314,9	331,5	345,3	359,7	376,1	392,5
South	397,3	422,3	433	466,3	492,8	521,2
Inhambane	162,8	178,6	184,9	210,7	232,9	255,9
Gaza	159,7	167,2	174,9	180,8	186,1	194,9
Maputo	633	690,8	702,2	775,6	780,4	820,8
Maputo C.	723,5	747,1	763,2	798,3	869,6	913,9
Mozambique	227,2	242,4	252	265,5	281	296,2

Tab. - 9 Total GDP in constant 2003 man UDS. Author's calculations on INE data using the exchange rate published by the Banco de Mozambique.

	2001	2002	2003	2004	2005	2006
North	848,2	933,8	1018,2	1090,0	1183,7	1289,3
Niassa	116,8	130,5	140,8	164,3	180,8	198,3
Cabo D.	189,8	209,4	229,8	246,1	265,4	294,2
Nampula	541,6	593,9	647,6	679,5	737,6	796,8
Centro/Centre	1373,5	1499,9	1602,7	1689,8	1834,5	1963,4
Zambézia	480,5	528,0	559,9	570,4	625,0	663,1
Tete	230,8	256,2	278,3	309,6	345,3	376,4
Manica	191,5	208,8	224,4	233,9	248,1	266,1
Sofala	470,7	507,0	540,1	575,8	616,0	657,9
South	1789,9	1948,2	2045,3	2254,3	2438,1	2638,3
Inhambane	205,6	230,6	244,2	284,5	321,6	361,4
Gaza	191,8	204,9	218,7	231,0	242,8	259,8
Maputo	591,8	664,8	695,1	789,2	815,5	880,0
Maputo C.	800,7	847,9	887,2	949,6	1058,2	1137,1
Mozambique	4011,6	4381,9	4666,2	5034,1	5456,3	5891,0

Tab. 10 - Real growth rates of GDP by province (2003 USD). Author's calculations on INE data using the exchange rate published by the Banco de Mozambique.

	2002	2003	2004	2005	2006
Norte/North	10,1	9,0	7,0	8,6	8,9
Niassa	11,7	7,9	16,7	10,0	9,7
Cabo D.	10,4	9,7	7,1	7,8	10,9
Nampula	9,7	9,0	4,9	8,5	8,0
Centro/Centre	9,2	6,9	5,4	8,6	7,0
Zambézia	9,9	6,0	1,9	9,6	6,1
Tete	11,0	8,6	11,3	11,5	9,0
Manica	9,1	7,4	4,3	6,1	7,2
Sofala	7,7	6,5	6,6	7,0	6,8
Sul/south	8,8	5,0	10,2	8,2	8,2
Inhambane	12,1	5,9	16,5	13,0	12,4
Gaza	6,9	6,7	5,6	5,1	7,0
Maputo	12,3	4,6	13,5	3,3	7,9
Maputo C.	5,9	4,6	7,0	11,4	7,5
Mozambique	9,2	6,5	7,9	8,4	8,0

Tab. - 11 Structure of the Mozambican economy by province in 2001 in constant 2003 prices. Author's calculations on INE data

	Niassa	Cabo Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Inhambane	Gaza	Maputo Prov.	Maputo City	Total
Agriculture, Livestock and Forestry	42,8	45,6	34,1	56,3	22,1	37,3	17,8	40,1	37,2	6,7	0,1	24,7
Asberies	3,7	5,3	3,8	4,0	2,9	0,7	1,2	3,7	3,5	0,3	0,4	2,2
Fining	0,2	0,3	0,4	0,3	1,9	0,5	0,4	0,6	1,3	0,5	0,2	0,5
Manufacturing Industry	6,7	7,2	7,8	8,2	2,5	12,6	16,4	4,4	8,9	40,5	14,0	14,7
Electricity and water	4,2	4,3	3,3	3,7	42,8	3,5	2,0	3,3	3,3	0,9	0,7	4,7
Construction	1,3	2,1	3,0	0,7	0,9	4,4	1,7	3,5	4,8	10,2	2,7	3,5
Commerce	9,2	9,6	10,1	8,4	5,3	9,4	9,8	12,3	10,4	10,0	15,0	10,6
Repairs	0,2	0,1	0,9	0,1	0,1	0,2	1,3	0,1	0,2	0,5	0,6	0,5
Restaurants and hotels	0,6	0,9	0,6	0,7	2,0	1,0	1,1	1,6	1,1	0,1	4,8	1,6
Transport and Communications	5,4	2,7	13,1	2,3	3,7	4,3	21,4	3,5	3,6	10,0	17,0	10,5
Financial and insurance services	2,5	2,4	3,6	0,9	0,5	1,3	3,9	1,5	1,0	0,8	8,4	3,2
Real estate, renting and business act.	5,4	5,3	7,5	2,9	3,4	8,8	12,9	9,9	7,8	13,2	25,0	11,7
Public administration and defence serv.	6,0	4,8	3,1	2,8	4,1	5,2	4,0	4,0	4,4	2,2	6,4	4,1
Education services	6,5	5,6	4,2	5,5	4,4	5,0	2,2	6,0	6,4	1,8	1,5	3,6
Health services	2,5	1,9	1,3	1,6	1,6	2,1	1,2	2,3	2,8	0,8	0,5	1,3
Other services	2,7	2,1	3,2	1,7	1,9	3,6	2,7	3,3	3,5	1,6	2,7	2,5

Tab. - 12 Structure of the Mozambican economy by province in 2006 in constant 2003 prices. Author's calculations on INE data

	Niassa	Cabo Delgado	Nampula	Zambezia	Tete	Manica	Sofala	Inhambane	Gaza	Maputo Prov.	Maputo Cid./City	Total
Agriculture, Livestock and Forestry	35,3	44,2	34,4	54,7	20,3	35,5	17,1	43,6	35,2	6,4	0,1	24,2
Fisheries	2,8	4,4	3,3	3,8	2,4	0,7	1,3	2,7	3,4	0,3	0,4	1,9
Mining	0,2	0,3	0,5	0,3	2,9	0,5	0,8	3,8	2,5	0,5	0,4	0,9
Manufacturing Industry	8,5	9,6	9,0	8,7	2,5	14,5	18,1	3,5	10,0	42,3	14,9	15,6
Electricity and water	4,5	4,9	4,0	4,9	48,2	4,6	2,2	3,4	4,4	1,1	0,9	5,8
Construction	6,9	1,1	1,6	0,6	0,6	3,7	1,2	5,3	3,6	12,4	2,0	3,6
Commerce	8,2	9,1	10,2	8,9	4,9	10,2	10,0	10,2	11,2	10,2	15,5	10,6
Repairs	0,1	0,1	0,6	0,0	0,1	0,1	1,0	0,0	0,1	0,4	0,5	0,4
Restaurants and hotels	3,1	1,2	0,6	0,9	1,1	0,8	0,9	2,0	2,2	0,3	4,3	1,6
Transport and Communications	5,1	3,5	10,7	2,3	3,0	4,0	21,8	5,6	3,3	10,1	17,8	10,3
Financial and insurance services	3,8	4,0	6,3	1,6	0,8	2,6	7,2	2,2	1,9	1,4	16,1	5,9
Real estate, renting and business act.	3,5	3,6	5,6	2,2	2,3	7,1	9,9	6,1	7,0	9,9	19,5	8,8
Public administration and defence serv.	8,5	5,7	5,5	1,9	3,8	4,8	3,3	3,5	4,3	1,9	4,2	3,9
Education services	6,3	6,0	4,8	6,7	5,1	6,6	2,9	5,0	6,5	1,8	1,4	4,0
Health services	2,3	1,8	1,5	1,4	1,2	2,3	1,1	1,7	2,5	0,7	0,7	1,3
Other services	1,6	1,4	2,2	1,8	1,5	3,0	2,1	2,2	2,8	1,2	2,1	2,0

Tab. - 13 Structure of the Mozambican economy (Source: Ine)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Agriculture	28,9	28,5	27,9	27,4	23,5	23,1	23,7	23,4	22,8	22,5	22,9
<i>Agriculture</i>	22,5	22,1	21,7	21,3	18,2	18,0	18,4	18,3	17,9	17,8	18,3
<i>Livestock</i>	2,7	2,7	2,6	2,6	2,2	2,2	2,2	2,2	2,1	2,1	2,0
<i>Forestry</i>	3,7	3,7	3,6	3,5	3,0	3,0	3,0	2,9	2,8	2,7	2,6
<i>Fishing</i>	3,3	3,1	2,4	2,2	2,3	2,0	1,9	1,9	1,8	1,7	1,8
<i>Mining, quarrying</i>	0,3	0,3	0,3	0,3	0,5	0,5	0,5	0,6	0,9	0,9	0,8
Manufacturing	7,8	9,3	9,5	10,1	11,4	13,7	13,6	15,0	15,7	14,8	14,5
<i>Food products</i>	1,4	1,7	1,8	1,9	2,1	2,5	2,5	2,4	2,4	2,3	2,4
<i>Beverages and tobacco</i>	1,0	1,2	1,2	1,3	1,4	1,7	1,7	1,7	1,7	1,6	1,6
<i>Textiles</i>	0,8	0,9	0,9	1,0	1,1	1,4	1,4	1,2	1,0	0,9	1,0
<i>Leather</i>	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
<i>Wood</i>	1,2	1,5	1,5	1,6	1,8	2,2	2,2	2,1	1,9	1,8	1,7
<i>Paper</i>	0,3	0,3	0,3	0,4	0,4	0,5	0,5	0,5	0,6	0,5	0,5
<i>Chemicals</i>	0,2	0,3	0,3	0,3	0,3	0,4	0,4	0,4	0,4	0,3	0,3
<i>Non metallic minerals</i>	0,3	0,3	0,3	0,3	0,4	0,4	0,4	0,5	0,5	0,5	0,5
<i>Iron and steel (incl MOZAL)</i>	2,2	2,6	2,7	2,8	3,2	3,8	3,8	5,4	6,7	6,2	6,0
<i>Machinery, equip</i>	0,3	0,3	0,3	0,4	0,4	0,5	0,5	0,5	0,5	0,5	0,4
<i>Other n.e.c</i>	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Electricity, gas	0,7	0,8	2,8	4,6	4,2	4,1	4,1	4,3	4,7	5,1	5,3
Water	-	0,1	0,2	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2
Construction	2,7	2,9	3,3	3,1	3,5	3,3	3,3	3,4	3,0	3,1	3,4
Trade	10,0	9,8	9,8	9,2	9,4	9,9	9,5	9,5	9,5	9,8	10,0
Repairs	0,5	0,5	0,5	0,5	0,5	0,5	0,4	0,4	0,4	0,4	0,4
Hotels and Restaurants	1,5	1,8	1,6	1,6	1,6	1,5	1,5	1,5	1,4	1,5	1,5
Transports and Communications	10,2	10,8	10,1	10,2	10,3	9,8	9,7	9,4	9,5	9,5	9,6
<i>Railway</i>	0,4	0,4	0,4	0,4	0,4	0,4	0,3	0,3	0,3	0,2	0,2
<i>Land</i>	4,3	4,6	4,3	4,3	4,4	4,2	4,1	4,1	3,9	3,8	3,9
<i>Pipelines</i>	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,1	0,1	0,1
<i>Air</i>	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
<i>Transport auxiliary services</i>	2,6	2,7	2,5	2,5	2,6	2,4	2,4	2,4	2,3	2,3	2,2
<i>Communications</i>	2,4	2,6	2,4	2,4	2,4	2,3	2,3	2,1	2,6	2,7	2,8
<i>Financial intermediation</i>	2,2	2,6	1,9	1,3	2,3	2,5	2,6	2,8	3,4	3,8	4,0
<i>Insurance, pension</i>	0,4	0,5	0,4	0,3	0,4	0,5	0,5	0,5	0,4	0,4	0,3
<i>Auiliary activities</i>	0,1	0,1	0,1	-	0,1	0,1	0,1	0,1	0,1	1,2	1,1
Real estate	10,7	9,8	9,6	9,1	9,1	8,5	7,9	7,5	7,2	6,6	6,1
Renting and business act	3,0	2,8	2,7	2,6	2,6	2,4	2,2	2,1	2,2	2,1	2,0
PA, Defence	3,8	3,4	3,1	3,4	3,5	3,9	3,8	3,7	3,6	3,6	3,6
Education	3,2	3,0	2,9	3,0	3,2	3,4	3,2	3,3	3,4	3,5	3,5
Health	1,2	1,1	1,1	1,2	1,3	1,2	1,2	1,2	1,2	1,2	1,2
Other services	2,2	2,1	2,1	2,1	2,5	2,4	2,2	2,1	2,0	1,9	1,8

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