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Macroeconomic Effects of the War in Mozambique

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The aim of this paper is to analyse some macroeconomic channels operating in a war economy. At the theoretical level, the effects of such war on the key economic variables capital, technology, uncertainty, and the government's fiscal deficit are discussed before proceeding to the analysis of individuals, firms and the government. These elements are combined in a dynamic macroeconomic model to study a war's impact on output, growth, consumption, welfare and the national debt. The final section of this paper considers economic policy implications for a government at war, and for donors supporting a war economy. Both the theory and the evidence, drawn from Mozambique, suggest that while capital destruction is the most obvious cost of conflict the long-term development potential of a war economy is more severely damaged by increases in the fiscal deficit, uncertainty and transactions inefficiency. Furthermore, economic policies implemented during a war will determine the size and nature of the country's long-term peace dividend.

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1. **Introduction**

Frequently, the analysis of Mozambique's recent economic development is interpreted either without adequate reference to the effects of war, or the effects of war are not fully understood. The former view is often implicitly adopted by the IMF and the World Bank, who frequently call for a reduction in government activity which may well be counterproductive under conditions of war. The latter position considers war as an emergency with most impact on the social infrastructure, requiring only short term policy responses. This is correct on humanitarian grounds but neglects the development implication of war. The analysis presented here emphasises the role of the war for the Mozambican economy and therefore complements the existing literature on its recent economic history.

This paper will proceed by analysing the impact of war on the key economic variables capital, technology, uncertainty, and the government's fiscal deficit and the three main actors in the war economy, namely individuals, firms and the government. These elements are combined in a dynamic macroeconomic model to study the war's impact on output, growth, consumption, welfare and the national debt both theoretically and for the case of Mozambique, 1974-1995. The final section of this paper considers some economic policy implications for a government at war, and for donors supporting a war economy such as Mozambique.

2. **The War in Mozambique**

The level of development in colonial Mozambique was low even by African standards and despite a burst of industrial growth induced by the Portuguese regime in the 1950s.[1] By 1970, total GDP was estimated at US$ 1.25 billion, that is US$ 132 per capita at current prices (Ratilal, tables 1 and 4, 1990). This compares with an estimate of US$ 196 per capita in 1980 and US$ 115 per capita in 1990 at current prices (table A.2 below). In addition to a harsh political regime, the economy started to endure the

[1] For an account of colonial Mozambican history, see Newitt (1995), while Hall and Young (1997) cover more recent events. Different perspectives to Mozambique's economic history include Hermele (1988), Brochmann and Ofstad (1990), Abrahamsson and Nilsson (1994), Castel-Branco (1994), Hanlon (1991 and 1996), and Brück (1996).

effects of war as early as 1964, when the Mozambican war of independence commenced. It was shaped by partial and slow successes of the Frelimo liberation army against the Portuguese fascist forces. The liberation war was an internal war carried out with conventional methods by the colonial army and guerrilla methods by the Mozambican rebels.

The Portuguese revolution of April 1974 led to an ill-planned decolonisation process, with much confusion and misunderstanding on both sides. After a time of relative peace and stability in the early years of independence, an internal, or civil, war commenced in various rural parts of Mozambique with varying degrees of intensity, and with a much stronger impact on the countryside than on the towns. After Zimbabwean independence of 1980, the war intensified, continuing in all parts of the country, including in the South around the capital Maputo. 1981 may hence be seen as the start of a new, intense phase of fighting. Mozambique joined the IMF and the World Bank in September 1984 thus starting a programme of stabilisation, structural adjustment and trade liberalisation, which reversed many of its former socialist policies well before the end of the cold war. Formally, the war ended when the successful peace agreement between the government and the Renamo rebels was signed in late 1992 after surprisingly successful, secret negotiations.

To understand the economic processes occurring in a war economy such as Mozambique's, one must first understand the meaning of war itself. An economic shock is a sudden and substantial disequilibrium in a socio-economic system induced by an exogenous event. A terms of trade shock, for instance, suddenly disturbs the relative price of exportable versus importable goods. However, the changes in world prices and hence in the terms of trade do not occur in isolation: They can be induced by changes in the natural environment (e.g. by a natural disaster), constraints (e.g. a resource discovery) or preferences (e.g. of the government). War resembles many of these aspects of a terms of trade shock as war will be affected by all three variables and will have its main direct effects in one sector (e.g. the rural sector), yet the main effects of war do not operate on prices directly.

Natural disasters, which share with wars their well defined geographical limits, may vary in duration (an earthquake may be over in a matter of minutes, a drought may

last several years), yet they can be expected to be only of temporary duration (except for exogenous climatic changes). A distinction between short- and long-lasting natural disasters is their impact: The former is likely to have strong direct effects while the latter may cause relatively intense effects in an indirect way over the long-term, possibly cumulating in sudden outbursts of further disaster such as famine or epidemics (Albala-Bertrand, 1993). Analogous considerations will shape the economic characterisation of war.

Conflicts are fundamental disagreements between two groups involving competing claims over the legal authority over some asset or territory and various methods and instruments for communicating and perhaps resolving this difference. Political conflicts characterise all societies and are the focus of much economic analysis. Violent conflicts involve the use of force in communicating and resolving the disagreement, where the type of force applied changes the nature of the violent conflict. In the extreme such conflict risks wide-spread and lethal use of force and the inherent and perhaps deliberate challenge of the opponent's authority. This is called war.

The analysis of war as a shock to an economic system crucially depends on the type of war under analysis.[2] Some wars are fought only with the intention of weakening an opponent rather than defeating them. Such wars of destabilisation will lead to large scale capital and technological destruction and uncertainty. Internal wars of destabilisation may require only very simple tools while their containment and (international) wars of conquest will typically require more sophisticated weaponry and organisation. In the case of Mozambique, it will be shown that both the *aim* of destabilisation (and hence the challenge to the legitimacy of the country's rulers) and *methods* employed in the pursuit of this aim shaped the economic nature of the war, namely larger than expected increases in capital destruction and the fiscal deficit as well as uncertainty and transactions inefficiency.

Arguably, a war is not a permanent change in an economy. One of the main implications of a temporary shock is that it will affect the savings behaviour of agents: Given the expected increase in future income (or equivalently the almost constant

[2] For reasons why a leadership may want to start a war (which of course are related to the net benefits of control over resources), see for example Bates and Collier (1995).

permanent income), people will dis-save for the duration of the temporary negative shock. For a permanent negative shock, however, permanent income unambiguously declines and consumption levels adjust accordingly. Therefore, the distinction between temporary and permanent shocks is crucial (Bevan *et al*, 1991). While at first a war may be perceived to be temporary, many wars quickly turn into lengthy campaigns with a highly uncertain outcome and time horizon, that is the war will become quasi-permanent. If a war is considered a quasi-permanent shock soon after fighting started, then agents' behaviour and expectations will quickly adjust to this.[3] The savings rate, for instance, may not change for the duration of the shock and expectations may be fully revised to reflect the new economic environment. Overall, this detailed definition of war has indicated that war may be viewed as a complex but not incomprehensible socio-economic shock, which differs significantly from trade shocks and natural disasters. It has thus been shown that both the conduct of war and its implications are more systematic if not rational than often assumed.

The post-1975 war in Mozambique was hence an internal war of destabilisation, using conventional weapons, with in parts only very basic equipment. The intention of the Renamo guerrilla (or their presumed Rhodesian / South African sponsors) was to lead a low-intensity war of destabilisation, not a full internal war aimed at taking over the administration of the country (Vines, 1991, Geffray, 1991, and Finnegan, 1992). The diffuse intention of destabilisation through terror suggested that the war created much confusion and volatility in the rural areas (particularly caused by Renamo) while the towns suffered a regime unsuccessfully trying to rebut the rural attacks. This caused an uneasy stalemate for over ten years without either side wanting or being able to protect the targets (mainly people and social infrastructure) with the exception of those in core urban areas. The government opted for an expensive, high-technological strategy of warfare making unsuccessful use of its capital intensive tools (like the colonial authority before) while Renamo used a very low-technology labour-intensive strategy to achieve its military (and political) aim of destabilisation. The general perception of the war was that would be quasi-permanently. The end of the war came unexpected and was conditioned by external political changes, namely the end of the

[3] It is unlikely that agents would have fully anticipated war many periods in advance thus war is likely to be a surprise to some extent.

Cold War and the change of government in South Africa, which reduced the level of intervention in Mozambique. However, the internal economic situation of both sides in the conflict may have contributed to the end of the war as well, as will be analysed below.

3. **Key Economic Aspects of the War Economy**

This section of the paper defines a set of economic variables and relationships which are directly affected by war shocks and which in turn shape the war economy. In particular, the variables capital, transactions efficiency, uncertainty, and the fiscal deficit will be defined and evaluated. Subsequently, household's objective function and the corresponding budget constraint, the production and investment behaviour of the firm, as well as the government's objective function and its budget constraint will be examined in detail.

3.1 **Capital**[4]

The category "capital" embraces a broad group of economic variables. It includes physical capital, human capital, and social capital. *Physical capital* includes assets such as roads, powerlines, hospitals, schools, etc as well as financial assets, natural resources and the environment. *Human capital* covers the number, skills and abilities of people in the labour force. *Social capital* encompasses institutions such as legislative, executive and legal systems as well as cultural and ethical values and attitudes. Hence the first two terms refer to physical assets while social capital denotes a more abstract concept. These three variables are denoted capital, labour and (transactions) efficiency respectively in this paper. Transactions efficiency is distinguished separately below, as it enables the use of capital and labour at lower transactions costs.

The most visible impact of war on an economy is on actual and desired capital stock. There are three channels of impact namely erosion, destruction and reallocation.[5] Erosion involves a loss of capital through its transformation to a lower value, including the complete disappearance of the asset in the special case of destruction.

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[4] The following section draws on Azam *et al* (1996).

[5] For human capital, the terms erosion, destruction and reallocation correspond to the instances of war-induced disability, death and migration, respectively.

For physical assets such as a school the meanings of these two terms are obvious yet both concepts can also be applied to abstract concepts such as law and order. Below a certain threshold, capital may not be operational, thus requiring less than full destruction to achieve complete economic destruction. Erosion and destruction involve direct and indirect effects. The former would be the loss of value attributable to enemy action while the latter includes externality effects. In addition, the economy-wide externality of a private loss of capital due to war action increases transaction costs (see below).

Reallocation relates to how agents anticipate or react to the effects of war on their portfolio. The erosion or destruction of a part of a portfolio is followed by a reallocation of capital assets, unless the net effect of the war impact was equiproportionate. In addition, reallocation may be brought about in response to other war variables changing, such as taxes or uncertainty. Given an ex ante optimal capital allocation, a reallocation must reduce productivity vis-à-vis peace time. Overall, reallocation may result in a reduction of both actual and desired capital stocks for a given activity, firm or sector.

The easiest way of conceptualising the impact of war on various types of capital is by analysing capital vulnerability. Note that war may affect the physical quantity of actual or desired capital, the value of the capital stock or the returns to capital (as well as the level of capacity utilisation of the firm which affects its efficiency of operation). Several aspects of vulnerability (related to the characteristics of capital itself) can be identified: Visibility, mobility, specificity, duration, and legality. Visibility makes an asset more vulnerable to attack. Indirectly, agents may anticipate this vulnerability ex ante and reallocate their capital into a less visible form. In addition, invisible assets are preferred if they have been obtained illegally or their legal status is uncertain.

Mobility acts to increase capital's vulnerability by making it more exposed to theft (keeping the capital's value unchanged but affecting its ownership). Immobility, on the other hand, would make an asset more subject to erosion or destruction thus reducing its value but maintaining its ownership intact. Expropriation by the state has the same effect as theft but may affect both mobile and immobile assets. Capital cannot be both invisible and immobile.

Specificity describes capital's degree of exclusiveness to an economic activity or sector. The more specific capital is to one activity or sector, the more vulnerable it is to military action in that area. This has an impact on the effect of anticipated warfare: Non-specific capital may be reallocated to another activity thus harming production in the threatened sector even before hostilities commence but at least putting this capital to some use in the economy (albeit at lower productivity). Specific capital, on the other hand, may continue to be operated even during the war but once attacked may cease to be functional. This makes general capital less risky compared to the all-or-nothing property of specific capital.

The duration of capital characterises the economic life span or life horizon of capital. A typical distinction is between non-durable and durable goods. The longer the life horizon of a capital good, the more vulnerable it becomes to possible future wars.

A war vulnerable sector such as the rural sector (both subsistence and export-oriented) in Mozambique is characterised by war vulnerable capital specific or common to that sector. Two examples would include livestock and irrigation machinery, respectively. A war vulnerable sector will experience the equivalent of a cost shock or an output tax since the erosion, destruction and reallocation of its capital will decrease both the scale of that sector and the overall economy. That is, the reduced capital stock acting as the input into a production function will directly cause a reduction in the level of output (a move along the function towards the origin). An indirect, transaction cost effect will cause the whole function to shift downwards as externality effects reduce the density of the market.

Portfolio holders will seek to reallocate their capital to optimise the portfolio in the light of the new war circumstances. Some traders may actually experience an increase in the profitability of their trading leading to further portfolio choices. War profiteers also exploit temporary illegitimate profit-opportunities (which may have high returns), providing an incentive to save. Other people likely to benefit from war and thus confronted with portfolio choices may be weapons traders or generals. War profiteers are likely to have a high savings propensity to the extent that they view the war as temporary (Sen, 1991). Finally, government policy will create incentives and risks co-determining capital reallocation and investment patterns.

War is likely to operate on the optimal level of capital, the current level of capital and on the adjustment coefficient of investment (denoted K^*, K_t and λ, respectively), particularly for war vulnerable capital or war vulnerable sectors. That is current capital is reduced through, for example, fighting while future capital may be reduced through long-term uncertainty and increased tax rates. Also the adjustment coefficient may fall, due to increased transaction costs in the economy and due to uncertainty.

3.2 **Transactions Efficiency**

Technology is "skills, knowledge and procedures for making, using and doing useful things" (Stewart, p. 1, 1977). It can be seen to consist of two complementary components: In a narrow sense technology involves (private) human capital including knowledge and skills. In a broader sense it also includes non-physical social capital created in part by government spending such as standards of government and communal behaviour ("social" human capital). For technology to be made available and subsequently be selected for use in a developing country, it requires physical capital and the externalities derived from it. These three forms of capital (human, social and physical) hence define the technology available to all economic agents and the level of technologies selected, or absorbed, in a particular developing economy. The potential level of technology used is improved further through scientific advance, thus creating more technology, or through education and institutional change thus permitting more availability and absorption (Ensminger, 1992).

Internal war in a developing country does not destroy global levels of technology but it reduces the local absorption of technology. In particular, war leads to significantly higher costs of market transactions, that is war reduces the *transactions efficiency* of the war economy (North, 1990). (This effect of war is related to the dispute over authority, that is to war uncertainty.) Transactions inefficiency may then shift down F(.) of equation (1) and decrease the speed of investment in equation (2). That is λ is reduced by war both through the breakdown of markets generally and the individual firm's reduced ability to operate effectively.

The type of war has a large impact on transactions efficiency. A scorched-earth policy in an internal war would have a comparatively larger negative effect on technological

absorption and hence transaction costs than would a swift, stable international war.[6] If only private assets but no social capital are affected by war, a quick restoration of private sector investment and output levels is possible soon after a war shock thus making a post-war peace dividend feasible. If much social and private capital has been destroyed, however, private investment will not recover unless public investment and confidence accompany the return of peace. Transactions inefficiency in conjunction with war uncertainty may thus lead to the destruction of the development capacity of the war economy. Such destruction of technological absorption and confidence will be hard to overcome even in the long-term.[7]

3.3 **Uncertainty**

The following paragraphs will consider a definition and sources of risk and uncertainty, opportunities for coping with them, and some of their basic effects. Consumption decisions and changes in the capital stock are closely related to issues of risk, uncertainty and expectations. A situation of perfect certainty is one in which all future events can be predicted without mistake by all economic agents, that is perfect foresight exists. In reality, however, events are impossible to predict accurately.

Risk represents the subjective probabilities agents attach to the occurrence of future events. This means that micro-economic variables will not be deterministic but rather have probability distributions of occurrence, which agents try to estimate based on their personal knowledge, experience and expectation-generating mechanism. In a war economy, this includes people's expectation of their time of and age at death.

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[6] The former was in fact pursued by Renamo in the rural areas hostile to its control. Its aim was to destabilise through deliberately random terror and to cream off the rural surplus as a way of financing its own war effort. However, it was not possible to achieve both aims in the long run. Renamo acted myopically as it destroyed much social capital and hence reduced the ability of those areas to recreate output thus damaging its own supply of war finance.

[7] It would be interesting to compare the breakdown of technology under war conditions with other such instances, e.g. as a result of informal or illegal market activity. Such markets may find substitutes for state provided technology hence ensuring continued market density (see also Chingono, 1995). War activity may be different from such activities if for example volatility and unique dangers of the war situation prevents the establishment of substitute social norms.

Several sources of risk can be identified in the context of agricultural developing countries (Ellis, 1993): Natural hazards or output risk, market or price fluctuations, social risk, and state actions. The existence of risk can allow markets for insurance to develop by providing insurers with a profitable opportunity for the diversification of imperfectly correlated risks. The provision of fair insurance would permit savings and production decisions to be made by agents regardless of the risks being faced. Instances of insurable risk could include fire, accident, crop failure, long, short or no further life, and ill health. Yet frequently insurance markets break down. This could be due either to moral hazard or adverse selection problems, so that informal provision of insurance (e.g. through interlocked markets or non-market institutions) may be more efficient as long as the risks are imperfectly correlated among different members of the relevant group. In addition, insurance will not be provided to cover for war-induced damages as war is a highly correlated risk for a given geographical, ethnic or political entity.

The main question in this context is whether one would expect war to change people's attitude to risk. While at first sight such change may seem likely, a more realistic approximation of risk behaviour is to consider an unchanged utility function across time but to recognise that it is not people's attitudes but their actions that change as their circumstances deteriorate. That is, individuals close to the survival threshold will not become more risk averse but they will act differently in order to avoid a further deterioration of their situation. Each person has an inherent contingency plan for how to behave in the face of disaster. The drawing closer of the disaster precipitates the pre-specified action, not a new plan. If, for example, agents' survival probability p is related to their consumption level but their utility function remains unchanged, their actions would focus ever more intensely on maintaining a minimum level of consumption as they approach the survival threshold. On the other hand, the population as a whole may exhibit various risk attitudes. For example, people drafted will not become more risk averse simply because they are now fighting but their personal attitude towards risk taking is determined by their personality from the start. Therefore, this model treats utility as not being directly affected by war.

Uncertainty refers to the experience of a variety of risks in the whole economy. Expectations tend to be defined relative to some optimal value (such as K* for capital)

and may influence adjustment variables such as λ for the case of investment. Information availability and processing will thus be crucial to coping with risk and uncertainty at the micro and macro levels of the economy. The expectations formation process itself may be damaged or affected by, for instance, a confusing war situation lacking either clear battle lines or victors. War uncertainty therefore is the extreme version of state-induced uncertainty. This is distinguished by its near-perfect correlation of risks among households and hence its uninsurability.

The source of much war uncertainty is the conflict between two parties over authority and legitimacy. The erosion of either or both increases war uncertainty. Thus war uncertainty need not imply "maximum" uncertainty but rather a form of uncertainty related to fundamental state functions and actions. Further adding to war uncertainty is the imprecise nature of the start and end of wars. Both for agents affected and for research purposes it may be difficult to date wars in the economic sense. For most economic purposes, conflicts last longer than the military campaign itself. An example of this is the case of an expected demobilisation of one army at the conclusion of an internal war.

War uncertainty operates at the micro and macro levels of the economy. Capital, for instance, may be exposed to war destruction and dislocation at the micro level through theft and violence (micro war uncertainty) and at the macro level through the abuse of state authority in a partisan way (macro war uncertainty). In addition, macro war uncertainty includes the use of the government fiscal machinery and economic regulation for war-related purposes thus reducing transactions efficiency. For agents, war uncertainty will be more severely felt the less they can substitute from vulnerable into less vulnerable assets or activities. The existence of vulnerability reducing institutions such as social networks and income diversification opportunities permit a reduction of this exposure to war uncertainty thus positively affecting people's welfare.

Some basic consequences of war uncertainty include: A large reduction of social capital, reducing the size of a future peace dividend and undermining confidence in the long-term viability of the economy. In addition, the reduction in confidence is likely to reduce asset transactions (except for the purpose of war-induced reallocation

or war-profiteers' asset accumulation) with the consequences of reduced investment and productivity, fewer risk-reduction opportunities, and further reduced market density.

The war uncertainty associated with the government is dependent on the type of conflict: In a stable international war, the government may have little uncertainty attached to its operations. The more likely it becomes that the opponent's aim of assuming sole leadership will be achieved (or the more volatile the war perhaps as a proportion of domestic territory affected in a short time period), the more single-minded the government will become in placing the war effort above all other policies. That is, the more threatened a government is the more it will regulate the economy to ensure its own victory.[8] But a more regulated economy is also likely to be less efficient. Furthermore, such threatened leadership may increase uncertainty by reducing policy credibility. The effects will be a reduction in investment due to the immobility of some forms of capital (an undesirable property of capital in times of uncertainty), due to the effect of uncertainty on savings (van Wijnbergen, 1992), and due to capital flight.

3.4 **Fiscal Deficit**

The fiscal deficit of the government is endogenously determined by warfare through effects on the tax revenue T and on government expenditure G. Both variables are dependent on the type of war fought. Tax revenues depend particularly on the war experience of the population as they are also the targets of the tax authority. Negative influences on T may be counterbalanced to some extent through coercion, both in volatile and in inconsistent wars, by increases in the tax rates and the tax bases. Yet there will be decreasing returns to scale in such activities due to tax evasion, which itself should be easier to achieve successfully in times of internal war. An easily taxable sector for a government in a developing country is the agricultural export sector as it involves a few readily recognisable units such as multinational firms with offices and accounts available in the capital, large concentrated plantations, obvious harvests and hence trading seasons, bulky goods, and particularly few channels of transport (e.g. international ports). Hence one would expect the agricultural export sector to be

particularly vulnerable to excess war taxation. Finally, tax raising operations will be limited further by the parallel decline in transactions efficiency, human and social capital, and the increase in uncertainty all working to undermine the effectiveness of tax raising operations by decreasing the revenue base and reducing the morale and habits of the taxable population further.

In the spirit of Barro (1990), there may be four functions of government spending: Providing production inputs, property rights, household consumption goods, and providing government consumption goods. The first function involves the government taxing the private sector to redistribute such revenue in the form of public production inputs (G_P). Second, the government may spend its revenue (G_L) on creating and enforcing property rights and other legal services needed to maintain an economic environment conducive to undertaking market transactions. As the private sector will benefit from the existence of a legal system without directly depending on it in the production process, this aspect of government activity is considered separately under the heading "transactions efficiency".

Third, the government may use its tax revenue to provide consumption goods (G_H in aggregate, h per household) to households directly, for example by subsidising housing. Such consumption would enter the agent's utility function directly alongside privately purchased consumption goods such that u = (c,h). In the context of war analysis, this may be relevant for the modelling of why wars take place and how leaderships attempt to bribe their followers to achieve victory. But below, this function of government will be ignored. Finally, the government may provide itself with consumption goods using its available tax revenue. That is, the war effort for instance will require the government to spend a share of its budget on unproductive war activities (G_W) from which the government itself derives utility.

As in the case of tax revenue T, government expenditure G will be affected by the type of conflict under way. Divergent styles of warfare by the two sides in a war result in different fiscal needs of both sides. In many conflicts it may be justifiable to determine

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[8] This is plausible as regulation is the only policy tool of government and wars typically are not won by deregulating domestic activity - after all military activity is a

the activity of the rebels as costless for the government (i.e. it is not in need of T or G and outside the GDP accounting framework) and exogenously determined (e.g. through the donation of foreign military hardware). As the rebels cannot normally provide their own consumption goods as bribes to the population, the rebels' main aim may hence be the reduction of the government's tax base and revenue. The actual size of government expenditure is not likely to be indicative of the extent of government involvement and regulation of the economy. In line with the need to raise further taxes, regulations such as production quotas, set prices or contributions in kind will give the government further opportunities for fulfilling its need for command over resources but these also have the effect of further increasing market transaction costs.

Foreign civilian aid may be increased or decreased in times of war hence positively or negatively affecting the fiscal deficit. Typically, one would expect a reduction in investment or project-oriented aid in line with the general reduction of investment in the economy while expecting an increase in consumption and relief-oriented aid to lessen the negative human costs associated with war. The net effect of war on aid is ambiguous a priori: War may (or may not) increase the inflow of foreign aid into the economy. **But** aid generally is dependent on factors exogenous to the recipient country. The uncertainties surrounding the provision of aid are another factor contributing to increased level of war uncertainty.

Aid resources may either directly benefit the government (thus allowing increased government spending) or they could enter the private sector directly (thus affecting private capital stocks and consumption levels). In any case, foreign aid inflows will relax the balance of payments constraint.

Finally, the fact that many developing countries are controlled economies seemingly complicates the analysis of the economic impact of war. Yet two factors help to ease the matter. First, the planning policies followed often are partially shaped by the experience of the war (the political change is not entirely exogenous) so that they need not be considered a fully independent variable. But this strengthens the concern over the use of models assuming free choice of individual consumption levels. Second,

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very authoritarian and centralised affair (Milward, 1970).

socialist reforms often work in the same direction as the effects of war (e.g. in reducing the efficiency of the market) so that while it may be difficult to assess the relative strengths of the two variables, they both have similar effects (see also Wuyts, 1989).

In conclusion, it may be justifiable to consider only the fiscal position of the government as the rebels' activity is largely exogenously determined. Depending on the type of warfare undertaken, T will need to be increased but opportunities to do so diminish during certain wars while G is raised, particularly for a high-tech war. The net result is likely to be a steep increase in the overall fiscal deficit of the government with consequences for policy credibility and long-term investment confidence.

3.5 **Individuals**

First, consider the individual's objective function:

$$\max \int_t^{\infty} u(c(z))e^{-\theta(z-t)}dz \tag{3}$$

and the corresponding budget constraint:

$$\int_t^{\infty} c(z)e^{-r(z-t)}dz \leq \int_t^{\infty} y(z)e^{-r(z-t)}dz \tag{4}$$

This set of equations is important as it represents a rational, optimising economic agent who derives her utility from consumption spread across the present and future. The only restriction placed upon her is that the net present value of her consumption may not exceed the net present value of her resources. The agent's challenge is to determine the optimal levels of consumption and savings given her set of resources consisting of labour income y and wealth.

The context of Britain in World War II suggests that consumption, savings and incomes are not jointly determined by individuals and by central government (Keynes, 1978). With rationing, consumption is not an entirely market-determined variable. Yet labour supply, wages and hence incomes are not fully market driven in a war economy, either, as people are being drafted into the army. As Keynes realised for the case of Britain, it is essential for financing any war effort to calculate optimal values for

these variables centrally while accepting parallel but decentralised market behaviour. The present analysis will utilise the set-up reflected in equations (3) and (4) while recognising the limited realism of this theoretical polar case under conditions of war and some degree of central planning.

3.6 **Firms**

Following Barro (1990), assume a private sector production function CRS in capital K and government goods G:

$$F(K,G) = K \times f\left(\frac{G}{K}\right)$$
$$\Leftrightarrow \frac{F(K,G)}{K} = f\left(\frac{G}{K}\right) = A \times \left(\frac{G}{K}\right)^{\alpha} \quad (1)$$

where α represents the effectiveness of government versus private services in production. Capital in this equation has been defined broadly to include human capital L. This formulation of the production function F(.) introduces a number of interesting concepts. First, it shows that a shock-related reduction of capital K will affect output immediately. In addition, a similar reduction in government spending G or a destruction of public infrastructure financed by past government spending will also reduce private output.

Second, it shows the need for a government sector except for the limiting case of private output only depending on private sector inputs, such as capital and labour. That is any discussion employing the simplified production function F(K, L) must be aware that it can only reflect the polar case of perfectly competitive, functioning markets. The endogenous growth literature on the one hand and the empirical prevalence of controlled economies in developing countries on the other hand suggest that one must consider the role and effects of the government sector on the economy. Furthermore, under perfect competition the marginal product of capital equals the rate of interest r. Yet empirically, r is frequently determined by non-market forces (e.g. it may be set by the government) with informal credit markets charging seemingly excessive rates and credit rationing being practised. This suggests the existence of strong market imperfections perhaps even amplified by the war situation.

Third, equation (1) introduces variables A and α reflecting the level of absorbed technology of the economy. These variables will be particularly difficult to estimate but to the extent that war reduces the take-up of technology, these variables will change.

Current investment, I_t, is assumed to be determined as follows: :

$$I_t = \lambda\left(K^* - K_{t-1}\right),\ 0 \le \lambda \le 1 \tag{2}$$

where K* stands for the desired capital level in the current period, K_{t-1} for last period's actual capital level, and λ for the adjustment coefficient of investment.[9] The latter determines the speed of adjustment. According to standard theory, this ought to be determined by relative prices of inputs and the exchange rate for the open economy. However, the degree of factor substitution and the availability of finance will also be important in practice. In fact, one might expect that in war, to the extent that banks are physically destroyed, the flow of financial funds available for investment might be reduced. Yet if investment is financed by retained earnings, the importance of financial markets is strongly reduced. Overall, λ is a summary variable reflecting a large set of economic conditions. Once more, it is important to consider the polar case of perfect markets which implies instantaneous adjustment where λ is set equal to 1.

The desired capital level K* for period t is a function of relative output prices, profitability and demand as well as a function of expectations under uncertainty. The latter case becomes important in times of war in particular. Dixit and Pindyck (1994) formulate the theory of option value. It accounts for three stylised facts of investment: Any investment project involves uncertain future costs and benefits, investors can decide the timing of investment, and investments are reversible only at a cost once undertaken. These facts require that the net present return of investments must equal the net present cost of investments plus the cost of keeping the option to undertake the investment open. That is there is always some value in not investing under

[9] This analysis for the time being abstracts from issues of depreciation. In practice, war may increase capital depreciation. For example, landmines will depreciate the value of land. However, given the high land / labour ratio in Mozambique, this is likely to be a short-term and humanitarian problem.

uncertainty. Under conditions of extreme or war uncertainty, this option value may be very high, thus explaining why apparent liquidity in an economy may correspond with very low levels of actual investment. From that point of view, war uncertainty is an extreme form of policy uncertainty, which can act as a tax on investment (Rodrik, 1991).

Finally, beyond the planning, execution and financing of investment lies the issue of how household savings (that is income minus expenditure) is being translated into investment and hence increased future output. Models such as that of Blanchard (1985) concentrate on the treatment of household choices and assume a one-to-one transformation of savings into investment. Yet as seen above, consumption and investment are functions of different variables (among others, income and profitability, respectively). Thus the assumption of the equality of consumption and savings may not hold a priori (Schmidt-Hebbel *et al*, 1996). Therefore, models considering both private optimal consumption and firms' optimal production ought to consider more explicitly the link by which foregoing the former leads to the latter. Overall, economic shocks may affect firms by influencing current and desired capital, the production technology, the investment adjustment coefficient, and firm-relevant government spending. These variables in turn determine investment and output levels.

3.7 **Government**

Consider a government with the following objective function (Barro, 1990):

$$\max \int_t^{\infty} u(G) e^{-R(z-t)} dz \tag{5}$$

and the current period government budget constraint:

$$G(t) + r(t)B(t) = T(t) + \frac{dB(t)}{dt} + M(t) \tag{6}$$

where G(t) denotes current government spending, r(t)B(t) denotes current government debt service payments, T(t) denotes current taxation revenue, dB(t)/dt denotes the

increase in government debt for the current period, and M(t) the current foreign aid received by the government.

Equation (5) states a specific but perhaps not obvious government objective function. For the purpose of analysing changes in preferences and war, however, governments may conveniently be viewed as following a specific agenda, for example maximising their war-related government spending. Yet as war economies frequently are subjected to strict economic controls, one could also view the government objective function as consisting of maximising national output or asset value (Milward, 1970).

The constraint (6) indicates a number of ways in which a government can raise its resources, namely taxation, debt and foreign assistance. It will be important to consider the decomposition of government spending and the sources of taxation in the war economy. Each may have further economic effects and may be subject to economic shocks. Overall, the variables G, T, and M will be affected by economic shocks and will in turn determine the debt B and perhaps the rate of interest r.

4. **A Dynamic Model And Its Predictions**

The aim of this section is to analyse the dynamic effects of a war shock by building an intertemporal model of a closed economy based on the definition of war and the discussion of the war variables and the economic agents developed above. Particular issues to be analysed include the effects of government war-finance, the effects on capital formation and the level of private consumption. The analysis in this section will start from the benchmark of perfect markets since this permits the model to be build on explicit micro foundations. A basic macro-model will be introduced and its principle mechanisms of operation discussed before extending it to take account of war. This model will yield some predictions which will be tested for the Mozambican case. Assume initially that the change induced by war occurs instantaneously between two time periods. This assumption will permit the analysis of the effects of a war shock. Later in the analysis it will become apparent, however, that some war shocks have a long-term impact thus implying different types of time profiles for changes in the endogenous variables.

4.1 **The Set-Up of the Model**

The basic model of this section, first developed by Blanchard (1985) and well explained in Blanchard and Fischer (pp. 115-126, 1989), is characterised by two crucial assumptions. First, it assumes that individuals have a finite horizon as people have a constant probability of death per unit time, p, throughout their lifetime. This is equivalent to expressing the expectation of the variable time-remaining-till-death, X, as $E(X) = 1/p$. The value of the parameter p is determined by, for instance, conditions of public health and nutrition and is uniform across the whole population. Note that p represents the only source of individual uncertainty in the model. This set-up will imply a model with varying horizons among agents and overlapping generations (OLG) but it will not capture life-cycle effects or diversity among agents in their marginal propensity to consume. The absence of retirement may be more realistic in developing countries with no social security system and low life expectancy. The absence of childhood, however, does not fit as well with reality. The more homogenous the economy under analysis, the more realistic the model will be.

It would be interesting to make explicit the dependence of p and $1/p$ on living conditions through the specification of the following function (Gersovitz, 1983):

$$(1/p) = p(c), \quad (1/p) = 0 \text{ for } c \leq \underline{c}$$
$$p' > 0, \quad p'' < 0 \tag{7}$$

This shows that indirect effects of war leading to a reduction in consumption can kill if consumption falls below the threshold level of c. For the time being, however, only the basic model will be considered.

Second, the basic model assumes perfectly competitive markets. Further assume that individuals only derive utility from their own consumption, not from that of their relatives (hence ruling out positive bequests), and that negative bequests are not permitted. Under the ensuing utility maximisation problem, perfectly competitive insurance companies hence sell policies paying a premium of p to each person alive per unit time, in exchange for a unit of the deceased person's estate on his death. All agents will find it optimal to contract out at the beginning of their life their whole wealth-upon-death thus receiving the premium pV(t) each period while alive. Death

itself brings zero utility to the individual. In order to justify this obvious abstraction from reality, agents may be viewed as making use of non-market institutions such as multigenerational families and households in trading their wealth-upon-death for current support hence approximating the working of the efficient market. However, agents continue to follow individual, not group, maximisation.

Individuals' utility function is then given by:

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma},\ \sigma \neq 1,\ \sigma > 0$$
$$u(c) = \log(c),\ \sigma = 1 \tag{8}$$

where σ = 1 for realistic simplicity. As will be seen below, a decrease in the elasticity of substitution decreases the steady-state capital stock in the basic model.

The objective function, which each agent aims to maximise at time t, is:

$$\int_t^{\infty} \log c(s,z) e^{-(p+\theta)(z-t)} dz \tag{9}$$

where θ stands for the individual rate of time preference (or personal discount rate). This shows that the additional uncertainty deriving from the unknown time of death is equivalent to increasing the personal discount rate. The objective function is maximised subject to the budget constraint which assumes perfect markets. In times of rationing, or with imperfect markets more generally, people may not be able to make use of their earnings and forced savings can result (Barro and Grossman, 1971).

Individual and aggregate consumption are a function of individual and aggregate wealth, respectively, with a marginal propensity to consume (MPC) of p+θ, as shown below for the aggregate case:

$$C(t) = (p+\theta)\left[V(t) + H(t)\right] \tag{10}$$

V(t) and H(t) denote non-human and human wealth, respectively, and capital letters denote aggregate variables. Changes in these wealth variables can be expressed as:

$$\frac{dV(t)}{dt} = r(t)V(t) + Y(t) - C(t), \text{ for } pv(t,t) = 0 \tag{11}$$

$$\frac{dH(t)}{dt} = \left[r(t) + p\right]H(t) - Y(t) \tag{12}$$

Together, these three equations denote the aggregate behaviour of the economy. Both the MPC and the discount rate for human wealth are positively related to p, the death probability. Note that the assumptions concerning the death probability and logarithmic utility strongly shape this result, in particular the assumption that MPC is independent of the interest rate. There exists a difference in the rate of individual wealth accumulation, r+p, and aggregate wealth accumulation, r, which will motivate some of the discussion to follow. The difference results from the second crucial assumption about insurance availability where the payment pV is a transfer, but not net social wealth. A newly born cohort owns zero wealth by assumption (see equation (11) for this condition) which explains the breakdown of Ricardian equivalence below.

The constant returns net production function for the two inputs labour capital and labour is defined as:

$$F(K,L) = AK^{\alpha}L^{1-\alpha} = AK^{\alpha}, \text{ for } L = 1 \tag{13}$$

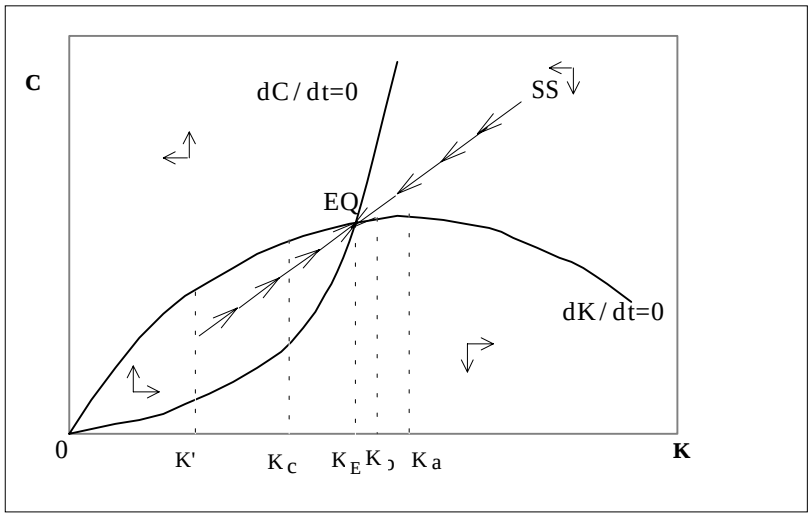
The combination of the household and production sides of the model then yields:

$$\frac{dC(t)}{dt} = \left[F'(K) - \theta\right]C(t) - \left(p + \theta\right)pK \tag{14}$$

$$\frac{dK}{dt} = F(K) - C(t) \tag{15}$$

which characterise equilibrium in this model. Figure 1 represents this dynamic system as a phase diagram.

Figure 1: Dynamic Adjustment in the War Economy



Source: Blanchard, p. 232, 1985.

The locus $dK/dt = 0$ follows from the shape of the production function and represents the steady state in which all output is consumed ($F(K) = C(t)$) while the $dC(t)/dt = 0$ locus is convex from the origin, approaches K_b asymptotically and represents the steady state level of consumption. At K_a, $F'(K_a) = 0$, that is steady state consumption is maximised. At K_b, $F'(K_b) = \theta$, and at K_c, $F'(K_c) = (p+\theta)$, such that $K_c < K_b < K_a$. K_E is the first equilibrium level of capital where the two loci intersect at point EQ such that $\theta < F'(K_E) < (p+\theta)$. This property of $r > \theta$ is required for the creation of positive aggregate capital formation given the assumption of a flat life-cycle income and the first order conditions of the maximisation problem. That is, there will have to be positive savings initially for each individual to maintain a positive capital stock in the aggregate. A second equilibrium exists at the origin. Equilibrium EQ is associated with the unique upward sloping saddle path SS. Therefore, $r > \theta \geq 0$ implies dynamic efficiency in this system.

The government in this simple model will provide, first, some capital goods G_P to the private sector which will be included in a broad definition of capital. Second, it will spend a fixed amount G_L on the maintenance of law, order and property rights thus improving the transactions efficiency and hence the production function. Third, the government will allocate G_W to the war effort, which is entirely unproductive. Hence assume the government spends goods $G = G_P + G_L + G_W$ (where G does not affect the

marginal utility of C and hence leaves individual consumption decisions unaffected), collects non-distortionary lump-sum taxes T and holds the level of debt B.

The new expressions for aggregate consumption and wealth (which now including the government variables and its budget constraint) imply that for $p > 0$, Ricardian equivalence breaks down because newly-born agents do not own any non-human wealth (Sen, 1994). This will affect the welfare impact of government debt.

4.2 **Capital**

An exogenous decrease in physical capital induced by war through destruction, erosion or reallocation would be reflected in the basic model as an exogenous, one-off reduction in the value of the aggregate variable K for a given population size. In conjunction with the second crucial assumption, this implies that each agent's capital stock must be reduced equally by a reduction in K. Otherwise life insurance companies would no longer find it profitable to continue paying premia pv(s,t) while receiving smaller net payments upon death in total. Instead, premia and payments shrink proportionately. Thus capital holdings and hence wealth for individuals, on the one hand, as well as the capital available for production as an input (that is V), on the other hand, are reduced by war (a budget-production duality for K). This is reflected by an exogenously reduced value of K in the model.

This capital destruction resembles a natural disaster shock and subsequent adjustment process. The effects of a reduction in the capital stock can be evaluated in terms of equations (14) and (11): The negative capital shock to, say, K' will require a parallel, temporary reduction in C(t) to allow capital to accumulate along SS, that is to ensure that $F(K) > C(t)$ until the steady state once more holds at EQ in figure 1. The speed of adjustment back to the old and new equilibrium at K* depends on investment lags and on how the war affected the other war variables. Overall, the temporary capital reduction works as a step back in time for welfare: The old equilibrium level of capital may be obtained but the lost welfare resulting from decreased consumption in times of the re-accumulation of capital is permanent. Equivalently, the total past consumption post-shock will be smaller than it would have been in the absence of war but the level of consumption relative to the new capital stock at K* will be the same. Hence, catching up with the now hypothetical peace-time optimal output level is not possible.

If post-war economies, perhaps even the defeated side, seemingly attain higher levels of output and welfare than peace-time or victorious countries, it is not simply due to the destruction and replacement of capital as modelled here.

Labour income and hence human wealth are not variables directly affected by war in this model. Yet an instantaneous, one-off and equiproportionate reduction in the population, and hence labour stock L, across all cohorts through death, disability or migration would shrink the size of the entire economy for a given capital stock and at full employment. However, the level of uncertainty would not increase as this war shock is instantaneous. Hence, all equations involving aggregation across all cohorts will find their respective values reduced by a reduction in labour. In equation (11), a reduction in L would decrease C(t), as fewer people now exist to consume, and it would decrease F(K), as less labour input is available to produce, revealing a consumption-production duality. The difference between K and L is an asymmetry at the individual level: That is a reduction in K affects every individual a little but a reduction in L affects only some individuals (but those very severely).[10] The fact that insurance companies are willing to continue to offer policies to individuals affected by war indicates the special assumptions on which the model and the shock are based. In circumstances of asymmetry (e.g. people are either soldiers or civilians) and imperfect information (insurance companies cannot distinguish these two types), companies may refuse to offer the contracts used in this model since soldiers are more likely to die than civilians. These people would be contributing less to the insurance fund until death than the average person, thus making those contracts unprofitable. Depending on the number of individuals affected by war, the insurance market either breaks down or contracts become more expensive making them less worthwhile particularly for civilians who are less likely to die. In fact, the population is heterogeneous in regard to another aspect abstracted from in the model, namely aspects of the life cycle. People are born and may die being dependent on their families for maintenance and

[10] A similar asymmetric effect results from the destruction of capital in a non-CRS model: The owner of profits accruing from capital will incur a relatively larger loss from the destruction of his capital than will society at large. If capital is specific and the war shock instantaneous, capital destruction will increase the future marginal productivity of investment. Yet the war in Mozambique was quasi-permanent so that war vulnerable capital, despite an otherwise high MPI, is unlikely to be replaced. That is, the *expected* MPI for specific yet war vulnerable capital is low.

care. The war-induced death of economically inactive child causes a reduction in transfer payments but also a destruction of discounted future earnings while the death of an inactive old person would only reduce transfer payments thus revealing a further asymmetry.

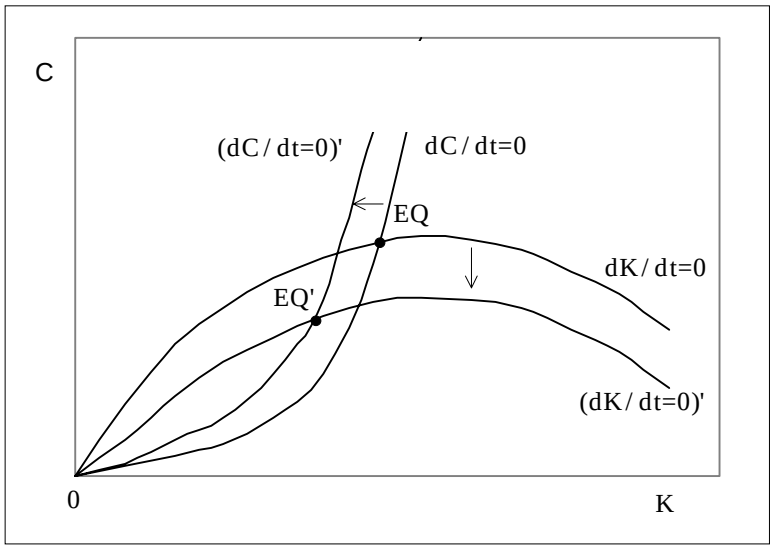
In conclusion, a reduction in capital is readily modelled in this context. Yet there is an asymmetry between a reduction in the labour force at the aggregate versus the individual level. The prediction, therefore, concerning the effects of a reduction in the war variable capital is that it will lead to a temporarily decreased level of consumption. This recovers with the re-accumulation of capital, although the output level possible before the shock will no longer be obtained thus leading to a reduction in welfare.

4.3 **Transactions Efficiency**

The function F(.) with its parameters A and α of the production function (13) define the constant returns to scale (CRS) production technology absorbed in this model. As previously discussed, the type of war affects the level of absorbed technology. For example in an internal war, the biased government may be unable to provide law and order thus increasing transaction costs and harming production (as well as increasing uncertainty), possibly for lengthy periods of time.

This effect may be represented by defining a productivity parameter A_t in the production function (13) such that $A_{t+1} < A_t$, thus reducing output for a given level of capital and labour inputs (i.e. making production less productive but keeping it efficient). Such unexpected multiplicative productivity shock reduces the marginal productivity of capital and has two effects in equations (14) and (11): On the one hand, the dK/dt schedule will shift down to reduce consumption for a given capital stock. On the other hand, the dC/dt schedule will shift left, as consumption will increase but the marginal product of capital will decrease for a given capital level. Overall, then, the equilibrium will move from EQ to EQ' in figure 2, that is the economy is shrinking.

Figure 2: Transactions Efficiency in the War Economy



The decrease in spending G_L reducing A_t can also be looked at as an increase in the effective income tax rate since a less effective tax collection calls for an increase in the rate of taxation. This illustrates the positive effect of government spending in the field of property rights and the legal system.

Equivalently, a negative productivity shock may be modelled as a rise in the rate of taxation where the extra revenue was spent by the government as to leave agents' utility unaffected. As such, an increase in the effective tax rate may last for a long time (until tax compliance has been re-established), government and the private sector will find their post-war capacity for reconstruction strongly diminished. The government therefore has less scope for revenue raising thus reducing the number of new investment projects available for reconstruction. Furthermore, the private sector faces lower incentives for investment at the given, higher rates of effective taxation. This interdependence of government spending and transactions efficiency is an example of the complex interactions in a war economy.

In conclusion, the effect of war on transactions efficiency is twofold: At the aggregate level, technological regress reduces the size of the economy for a given size of the population and thus leads to lower welfare per capita. In addition, technological regress is likely to destroy the capacity for generating future development, although

this is a difficult concept to express within the dynamic model. Proxies for this effect include the increased tax burden or reduced productivity of individual firms.

4.4 **Uncertainty**

The model captures uncertainty through the individual probability of death, p, and the expected individual life horizon, $1/p$. A one-off war shock will kill some people and thus shrink the economy but would not affect uncertainty. This section is hence concerned with a sudden change to p which lasts several periods.

War may be modelled in this context by increasing the value of the parameter p, thus specifying an increased probability of death through the additional possibility of dying in war actions. Obviously, the type of war will affect the extent of such increase in p: Military action only aimed at military targets would only increase p for soldiers. However, with the advent of high technology warfare aimed at civilians and the continuation of "medieval" warfare in many developing countries, the whole population may directly experience an increase in the value of p. In fact, about 95% of all war-related deaths in Mozambique were of civilians (Stewart, 1993).

In addition, wars may kill citizens directly through fighting or indirectly through malnutrition and disease which may result from a breakdown in markets induced by high transaction costs and which in turn leaves sections of the population (e.g. refugees, peasants) more vulnerable than others. It may thus be difficult to estimate the exact extent of war-related increases in the probability of death and it may be slightly unrealistic to assume this affects the population uniformly.

On the one hand, actual deaths diminish some people's human capital completely and diminish total human capital (the labour force) slightly. On the other hand, the increase in p increases everybody's uncertainty slightly. Hence the effect of the first casualty in war is two-fold: First, it reduces aggregate human capital and, second, it changes aggregate perception of likely mortality to a new and higher p. An increase in p then results in a shift of $dC(t)/dt$ in equation (14) to the left (thus reducing the optimal steady state capital level K_E and increasing the steady-state interest rate. This effect is reversible, given functional markets, once war uncertainty and hence p revert to peace-time levels. Yet with strong transactions inefficiency, markets may be unable to restore output even if p reverts to its pre-war level. A temporary shock may

therefore have a permanent effect. Expressed differently, p may revert back to its usual level much quicker than output.

Return for a moment to the endogenous survival probability of Gersovitz (1983). Recall that people may die from the indirect effects of war if war results in levels of consumption below a threshold of c. At the micro level, this implies increasing propensities to consume with decreasing incomes. In addition, endogenous survival may lead to a reduction in the efficiency of the annuity market. Three cases may occur: The poor subsidise the better off (as the poor have a lower survival probability), the market breaks down completely, or informal institutions (the family) substitute for the inefficient annuity market. Thus endogenised survival provides a further rationale on why the basic model's assumption of perfect markets may not obtain in reality. In addition, this extension indicates once more how development may become unsustainable under war conditions. The decreased consumption of large parts of the population would force more people closer to the survival limit and lead to further income inequality or market failure through the channel of the annuity market.

Other elements of uncertainty may of course be present in a situation of war. This includes people's willingness to discount future benefits more highly (affecting θ) as well as the dispersion of prices, quantities traded and the variance of other such economic variables. In regard to θ, one may abstract from varying this parameter due to war as it acts in the same way as p. The individual's objective function (3) shows this clearly. The level of consumption in equations (7) and (8) also is co-determined by both θ and p. Any increase in the value of θ would hence only reinforce the increase in the value of p and thus the basic conclusion of a reduced capital level but such modification would not create any further analytical results. Generally, an analysis with several forms of uncertainty may not yield results much different from this basic model, making the analysis hardly worthwhile (for such extensions, see Blanchard and Fischer, 1989). The conclusion would remain that consumption is a function of current and future incomes, wealth, and parameters of taste and risk aversion. Therefore, this analysis assumes certainty except for the time of death.

4.5 **Fiscal Deficit**

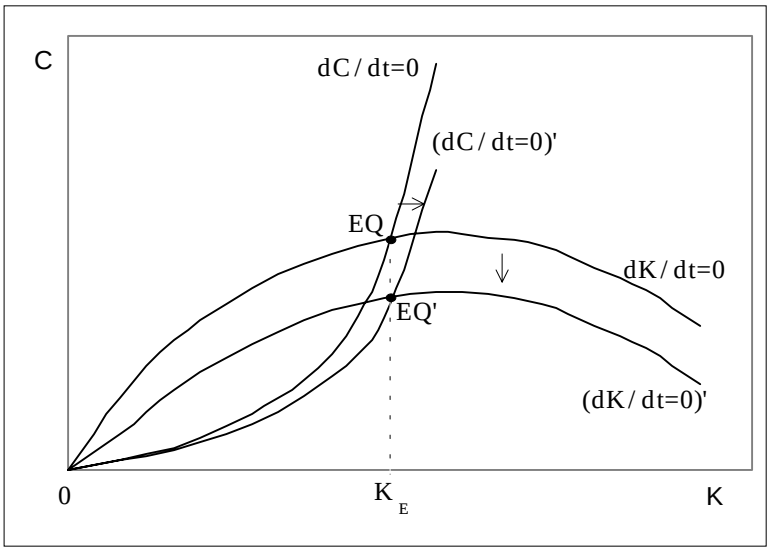
The effect of an increase in G_W or a decrease in T are symmetric in this model, hence a change in both variables can be analysed as a comparably stronger change in one variable only. Furthermore, the inflow of foreign aid, as mentioned above, may in this model be viewed as increasing T and thus expanding the government's budget constraint. Conditions on aid may prevent the government from freely allocating it to any of the four uses of G. Yet even aid tied to humanitarian purposes may free other resources which in turn can be dedicated to the war effort. Spending a part of the budget on the war effort amounts to the burning of productive resources on the supply side of the economy. The following paragraphs will consider the effects of an increased budget deficit spent on the war.

First, government expenditure on non-productive or non-utility raising goods may also be modelled as a negative additive shock to the production function. This is a non-monetary taxation system, in which the government suddenly and permanently extracts a set amount of resources T per unit of time from producers such that equation (13) becomes:

$$F(K) = AK^{\alpha} - T \tag{16}$$

This additive shock, however, leaves the marginal product of capital unchanged so that, in a world with otherwise no government activity, $dC(t)/dt$ in equation (14) is not directly affected. Equation (15), specifying dK/dt, will have a reduced value for F(K) thus shifting down to maintain equality between F(K) and C(t). Therefore, $dC(t)/dt$ will be shifted right as (for a given capital stock and a given marginal capital productivity) consumption will have to decrease. Thus, consumption decreases but the capital stock is unaffected at the new equilibrium EQ' in figure 3.

Figure 3: Taxation in the War Economy



Second, government debt finance in this model has a differential welfare impact as different people in the model are differentially affected by government debt and taxation. Consider a given level of G but a reduction in T at time t due to the war, ultimately financed through increased taxation in time t+s in the post-war period. Under these circumstances, the government needs to conform to its budget constraint which uses the interest rate r(t). Aggregate demand is increased through increased net human wealth and hence higher consumption (both a larger tax reduction and a larger s work to increase consumption further). Yet human wealth is defined using the discount factor r+p. A proportion of agents at time t will expect not to be alive at time t+s when some newly-born generations will have to contribute to the increased tax burden. Since the newly-born agents do not possess wealth at birth as discussed above, they carry the burden of financing previous budget deficits. Their welfare is thus traded off against previous generations' increased welfare.

The focus of the third issue is the portfolio effects of fiscal policy on general equilibrium. A reduction in T at time t and an offsetting increase in T at time t+s for a constant G increase the equilibrium level of debt and reduce the steady state level of capital. Likewise, an increase in G_W and B for a constant T would have a comparative negative effect on the steady state capital level (the crucial magnitude being the net fiscal deficit). Hence, government debt is a burden on the economy in this model as it

displaces capital from the portfolio of individual savers and thus diminishes the productive capacity to sustain growth now and in the future.

Fourth, the decomposition of government expenditure indicates that even if the government wishes to reallocate some of its G_P expenditure towards G_W (thus increasing G by less than G_W at the start of the war), the economy will suffer negative effects. That is, the government cannot decrease G_P by as much as G_W increases because less productive spending also implies less tax revenue. The externality of G_P hence ensures that even with budgetary reallocation, war spending always implies a debt burden. For example, a reduction in spending on productive capital will decrease firms' effectiveness, as can be seen from equation (1) where G is replaced by G_P. Consider a government objective function such as equation (5) subject to equation (6). The government agent then solves her maximisation problem by setting the efficient level of G_P to be made available to the private sector (which is $G_P/Y = \alpha$), hence maximising the tax earnings and thus the net gain of G_W. The provision of G_P will still be productively efficient but the share of government revenue in the economy will be higher than the optimal level (i.e. $\alpha = G_P/Y < G/Y = T/Y$). Hence taxes are too high and the economy suffers a war burden.

Government war spending therefore imposes a double burden on the economy: It reduces output now and, through public debt and taxation, prevents the re-accumulation of capital and output later. This reinforces the conclusion that it is the unproductive use of resources, not a diminished ability to produce in the first place, which is the central feature of an increased budget deficit.

4.6 **Predictions of the Model**

This section has outlined a basic model of overlapping generations in which individuals face one type of uncertainty. The dynamic model permitted a structured debate of the effects of war on the variables capital, transactions efficiency, uncertainty, and fiscal deficit and in turn on the endogenous variables output, growth, consumption, welfare, and government debt. These effects lead to nine predictions as summarised by table 1.

Table 1: The Predictions of the Dynamic Model

	Output	**Growth**	**Consumption**	**Welfare**	**Government Debt**	
↓ Capital	↓ LR	= LR	↓ SR	↓K: ↓; ↓L: =	na	P1
↑ Fiscal Deficit	= SR, ↓ LR	↓ LR	↓ LR	= SR, ↓ LR	↑ LR	P2
↓ Transactions Efficiency	↓	↓	↓	↓	na	P3
↑ Uncertainty	↓	↓	↓	↓	na	P4
Net Effect	P5: ↓	P6: ↓	P7: ↓	P8: ↓	P9: ↑	
P = prediction; na = not applicable; SR = short-run; LR = long-run; K = capital; L = labour						

Prediction 1 states that, while capital destruction has a negative effect on levels of output, consumption and welfare, the growth rate can recover in the long term. Yet there is no long-term catching up. A decrease in the population size, on the other hand, has the effect of shrinking the economy thus leaving the remaining workers' welfare unaffected. Both a reduction in K and it L could occur instantaneously or repeatedly, the outcome is not dependent on this factor.

Prediction 2 states that an increased fiscal deficit has a differential welfare impact on current versus future generations, thus leading to an eventual decline in both output (and welfare) levels and the growth rate. Current generations may be unaffected, though. Increased taxation may leave the capital stock and its productivity unaffected but in the long-term the increased fiscal debt will displace private capital.

Prediction 3 states that the reduced transactions efficiency shrinks the size of the economy and undermines the capacity of future development. Firms' inside production efficiency may remain unaffected but outside transactions inefficiency acts like increased taxation on the firm.

Prediction 4 states that a one-off increase in uncertainty will stabilise the economy at lower output levels and growth rates, as long as this level of uncertainty prevails. This is brought about by a decrease in actual human capital and changed expectations concerning death. Once more, a temporary shock will have a permanent effect. Furthermore, transactions inefficiency and increased uncertainty reinforce each other thus undermining further the development capacity of the economy.

The net effects of war on the main variables output, growth, consumption, government debt, and welfare are summarised by the following predictions. Prediction 5 states that

war will reduce the short and particularly the long-term level of output in the economy. Prediction 6 states that war, in addition, will reduce the growth rate of the war economy, possibly beyond the end of the war. In other words, catching up with (or reducing divergence from) the counterfactual, peace-time output level will not obtain in the long term. Predictions 7 and 8 state that under such conditions consumption levels and welfare will fall, respectively. (Only some current generations may escape the burden of the fiscal deficit.) Finally, prediction 9 states that, given the government increases war spending and taxation will be low and falling, an increased fiscal debt will obtain, thus further reinforcing other negative effects operating on the war economy.

5. **Economic Effects of the War in Mozambique**

This section applies the theory developed above to the case of Mozambique. Due to the deficiencies of the data in Mozambique, changes in the war variables will be represented by various proxies. The predictions of the dynamic model will then be tested to evaluate the economic effects of the war in Mozambique. Given the data limitations, the aim of this discussion is to indicate broad trends, not to provide detailed econometric evidence.

5.1 **Capital**

The destruction and erosion of immobile and hence war vulnerable capital is shown in table 2. Export agriculture would have suffered severely from the two-thirds reduction in operational dams and plant nurseries as compared to the pre-war capital stock. The average destruction and erosion of all categories was 40%. Assuming the war was at its worst during the 10 years prior to the peace agreement, this implies an annual rate of war-related capital reduction of almost 4%.

Table 2: Destruction of Immobile Capital (Measured at the End of 1992)

Immobile Capital by Sector	Number				%	%
	Operational	Non-Operational	Destroyed	Total	Destruction	Non-Operational and Destroyed
Agriculture						
Irrigation Systems	118	24	7	149	5	21
Dams	122	208	57	387	15	68
Seed Production Centres	13	9	0	22	0	41
Nurseries	38	19	4	61	7	38
Tick-Cleansing Tanks	70	299	40	509	8	67
Water Supply						
Wells	3057	1071	138	4266	3	28
Holes	1225	530	32	1787	2	31
Fountains	484	205	11	700	2	31
Small Water Supply Systems	96	84	29	209	14	54
Domestic Trade						
Shops	6664	1318	2381	10363	23	36
Warehouses	369	8	40	417	10	12
Banks	144	6	4	154	3	6
Savings Posts	54	31	0	85	0	36
Communication						
Post Offices	123	8	17	148	11	17
Rural Post Offices	49	90	13	152	9	68
Public Administration						
District Admin.	117	33	42	192	22	39
Municipal Admin.	99	83	120	302	40	67
Admin. Residences	724	474	374	1572	24	54
Average						**39.7%**

Source: CNP, p. 21, December 1993.

An even higher rate of destruction and erosion was experienced by the railway system, a visually obvious and politically suitable target for attacks. Table 3 also indicates the constant, high level of military activity and subsequent insecurity experienced throughout the 1980s.

Table 3: Destruction of CFM Locomotives

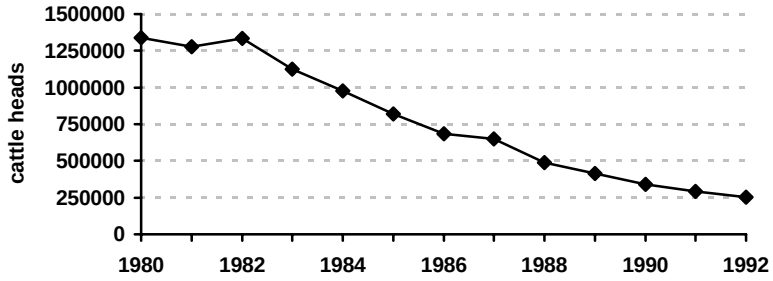
	1982	1983	1984	1985	1986	1987	1988	1989
Units Destroyed or Damaged [a]	24	34	37	28	32	59	36	58
Units in Operation [b, c]	222	222	249	214	178	172	146	158

Sources: [a] Stephens, pp. 136-141, 1994; [b] CNP, p. 25, December 1990; [c] World Bank, p. 69, October 1990.

Finally, figure 4 illustrates that cattle production, a visible yet somewhat mobile activity, was strongly affected by war. Less than a fifth of its recorded 1980 cattle stock

remained in 1992, the remainder having been lost both through direct (rebels killing cattle to spread terror, to halt development and to feed their troops) and indirect effects (lack of feed and veterinary care, short-term consumption needs of the population, and missing cattle markets for related trading and breeding activities).

Figure 4: Cattle Stock, 1980 to 1992



Source: Ministério da Agricultura, 1994.

Certain characteristics of capital make it vulnerable to war. Certain sectors employ particular types of capital hence making some sectors more war vulnerable than others. This allows a classification of war-affected and non-affected sectors in Mozambique, as shown by table 4.

Table 4: War Vulnerability of Different Sectors in Mozambique

Sector		**Visible?**	**Immobile?**	**Specific?**	**Duration?**	**Vulnerability**
Export-Oriented	inputs	xxx	xx	xx	xxx	medium
Agriculture	production	xxx	xxx	xxx	xxx	high
	output	xxx	xx	xxx	xx	medium
Manufacturing	input	xxx	xx	xxx	xx	medium
	production	xxx	xxx	xxx	xxx	high
	output	xxx	xx	xx	xx	medium
Subsistence	land	xx	xxx	xx	x	medium
Agriculture	livestock	xxx	xxx	xxx	xxx	high
	seeds	xx	x	xx	xx	medium
	output	xx	xx	x	x	low
Construction	rural	xx	xxx	x	x	low
	urban	xxx	xxx	xx	xxx	high
Government	input	xxx	x	xxx	xxx	high
	output	xx	x	xxx	xxx	high
x, xx and xxx denote low, medium and high relative war vulnerability, respectively.						

Export-oriented agricultural in Mozambique suffered a particularly high war burden. The facts that crops are slow-growing, production is located in the countryside (where most fighting took place), and that the bulky output needs to be transported in a modern transport system through rural areas all contributed to the war vulnerability of this cash crop sector. In fact, the pre-war transport sector had been a large foreign exchange earner as it had transported goods for the neighbouring states of Malawi, Zimbabwe, South Africa and Swaziland. The manufacturing sector, involving for example the processing of cash crops, produced tradable goods at source (i.e. in rural) or peri-urban areas. The war vulnerability of these location was high as occasional attacks even near towns were probable. The visible location of production, the storage of inventories (especially with poor transport and the seasonality of some crops), and the specificity of some inputs combined to make this sector highly war vulnerable.

The agricultural subsistence sector was placed in a better position despite its seeming resemblance to the cash crop sector. Bare land by itself is unlikely to be attacked but fields may have been burned and livestock killed, as indicated above. Seeds benefited from being storable, concealable and edible by their producers if necessary. Subsistence agriculture, while the target of many attacks, was less war vulnerable compared to cash crop agriculture as it depended on very localised purchases and sales and thus local transport, if any. While this may be detrimental to objectives of rural development, it contributed to the subsistence sector being marginally more protected from the war by the nature of its activities than was the export-oriented sector. This does not imply, of course, that the countryside did not suffer a high war burden particularly in human costs (it did) but that some economic activities in the countryside were less affected than others. On the other hand, many people were forced into extreme forms of self-reliance as the war destroyed all other forms of survival. Given the war situation, subsistence agriculture was therefore an enforced alternative for previously fortunate producers of cash crops, a deliberate choice of survival activity for some peasants, and an unattainable means of survival for a large group of landless labourers and refugees.

The aim of destabilisation included the destruction of nearly every concrete building in rural Renamo territories, mainly government facilities. Yet local construction inputs (and thus simple houses) could be obtained at little cost and were considered less of a

target and thus less war vulnerable. Urban areas were quite safe from attacks. The government sector was always war vulnerable as a major target, but the main government activities were concentrated in the safer areas. Generally, one could say that formal sector activity was more war vulnerable (especially to increases in transaction costs) and the formal tradable sector more so than the formal non-tradable sector.

Investment responds to the relative war vulnerability of assets, activities and sectors. War vulnerability will decrease the desired capital stock K* hence reducing actual investment as can be seen in equation (2). While it is difficult to measure domestic investment, foreign direct investment (FDI) is more readily quantifiable. The Mozambican government regulates FDI through an agency called Centro de Promoção do Investimento Estrangeiro, CPI, for most sectors except minerals and commerce. The CPI data of table 5 indicates annual FDI of about 30 million US dollars, 1985-93. As it is difficult to confirm if investments have been undertaken, actual annual FDI has been estimated conservatively at about 12 million US dollars by CPI. This is a very low value which must have been determined, at least partly, by the war. In comparison, in the post-war period, mid-1993 to end-1994, 442.8 million US dollars worth of FDI were approved by CPI under the new investment legislation. This is equivalent to over two-thirds of the sum approved in the previous eight years. Furthermore, the investments cancelled or pending at the time of the survey were much reduced in the post-war period.

Table 5: Foreign Direct Investment

	mid 1985 to mid 1993		mid 1993 to mid 1994	
Project Status	**Investment (mn US$)**	**% of Total Investment**	**Investment (mn US$)**	**% of Total Investment**
Active/Realized	165.6	26.8%	40	9.0%
Being Implemented	62.8	10.2%	217.1	49.0%
Implementation not Started	22.5	3.6%	158.2	35.7%
Cancelled/Pending	366.5	59.4%	27.6	6.2%
Total Approved	**617.4**	**100%**	**442.8**	**100%**

Source: CPI, *Unpublished Data*, August 1995.

Human capital also suffered erosion, destruction and reallocation.

Table 6 shows the destruction and erosion of primary schools at an average annual rate of about 6% for the years 1983-91. A similar destruction of hospitals and health posts occurred in rural areas (Cliff and Noormahomed, 1988). The subsequent effect on the quality of human capital is not measurable but will be evident.

Table 6: Destruction in the Education Sector

Year	Primary Schools (Grades 1 to 5) Closed or Destroyed	
	Total Number	%
1983-1987	2655	45.1
1988	226	3.8
1989	238	4.0
1990	77	1.3
1991	206	3.5
Total	3402	57.8
Total Number of Primary Schools in 1983	5886	100.0

Source: Ministério da Educação, pp. 7-8, October 1994.

Frequently, people subjected to hostilities became displaced either within their municipalities, within Mozambique or internationally. Table 7 indicates that war-induced population flows increased in the late 1980s. About a quarter of all domestic residents (excluding international refugees) were displaced within Mozambique at the end of the war, a further 10% were international refugees and an unknown number of Mozambicans, although they remained near their usual residence, had their livelihoods destroyed by the war. These figures suggest three things at least. First, the extent of the displacement of human capital in Mozambique was extreme, only comparable to few other population movements following genocide in recent world history. Second, such migration pattern must have been caused both by extreme security and by dire economic concerns of the individuals involved. Third, such level of migration will in turn cause unprecedented higher levels of uncertainty, transaction costs and increased claims on fiscal and aid resources.

Table 7: Estimated Displaced and Refugee Population

	Sept. 1986	mid 1989	Oct. 1992
Total Population	14 174 300 (100%)	15 166 000 (100%)	14 285 000 (100%)
Total Affected[a]	na	2 873 957 (19.0%)	na
Total Displaced[b]	na	1 689 492 (11.1%)	3 728 000 (26.1%)
Total Affected and Displaced	3 482 626 (24.6%)	4 563 449 (30.1%)	na
Total Refugees[c]	250 000	1 000 000	1 390 000
Total Displaced and Refugees	na	2 689 492	5 118 000
Total Displaced, Affected and Refugees	3 732 626	5 563 449	na

[a] affected persons are defined as those whose homes or livelihoods have been destroyed but have not fled the area
[b] displaced persons are defined as those who have moved internally
[c] data for refugees refers only to those persons living in neighbouring countries with 1986 and 1989 data restricted to Malawi, Zambia and Zimbabwe

Sources: 1989 and 1986 data: World Bank, p. 67, October 1990; 1986 population estimates: CNP, April 1987; 1992 data: International Organisation for Migration, pp. 9-11, April 1994; and: UNOHAC, pp. 8-9, September 1994.

Finally, table 8 presents some figures which are unlikely to have immediate economic significance but further reinforce the profoundness of this type of shock, particularly compared to natural disasters. It illustrates the psychological traumas experienced and crimes committed by war-affected children. The persistence of the war shock is thus likely to be more long-lived, at least in the minds of people, than adverse economic shocks or natural disasters of a similar magnitude.

Table 8: War Experiences of 6 to 15 Year-Old Children from War-Affected Areas

War Experience	Percentage
witnessed physical abuse and/or torture	88%
witnessed killings	77%
served as porters for Renamo	75%
were abducted from their families	64%
witnessed rape or sexual abuse	63%
were physically abused or tortured	51%
witnessed family members killed	37%
were trained for combat	28%
admitted to being raped	16%
admitted to killing	9%
suffered permanent physical injury	7%
Sample consisted of 504 children between the ages of 6 to 15 at the time of their war experiences, originating from 7 different provinces, all of whom had been resident in war-affected areas. Data collected between 1989-1990.	

Source: Boothby *et al,* p. 21, 1991.

5.2 **Transactions Efficiency**

The war-related reduction in transactions efficiency is the most difficult to estimate. Some proxies for this effect include domestic marketing activity and transport costs. Table 9 lists the net changes in numbers of operational units for a variety of structures (buildings and some mobile marketing units). Warehouses, shops and trading posts may have been abandoned due to insecurity, eroded in value, or completely destroyed. The net decrease for all structures in the period 1982-88 was approximately 30%, suggesting a net annual loss rate of about 5%.

Table 9: Commercial Network for Agricultural Marketing

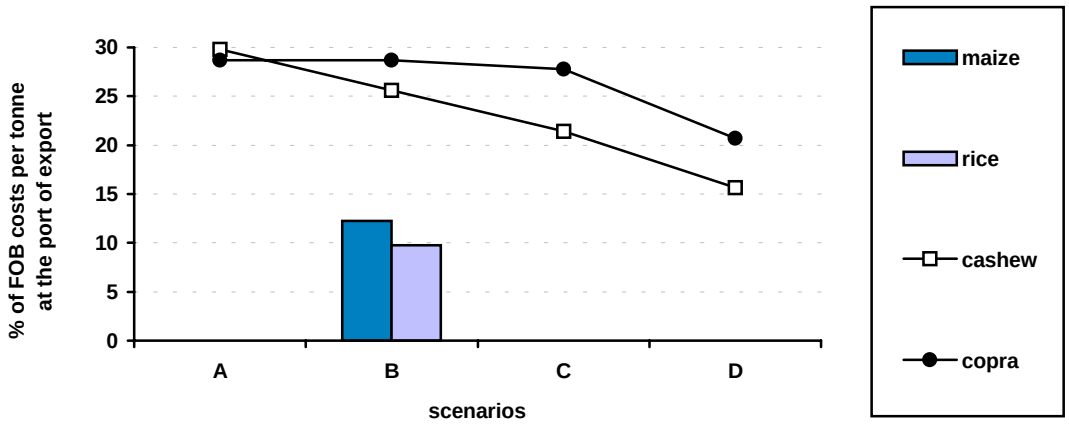
	Numbers of Establishments Nationally			% Change
Commercial Structure	**1982**	**1985**	**1988**	**1982-1988**
Private Shops	3582	2452	2187	-39%
Agricom Fixed Posts	235	150	62	-74%
Other Fixed Posts	393	94	99	-75%
All Other Structures	882	1230	1226	39%
Total Commercial Structures	5092	3926	3574	-30%

Source: World Bank, p. 142, October 1990.

Another proxy for transactions inefficiency focuses on increases in distribution costs both due to insecurity (requiring protection and reducing load factors due to co-ordination problems) and due to the reduced quality of transport infrastructure (reducing travel speeds and increasing breakdowns on rough or mined roads). Figure 5 shows distribution costs as a percentage of costs for the two largest export and subsistence crops (by weight) in 1989, under several security and transport scenarios. Distribution costs contribute a much larger share of total costs for export costs than for domestic consumption crops (as discussed above). The potential savings from security improvements are much larger than the improvements from transport infrastructure. For cashew, the largest by total volume and most valuable Mozambican export crop, distribution costs halve as one moves from war (with well protected distribution) to peace time and improved transport infrastructure. Thus war imposes a tax on output which affects cash-crops relatively more than other crops.

Figure 5: Distribution Costs in the War Economy

Source: World Bank, pp. 75-76, October 1989.



scenario A: 1989 Mozambican situation with dedicated security force protection
scenario B: actual 1989 Mozambican situation
scenario C: same as B but with improved road transport infrastructure
scenario D: same as C but improved maritime transport and security improvements which would allow the elimination of military escort (peace scenario)

5.3 **Uncertainty**

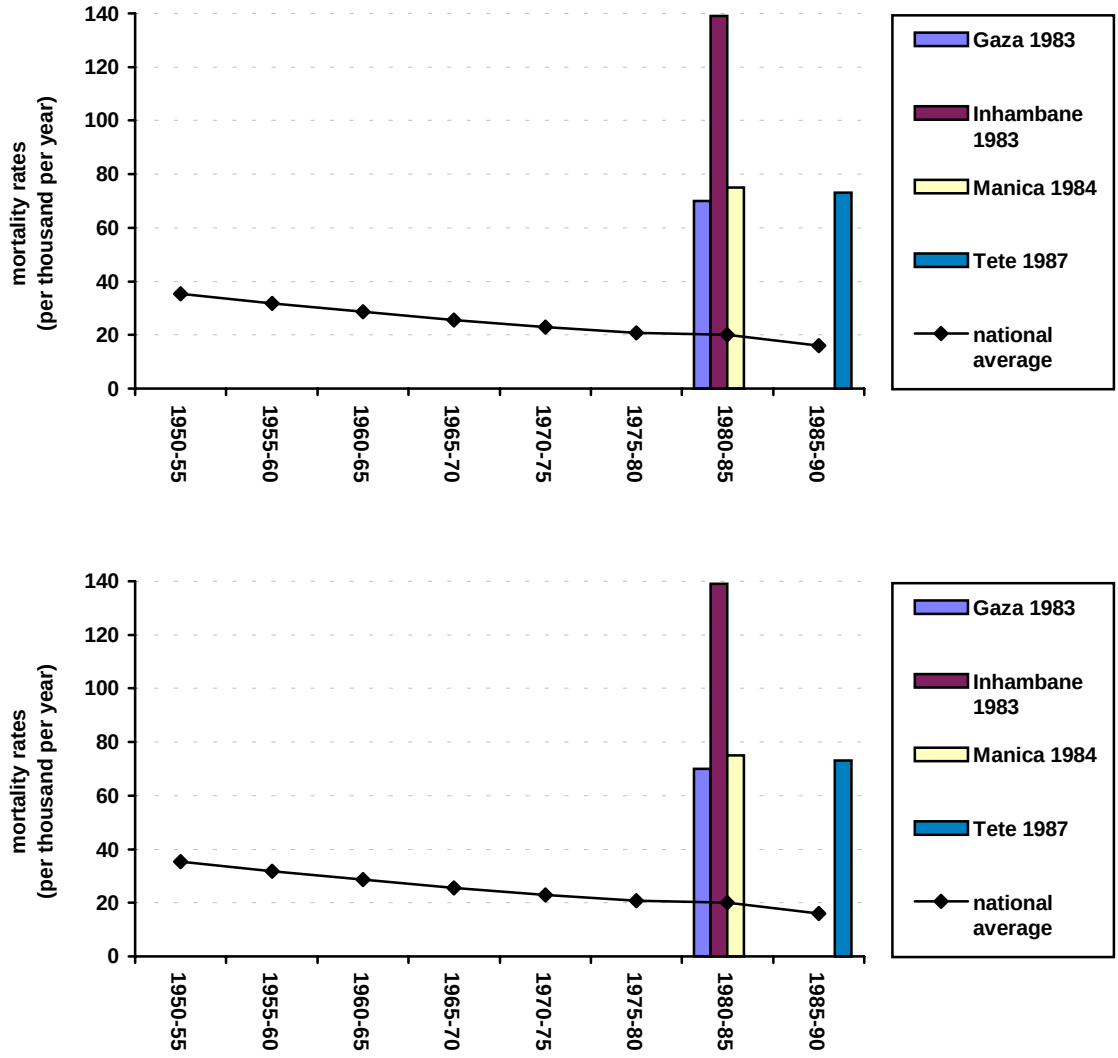
The Mozambican government was able to build up its legitimacy in the course of the war thus reducing war uncertainty over time. The government went through successive stages of war uncertainty from chaotic times at independence to a newly established authority soon afterwards, to then being a legitimate but threatened authority (by Renamo) and finally to becoming the fully legitimate authority (see table 10). Thus at the macro level state uncertainty declined in the course of the war but it was significant throughout this period. This would mainly have effects on the reallocation of capital and transactions inefficiency and be reflected in, for example, investment and population movements. Further macro-uncertainty would have been created by government spending as analysed below.

Table 10: Determinants of War Uncertainty in Mozambique

War Uncertainty (in Mozambique)	**Little Authority**	**Full Authority**
Little Legitimacy	most (chaos: 1975)	intermediate (recently established authority: 1976)
Full Legitimacy	intermediate (threatened authority: 1980s)	none (full peace: late 1990s)

At the micro-level, war of this type meant that civilians as well as soldiers faced increased risks of mortality, that is an increased parameter p. Figure 6 plots the national trend for average mortality rates (for all ages) and compares it to mortality rates calculated in surveys of directly war-affected populations in several provinces over various years. While the national mortality rate did not increase during the war years, directly war-affected people could face mortality rates 3.5 to 7 times the national average (that is their p increased up to seven-fold). The change is unlike the destruction of physical or qualitative human capital, which will not return to the pre-war levels as quickly but which was reduced by less.

Figure 6: Comparison of Mortality Rates in War-Affected Areas to National Averages



Source: Cliff and Noormahomed, p. 720, 1988; CNP, pp. 21-31, May 1993.

Additional factors in the determination of mortality rates were the parallel occurrence of famine and the offsetting provision of humanitarian assistance to cope with famine and war. War, however, weakens the aid response to famine while famine may intensify the struggle over the control of resources thus making both factors combined more harmful than the individual components would suggest.

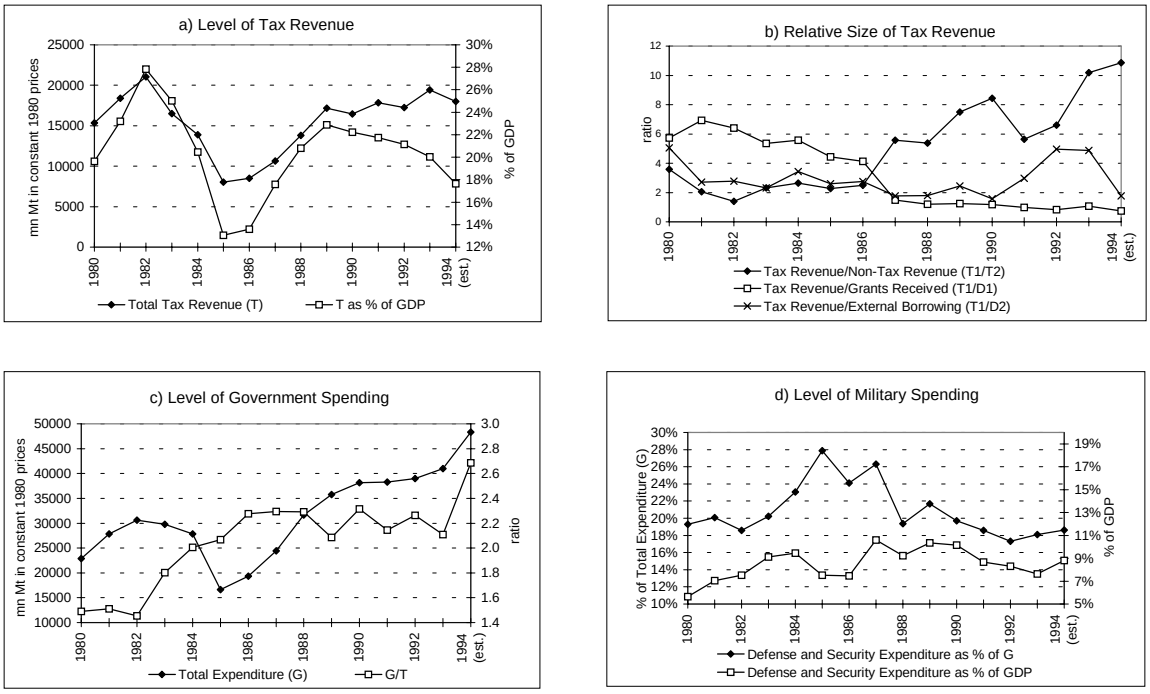
Finally, landmines obviously increase the risk of mutilation (eroding human capital in part) or death in Mozambique (Roberts and Williams, 1995). Compared to the level of atrocities committed, the impact of mines is likely to be lower in numbers of fatal

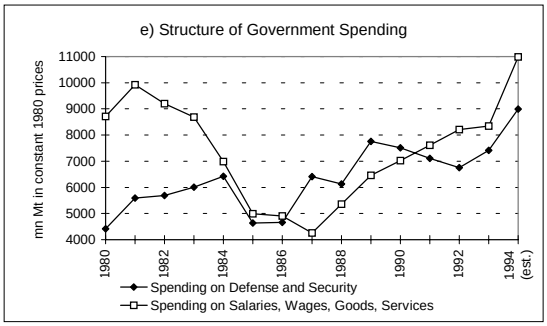
casualties during the war, particularly among people resident in areas at time of their mining who hence know some of the unsafe areas (unlike refugees). Yet mines will continue to destruct lives and keep land useless for years after the cease-fire thus maintaining war uncertainty beyond the end of the formal conflict.

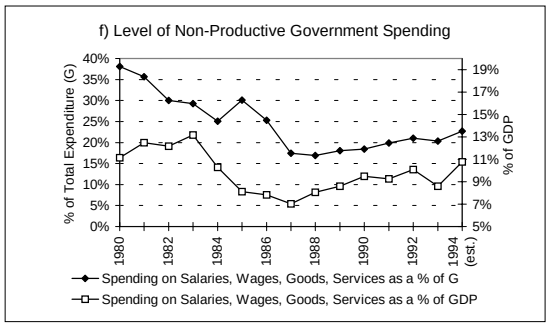
5.4 **Fiscal Deficit**

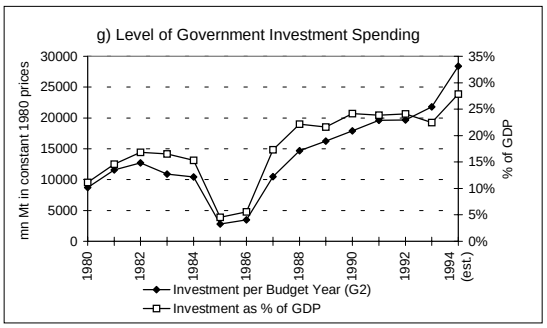
Three important aspects of public finance are tax revenue, government spending and the net fiscal deficit. Foreign aid in addition may relax the fiscal constraint. Given the structure of the war in Mozambique, one would expect either declining tax revenues or increased tax rates and an attempt to expand the tax base. In fact, the data presented in table A.1 (which contains all relevant data on the fiscal situation) and in figure 7a indicates that the real value of total tax revenues fell by half 1981-85 (and by almost two-thirds on a per capita basis 1982-85). Only with the start of adjustment in 1985 did revenues rise again, possibly due to increased formal market activity (an implicit widening of the tax base) but it did not attain previous levels. Nevertheless, tax revenue as a proportion of GDP started to decline again in the early 1990s, perhaps because the structural adjustment programmes only represented a one-off improvement but yielded no long-term growth in revenues.

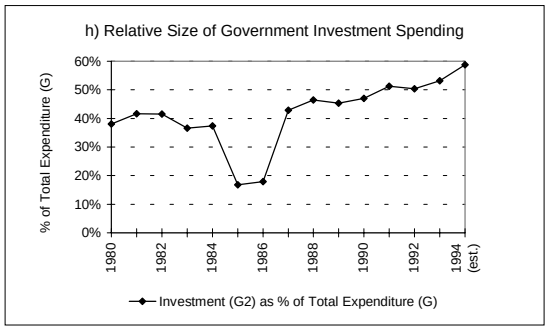
Figure 7: Summary of Fiscal Variables

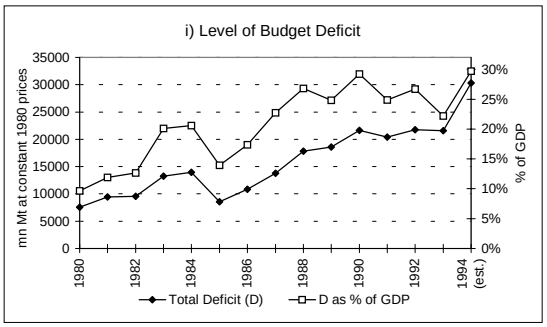


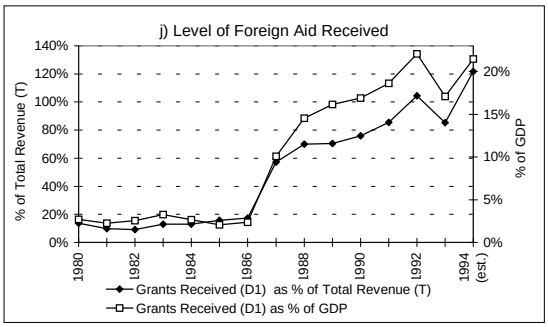


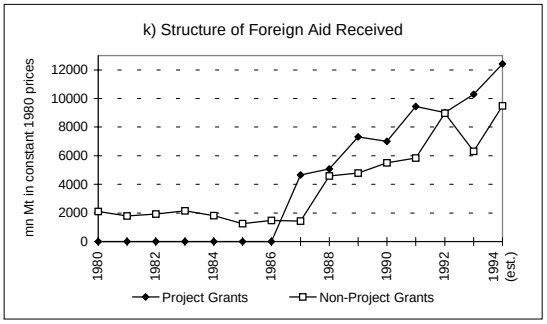


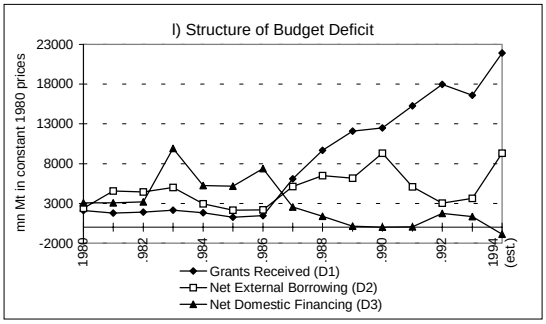












Similarly, tax revenue rose in relative importance to non-tax revenue after the introduction of economic reforms which took effect about 1986 (table A.1 and figure 7b). Yet tax revenue was eclipsed by external grants in 1992 when they were worth 21.1% and 22.1% of GDP, respectively. In the last 6 years of the war, 1987-92, this ratio averaged 16.4% of GDP for grants, showing their relative importance in financing the

war economy. The relation of tax revenue to external borrowing was more volatile, both being determined by war conditions. Overall, tax revenue declined in the early 1980s but recovered partially in the years of structural adjustment. The composition of tax revenues was affected by the war and both non-tax revenue and grants became relatively more important as expected.

Overall spending was volatile (figure 7c). It peaked in 1982, fell until 1985 and rose until 1988 when it stabilised at an historically high level. With such fluctuations, it is hard to characterise G as continuously rising. Yet given the post-1985 recovery in spending, the trend pointed upwards in most years and G certainly rose relative to T up to 1988.

For government spending, one would predict war spending G_W to increase and perhaps also G_H as it allows the government to gain popular support. Economically productive expenditure such as G_L and G_P on the other hand are likely to be squeezed. G_W more than doubled in real terms 1980-94, rose by almost nine points as a percentage of G 1980-85, and increased by 86% as a share of GDP 1980-87 (figure 7d). Note that until 1980, Mozambican security was threatened by Rhodesia so that the level of G_W was already high at that time while the post-war levels include costs of demobilisation, a long-term, peace-time cost of war. Yet G_W was also very volatile supporting the view that government spending contributes towards uncertainty in the economy either directly (through fighting) or indirectly (by e.g. raising demand or causing inflation).

G_H (defined as the salaries, wages, goods and services component of current expenditure) first declined by 60% but recovered after 1987 (figure 7e). Yet it declined relative to other expenditures and as a share of GDP for most of the 1980s (figure 7f). Hence the government was either not willing or unable to expand this type of spending in the early war years, when aid finance was not yet widely available. Economically productive spending (that is real public investment expenditure) fell to a fifth of its peak 1982 value in only three years (figure 7g) while it also decreased strongly relative to other expenditures and as a proportion of GDP (figure 7h). Later, aid inflows permitted the resumption of public investment activity at higher level. The components of government spending therefore changed as expected under war

conditions (increases in G_W and falling other expenditures) especially in the first half of the 1980s.

The fiscal deficit increased every year, except during 1985 and twice in the 1990s when the real deficit was almost unchanged (figure 7i). As a proportion of GDP, the deficit more than doubled in the four years to 1984 and trebled 1980-90 thus putting much strain on the domestic economy. Initially, domestic financing accounted for much of the deficit but with increased adjustment its role declined. External financing initially was also high but started to fall prior to adjustment. The renewed decline in external borrowing was presumably supply-determined through credit-rationing. These two observations suggest an important result, namely that Mozambique was forced into structural adjustment as a result of the burden of war finance. With little Eastern bloc support forthcoming and finding it difficult to mobilise domestic resources, the government could not afford to self-finance both the war and Mozambique's development.

The one exception to this rule were grants. The turn from Eastern bloc support to the West facilitated a significant inflow of financial resources in support of the government. Grants increased from 2-3% to about a fifth of GDP in the early 1990s (figure 7j). In fact, grants were equivalent in value to government revenue, 1992-94. In the early war years, non-project grants to the government actually declined as a relative share of the deficit and, for several years, in real terms, while project-grants were the more common type of grant post-1986 (figure 7k). The order of importance for three types of funding of the budget deficit changed from domestic financing, external borrowing and grants (in declining order) in the mid-1980s to the inverse in the late-1980s and 1990s (figure 7l).

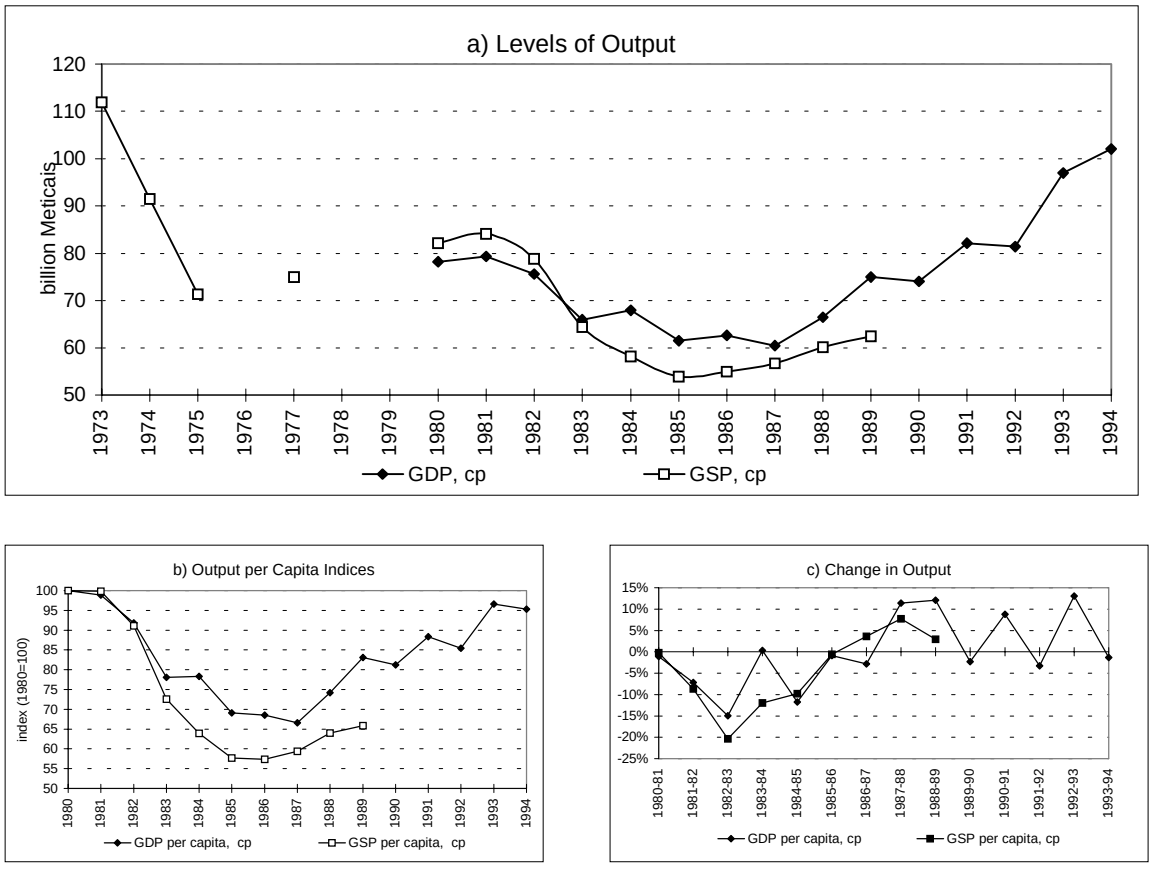
Yet the timing of the increase and the composition of the grants suggest that foreign aid is determined by factors other than war as well. Aid for general use of the government is supplied even in times of war but that specific aid is more readily provided by donors in an era of adjustment. Furthermore, aid in Mozambique was delivered on humanitarian grounds in times of famine or for general development purposes but not explicitly to support the war effort. Mozambique continued to attract much aid throughout the years of its internal war but not primarily because of the war.

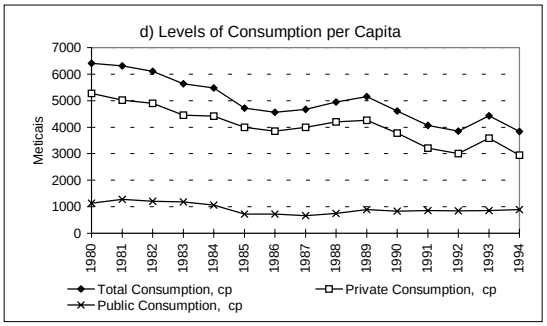
Aid in Mozambique should thus be seen as a variable independent from the war, though of great importance in maintaining government expenditure patterns and levels.

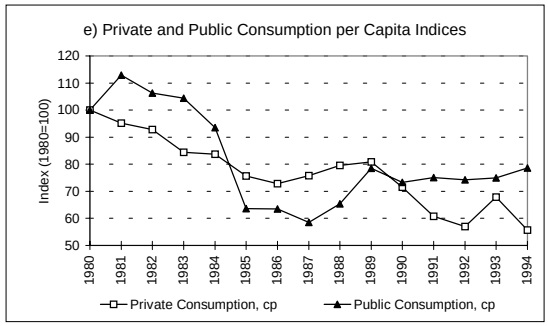
5.5 **Output**

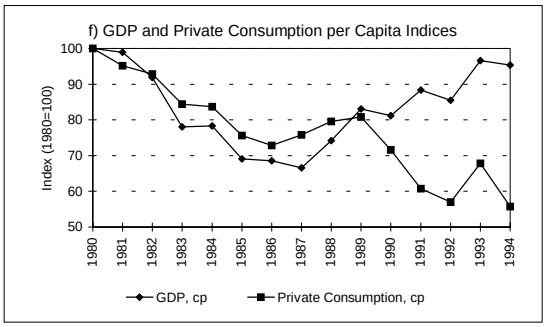
The empirical testing of the macroeconomic model will focus on the five predictions concerning output, growth, consumption, welfare and government debt. Prediction 5 stated a decline in output resulting from capital destruction, transactions inefficiency and increased uncertainty, all of which took place in Mozambique. The measures used as proxies for output are gross domestic product (GDP) and global social product (GSP). While calculated according to different methodologies, both series show similar patterns thus allowing comparisons over time. As the dynamic model is standardised for the size of the population, per capita (pc) measures are used throughout. Data is expressed in constant 1980 prices (cp) using the GDP deflator and is calculated as an index (1980 values being set to 100) so that comparisons in trends can be made readily.

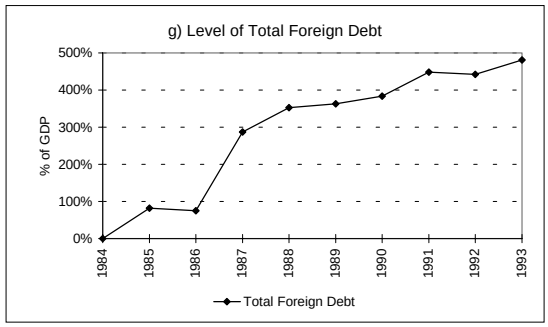
Figure 8: Summary of Output, Consumption and Debt Variables











The data presented in table A.2 and in figures 8a-b show that both measures of output declined until 1986/87. While GSP pc fell more steeply and more continuously, both measures indicate a drastic decline of about 30-40% in output in the early and mid-1980s. The GSP data available for the mid-1970s shows output also fell over a third after decolonisation. Such a political shock may have long-term effects akin to war (especially due to a reduction of human capital) but the increase in output by about 17% during 1975-81 indicates that the decolonisation shock was at least partially overcome when the war intensified in the early 1980s. This is related to the one-off nature of decolonisation which implied expectations could adjust to the new regime (though that may have been creating uncertainties of its own). The expectation of an independence dividend was therefore more realistic in 1975 than was the expectation of a peace dividend in 1992.

However, the rise of measured output in the late 1980s indicated that war was not the only relevant factor determining output in those years. Instead, the positive effects of the reform projects and the related inflow of aid allowed an expansion of output despite the continuous destruction of capital. The war shock became relatively less important as some war variables acted in a one-off fashion. Uncertainty over life spans, for instance, would have shifted up to a higher level for each war zone but

would not typically increase further thereafter. Capital destruction in some areas was nearly complete while the destruction of capital elsewhere was being offset by aid inflows (thus preventing a further fall in consumption, see below). Arguably the productive capacity was not being maintained during the war. That is, increases in output were not achieved on a sustainable basis of domestically generated savings turned into investment but growth instead depended on an exogenously determined level of foreign aid inflows. This view of Mozambique living on a life-support machine of aid during the war years is further supported by the above evidence on the level of aid supporting the fiscal deficit of the government. Overall, prediction 5 is thus supported by the evidence: Output in this war economy fell, especially before 1988.

5.6 **Growth**

Prediction 6 states that war will reduce the long-term growth rate of the economy (beyond the initial reduction in output). This is in contradiction to the prediction derived from a reduction in capital only. The result is brought about by the joint effects of transactions efficiency and uncertainty on the war economy. Testing this claim is difficult since growth of output is likely to fluctuate strongly and unlikely to show a clear long-term trend.

The actual growth rates of GDP and GSP indicate such strong yearly fluctuations (figure 8c). Yet the GDP series shows a small trend: While practically all pre-1988 rates are below zero, most values thereafter lie near or above zero percent growth. A possible interpretation is that the war reduced the growth rates initially, the adjustment programmes helped improve this rate but the internal war prevented a growth rate allowing a catch-up with hypothetical peace-time values, as argued above. Therefore , the case of Mozambique gives support to the view that war damages the growth potential beyond the period of the capital destruction. However, the number of other factors influencing the economy in these years and the fact that a long-term post-war data series is not yet available, make this prediction hard to prove.

5.7 **Consumption**

Prediction 7 states that consumption will fall in a war economy. The levels of constant-price per capita private consumption declined for the first six years of the period covered in table A.2 and figure 8d before rising slightly for three years and falling to

nearly half of its 1980 value by 1994. Interestingly, government consumption fell relatively more than private consumption initially and benefited more from the aid inflows as it increased relatively more in the later years (figure 8e). This shows the responsiveness of the composition of government expenditure to the war situation and the importance of external finance (including aid) for the government's budget constraint as seen in equation (6).

Another interesting fact is highlighted by the relation of consumption to GDP. The dynamic theory predicts that a one-off reduction in capital will lead to a curtailment of consumption so that additional investment may rebuild the capital stock. Yet prediction may not hold for a more complex shock as war will also reduce the ability of the economy to rebuild itself, hence further decreasing output. In fact, both consumption and output fell strongly in the first half of the 1980s but relatively speaking private consumption fell by less till 1987 (figure 8f).

Before 1987, the prospect of on-going warfare and corresponding capital destruction hence forced people into involuntary consumption. Alternatively, as mentioned above, people were so close to their survival threshold that their propensity to consume actually increased with declining incomes. Furthermore, the accumulation of a war-related budget deficit has an impact on the long-term welfare of the population yet some parts of the current population in the early 1980s may not have found their consumption to be affected thus maintaining relatively higher levels of consumption than output. Finally, the increased share of consumption will eventually lead to a further reduction of output as it reduced the resources available for future growth thus making some of the reversal in the relative change of these two variables inevitable.

After 1987, the higher growth of output could be either due to foreign aid or due to structural adjustment. It is doubtful that aid generally and the composition of aid to Mozambique particularly would have permitted growth in output as witnessed post-1987. Instead, aid allowed a maintenance of consumption for some of the most threatened victims of war and famine, and it helped to sustain the level of public consumption from 1988 onwards. Structural adjustment on the other hand increased the prospect of employing resources more efficiently thus encouraging non-consumption activities and thereby reversing the involuntary increase in the MPC

with declining income. Furthermore, the rural sectors and its population suffered a greater deal from the war while the urban sectors benefited more from the market oriented policy reforms. Hence productivity gains in the late 1980s were achieved in the towns, where economic data collection was superior as well, while consumption decreases were incurred by the large share of the population living in the countryside. This is a strong indication of the duality of the war economy in Mozambique where the war was removed from some of the productive sectors of the economy hence causing asymmetries in the development of the economy and possibly the society as well.

Overall, the evidence supports the prediction that total private consumption per capita decreased as a result of the war. However, consumption did not fall by as much as output until 1987 reflecting the behaviour of individual consumption near the survival threshold. After 1987, reform-oriented policies assisted a recovery of output in the safer, mainly urban areas.

5.8 **Welfare**

Given that prediction 8 states that war reduces welfare, it is important to consider proxies for welfare. The most common one is GDP per capita, which fell drastically as a consequence of war (table A.2). Social indicators such as malnutrition, infant mortality and literacy rates provide more detailed impressions on some aspects of welfare. Already, it was shown that education sector suffered capital major losses (table 6), that mortality rates in war areas increased sharply (figure 6), and that huge proportions of the population were displaced (table 7) or even directly affected by the terror of the war (table 8). The difficulty with these concepts lies in collection and measurement problems particularly under war conditions and in a country where 95% of its population have been estimated to be poor with over two-thirds considered absolutely poor (World Bank, October 1990). Poverty in this context includes the inability to collect and evaluate data, due to a lack of capacity, due to other, more pressing spending priorities, and due to the insecurity and fluctuation inherent in the war situation. The lack of data on social variables is therefore another cost of this conflict. Yet it is clear from the evidence available that welfare did decline significantly as a result of the war.

5.9 **Debt**

Finally prediction 9 states that the government debt will increase in times of war. Given the constraints on the domestic financial market (including its small size, lack of financial institutions, inflation, uncertainty and its lack of credibility), most government borrowing had to come from foreign sources. The total foreign debt stock increased continuously to 500% of GDP after it became possible for the Mozambican government to borrow abroad in 1985 (figure 8g). This is a reflection of the fiscal deficits accumulated over the war years and reflects both the need for increased war spending and the reduced ability of the government to generate tax revenue domestically in times of war. Prediction 9 is therefore applicable in the case of Mozambique.

6. **Policy Considerations and Conclusions**

The case of Mozambique provides some clear conclusions concerning the macroeconomic effects of war. One, war leads to lower output and growth, as predicted. The actual magnitudes of these variables are strongly influenced by other economic factors, such as decolonisation, government policies and structural adjustment. War does not permit a quick restoration of output if it causes more than one-off capital destruction. The effects of government debt, uncertainty and transactions inefficiency further undermine the economy. In fact, while aid inflows permit some output growth, the ongoing war (and hence uncertainty and transactions inefficiency) prevent sustainable development. The evidence presented here supports the view that war can potentially undermine the capacity of an economy to initiate and support long-term development.

Two, there was an initial increase in private consumption relative to output, followed by a sharp recovery of output and falling consumption. This suggests that the behaviour of very poor agents in a war economy is affected by their immediate concern for survival, thus placing a premium on short-term consumption at the expense of savings and investment. The breakdown of market activity under war conditions (as illustrated by the implications of the Gersovitz model on the annuity market) will reinforce increases in inefficient survival activities. On the other hand, sectors less directly affected by the war respond to market-oriented reforms and

produce some growth. However, the benefit of such growth to those directly suffering a war burden is doubtful. These people may rather benefit from consumption-oriented foreign aid, which at least maintains their basic needs.

Three, the budget constraint of a war-time government is particularly tight: Receipts are likely to be low and spending needs high. Deliberate inflation or taxation lead to incentive problems, create distortions and impose a heavy war burden on the economy. The obvious solution is therefore for a developing country to use foreign borrowing and aid to finance its war-time spending plans. Aid in particular will permit high consumption levels in the short term.

Four, government war taxation involves an extraction of resources from the population thus reducing their welfare in the long-term. Hence, war decreases welfare through four channels: The loss of capital through enemy action, the inefficient use and destruction of the resources extracted by the government, the long-term debt burden of war finance, and the negative effects of uncertainty and transactions inefficiency on the capacity to raise current and future output.

Five, aid can extend the government's budgetary constraints significantly. Yet there is a price for turning to donors for help. Mozambique was driven by its dire budgetary and growth position of the mid 1980s to seek support from the IMF and the World Bank. In exchange for aid and financial lending the government had to accept structural adjustment and liberalisation policies which in turn placed much emphasis on complying with strict financial standards. By 1992, the government had exhausted all domestic and external resources for financing core governmental functions and the war. Therefore, both the government and Renamo needed to seek an end to the war for lack of further resources. This framework of analysing the war from an economic point of view hence explains endogenously the end of the war itself. However, this also implies that the provision of resources by donors may lead to a temporary continuation of the war. Donors should use their influence to express a preference for humanitarian over military government expenditure and to work towards resolving the socio-economic issues underlying the conflict in the receiving country. Given a strong dependence of a war economy on external support, there exists a powerful lever for forcing the warring parties out of the conflict. It appears as if Mozambique had

been allowed to continue its war without very strong efforts on the side of the donor community to use this lever. It is doubtful that Mozambique benefited in any way from this absence of strong outside leadership.

Finally, these conclusions suggest that war forces the economy into a state of diminished competitiveness. The benchmark of perfect competition in economic analysis entails a number of restrictive assumptions such as certainty, full information, no transport costs, and enforceable property rights. In times of war, however, all of these assumptions need to be relaxed much more than in times of peace. While natural disasters may only require the rebuilding of the capital stock, war differs from this and most other economic shocks in that it requires the reconstruction of physical as well as abstract forms of capital. The latter may entail rebuilding confidence, certainty, information flows, government fairness and efficient civil administration. A key conclusion of this analysis is therefore that capital destruction may be easier to overcome and less of an obstacle to development than the war-induced destruction of transactions efficiency and certainty. This explains the absence to date of a strong peace-dividend in post-war Mozambique.

Another key conclusion of this analysis is that the government and donors are clearly able to lessen these negative effects of war. Policies should aim, first, to reduce fighting and thus the war vulnerability of capital, secondly, to reduce the scale of the inefficient use of resources by the government, thirdly, to provide financial resources other than debt to support government expenditure in times of war, and fourthly, to maintain certainty, confidence and the level of transactions efficiency throughout the time of war. Such measures include protecting civil administrative institutions, credibility and efficiency and the reduction of the war vulnerability of people, capital, and activities. These policies will protect private sector activity first in the less war-vulnerable sectors of the war economy and subsequently in the whole post-war economy. In short, the potential for sustained post-war reconstruction is dependent on the policies adopted during the war. Reducing the costs of war and facilitating sustainable development are equivalent from this point of view.

References

Abrahamsson, H. & Nilsson, A. (1994) *Moçambique em Transição* (Gothemburg, Padrigu, Gothemberg University).

Albala-Bertrand, J.M. (1993) *The Political Economy of Large Natural Disasters* (Oxford, Clarendon Press).

Azam, J.P., Bevan, D., Collier, P., Dercon, S., Gunning, J. & Pradhan, S. (1996) *Some Economic Consequences of the Transition from Civil War to Peace,* Manuscript (Oxford, Centre for the Study of African Economies).

Banco de Moçambique (1995) *Boletim Estatístico,* 3(7) (Maputo).

Barro, R.J. (1990) Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economy,* 98, pp. S103-S125.

Barro, R.J. & Grossman, H. (1971) A General Disequilibrium Model of Income and Employment, *American Economic Review,* 61, pp. 82-93.

Bates, R. & Collier, P. (1995) *Wars of Secession*, Discussion Paper (Oxford, Centre for the Study of African Economies), 139.

Bevan, D., Collier, P. & Gunning, J.W. (1991) The Macroeconomics of External Shocks, in: Lall & Subramanian *Current Issues in Development Economics* (London, Macmillan).

Blanchard, O.J. (1985) Debt, Deficits, and Finite Horizons, *Journal of Political Economy*, 93, pp. 223-247.

Blanchard, O.J. & Fischer, S. (1989) *Lectures on Macroeconomics* (Cambridge, MIT Press).

Boothby, N., Uptom, P. & Sultan, A. (1991) *Children of Mozambique: The Cost of Survival* (Duke University).

Brochmann, G. & Ofstad, A. (1990) *Mozambique: Norwegian Assistance in a Context of Crisis* (Fantoft, Chr. Michelsen Institute).

Brück, T. (1996) *The Economic Effects of War* (Oxford, University of Oxford).

Castel-Branco, C.N., Ed. (1994) *Moçambique: Perspectivas Económicas* (Maputo, Universidade Eduardo Mondlane, Fundação Friedrich Ebert).

Centro de Promoção do Investimento Estrangeiro - CPI (1995) *Unpublished Data* (Maputo).

Chingono, M. (1995) *War, Economic Change and Development in Mozambique: The Grassroots War-Economy of Manica Province, 1982-1992,* Manuscript (Cambridge, University of Cambridge).

Cliff, J. & Noormahomed, A.R. (1988) Health as a Target: South Africa's Destabilization of Mozambique, *Social Science and Medicine,* 27, pp. 717-722.

Comissão Nacional do Plano - CNP (1987) *Informação Estatística 1986* (Maputo, April).

Comissão Nacional do Plano (1990) *Estatísticas dos Transportes e Comunicações 1989* (Maputo, December).

Comissão Nacional do Plano (1993) *Anuário Estatístico 1992* (Maputo, May).

Comissão Nacional do Plano (1993) *Plano de Reconstrução Nacional 1994-96* (Maputo, December).

Dixit, A.K. & Pindyck, R.S. (1994) *Investment under Uncertainty* (Princeton, Princeton University Press).

Ellis, F. (1993) *Peasant Economics* (Cambridge, Cambridge University Press).

Ensminger, J. (1992) *Making a Market: The Institutional Transformation of an African Society* (Cambridge, Cambridge University Press).

Finnegan, W. (1992) *A Complicated War: The Harrowing of Mozambique* (Berkeley, University of California Press).

Geffray, C. (1991) *A Causa das Armas* (Porto, Edições Afrontamento).

Gersovitz, M. (1983) Savings and Nutrition and Low Incomes, *Journal of Political Economy*, 91.

Hall, M. & Young, T. (1997) *Confronting Leviathan: Mozambique since Independence* (London, Hurst & Company).

Hanlon, J. (1991) *Mozambique: Who Calls the Shots?* (London, James Currey).

Hanlon, J. (1996) *Peace without Profit: How the IMF Blocks Rebuilding Mozambique* (Oxford, James Currey).

Hermele, K. (1988) *Country Report: Mozambique* (Stockholm, SIDA).

International Organisation for Migration (1994) *Assistance Programme for Internally Displaced Vulnerable Groups in Mozambique* (Maputo).

Keynes, J.M. (1978) Paying for the War, in: Moggridge, D. (ed.) *Collected Writings of J.M. Keynes*, pp. 41-51.

Milward, A.S. (1970) *The Economic Effects of the Two World Wars on Britain* (London, Macmillan).

Ministério da Agricultura (1994) *Unpublished Data* (Maputo).

Ministério de Educação (1994) *Impacto da Guerra na Educação 1983-1992* (Maputo).

Newitt, M. (1995) *A History of Mozambique* (London, Hurst).

North, D.C. (1990) *Institutions, Institutional Change and Economic Performance* (Cambridge, Cambridge University Press).

Ratilal, P. (1990) *Using Aid to End the Emergency* (New York, UNDP).

Roberts, S. & Williams, J. (1995) *After the Guns Fall Silent: The Enduring Legacy of Landmines*, (Washington D.C., Vietnam Veterans of America Foundation).

Rodrik, D. (1991) Policy Uncertainty and Private Investment in Developing Countries, *Journal of Development Economics*, 36, pp. 229-242.

Schmidt-Hebbel, K., Serven, L. & Solimano, A. (1996) Saving and Investment: Paradigms, Puzzles, Policies, *World Bank Research Observer*, 11, pp. 87-117.

Sen, A. (1991) *Wars and Famine: On Divisions and Incentives*, (London, London School of Economics).

Sen, P. (1994) Savings, Investment, and the Current Account, in: van der Ploeg, F. *The Handbook of International Macroeconomics* (Oxford, Blackwell) pp. 506-534.

Stephens, J. (1994) *The Political Economy of Transport in Mozambique: Implications for Regional Development* , (University of Sussex).

Stewart, F. (1977) *Technology and Underdevelopment* (London, Macmillan).

Stewart, F. (1993). "War and Underdevelopment: Can Economic Analysis Help Reduce the Costs?" *Journal of Economic Development* 5(4): 357-80.

UNOHAC (1994) *UNOHAC Map Series* (Maputo).

van Wijnbergen, S. (1992) Trade Reform, Policy Uncertainty, and the Current Account: A Non-Expected Utility Approach, *American Economic Review,* 25, pp. 626-633.

Vines, A. (1991) *Renamo: Terrorism in Mozambique* (London, James Currey).

World Bank (1989) *Mozambique: Transport Sector Review* (Washington, D.C., October).

World Bank (1990) *Mozambique: Restoring Rural Production and Trade* (Washington, D.C., October).

World Bank (1992) *Mozambique: Second Public Expenditure Review* (Washington, D.C., December).

Wuyts, M.E. (1989) *Money and Planning for Socialist Transition* (Aldershot, Gower).

Appendix

Table A.1: Fiscal Variables

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
T-Total Tax Revenue	**15356**	**18408**	**21051**	**16500**	**13894**	**8038**	**8503**	**10638**	**13815**	**17156**	**16470**	**17853**	**17229**	**19439**	**18000**
T per capita (Mt)	1266	1479	1648	1258	1033	582	600	754	994	1225	1156	1238	1165	1247	1083
T as % of GDP	19.6%	23.2%	27.8%	25.0%	20.5%	13.1%	13.6%	17.6%	20.8%	22.9%	22.2%	21.7%	21.1%	20.0%	17.6%
T1-Tax Revenue	**12003**	**12402**	**12296**	**11518**	**10078**	**5589**	**6069**	**9022**	**11649**	**15135**	**14723**	**15166**	**14964**	**17702**	**16484**
T2-Nontax Revenue	**3353**	**6006**	**8755**	**4982**	**3816**	**2449**	**2434**	**1616**	**2166**	**2022**	**1747**	**2687**	**2265**	**1736**	**1516**
(T1) / (T2)	3.6	2.1	1.4	2.3	2.6	2.3	2.5	5.6	5.4	7.5	8.4	5.6	6.6	10.2	10.9
(T1) / (D1)	5.7	6.9	6.4	5.4	5.6	4.4	4.1	1.5	1.2	1.3	1.2	1.0	0.8	1.1	0.8
(T1) / (D2)	5.1	2.7	2.8	2.3	3.4	2.6	2.8	1.8	1.8	2.5	1.6	3.0	5.0	4.9	1.8

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
G-Total Expenditure	**22892**	**27833**	**30609**	**29747**	**27874**	**16609**	**19362**	**24402**	**31641**	**35758**	**38121**	**38266**	**38995**	**40993**	**48331**
G per capita (Mt)	1887	2236	2396	2269	2072	1203	1366	1731	2276	2554	2675	2654	2637	2631	2909
G as % of GDP	29.3%	35.1%	40.5%	45.1%	41.0%	27.0%	30.9%	40.3%	47.6%	47.7%	51.5%	46.6%	47.9%	42.3%	47.3%
(G) / (T)	149%	151%	145%	180%	201%	207%	228%	229%	229%	208%	231%	214%	226%	211%	268%
G1-Current Expenditure	**14172**	**16248**	**17889**	**18851**	**17461**	**13815**	**15887**	**13940**	**15666**	**18624**	**18928**	**18264**	**19931**	**20764**	**23336**
G1 as % of G	61.9%	58.4%	58.4%	63.4%	62.6%	83.2%	82.1%	57.1%	49.5%	52.1%	49.7%	47.7%	51.1%	50.7%	48.3%
G1 as % of GDP	18.1%	20.5%	23.7%	28.6%	25.7%	22.4%	25.4%	23.0%	23.6%	24.8%	25.5%	22.2%	24.5%	21.4%	22.9%
Defense and Security	**4419**	**5590**	**5684**	**6012**	**6426**	**4631**	**4665**	**6415**	**6125**	**7753**	**7516**	**7108**	**6758**	**7415**	**8990**
D & S per capita (Mt)	364	449	445	459	478	335	329	455	441	554	527	493	457	476	541
D & S as % of G	19.3%	20.1%	18.6%	20.2%	23.1%	27.9%	24.1%	26.3%	19.4%	21.7%	19.7%	18.6%	17.3%	18.1%	18.6%
D & S as % of GDP	5.7%	7.0%	7.5%	9.1%	9.5%	7.5%	7.5%	10.6%	9.2%	10.3%	10.1%	8.7%	8.3%	7.6%	8.8%
Salaries and Wages	**5112**	**5637**	**5314**	**5201**	**4483**	**3191**	**3019**	**2308**	**2613**	**3254**	**3592**	**4033**	**3714**	**4249**	**3890**
S & W as % of G	22.3%	20.3%	17.4%	17.5%	16.1%	19.2%	15.6%	9.5%	8.3%	9.1%	9.4%	10.5%	9.5%	10.4%	8.0%
S & W as % of GDP	6.5%	7.1%	7.0%	7.9%	6.6%	5.2%	4.8%	3.8%	3.9%	4.3%	4.8%	4.9%	4.6%	4.4%	3.8%
Goods and Services	**3605**	**4281**	**3883**	**3492**	**2498**	**1803**	**1884**	**1954**	**2748**	**3204**	**3426**	**3578**	**4493**	**4092**	**7100**
G & S as % of G	15.7%	15.4%	12.7%	11.7%	9.0%	10.9%	9.7%	8.0%	8.7%	9.0%	9.0%	9.3%	11.5%	10.0%	14.7%
G & S as % of GDP	4.6%	5.4%	5.1%	5.3%	3.7%	2.9%	3.0%	3.2%	4.1%	4.3%	4.6%	4.4%	5.5%	4.2%	7.0%
S&W and G&S	**8717**	**9918**	**9197**	**8692**	**6981**	**4994**	**4903**	**4262**	**5360**	**6458**	**7019**	**7611**	**8208**	**8341**	**10990**
S&W and G&S as a % of G	38.1%	35.6%	30.0%	29.2%	25.0%	30.1%	25.3%	17.5%	16.9%	18.1%	18.4%	19.9%	21.0%	20.3%	22.7%
S&W and G&S as a % of GDP	11.1%	12.5%	12.2%	13.2%	10.3%	8.1%	7.8%	7.0%	8.1%	8.6%	9.5%	9.3%	10.1%	8.6%	10.8%
Interest on Public Debt	**5**	**6**	**7**	**35**	**32**	**38**	**299**	**1274**	**1619**	**2324**	**2470**	**1845**	**3130**	**3523**	**1776**
Interest as % of G	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	1.5%	5.2%	5.1%	6.5%	6.5%	4.8%	8.0%	8.6%	3.7%
Interest as % of GDP	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.5%	2.1%	2.4%	3.1%	3.3%	2.2%	3.8%	3.6%	1.7%
G2-Investment, Budget Year	**8720**	**11584**	**12720**	**10897**	**10413**	**2794**	**3474**	**10462**	**14712**	**16225**	**17922**	**19602**	**19653**	**21786**	**28411**
G2 as % of Total Expenditure (G)	38.1%	41.6%	41.6%	36.6%	37.4%	16.8%	17.9%	42.9%	46.5%	45.4%	47.0%	51.2%	50.4%	53.1%	58.8%
G2 as % of GDP	11.2%	14.6%	16.8%	16.5%	15.3%	4.5%	5.6%	17.3%	22.1%	21.6%	24.2%	23.9%	24.1%	22.5%	27.8%
G3-Enterprise Debt Liquidation	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1263**	**909**	**1271**	**1438**	**975**	**712**	**0**
G3 as % of Total Exenditure (G)	0.0%	0%	0%	0%	0%	0%	0%	0%	4.0%	2.5%	3.3%	3.8%	2.5%	1.7%	0.0%
G3 as % of GDP	0.0%	0%	0%	0%	0%	0%	0%	0%	1.9%	1.2%	1.7%	1.8%	1.2%	0.7%	0.0%

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
D-Total Deficit	**7536**	**9425**	**9558**	**13247**	**13980**	**8571**	**10859**	**13764**	**17826**	**18602**	**21651**	**20413**	**21766**	**21554**	**30331**
D per capita (Mt)	621	757	748	1010	1039	621	766	976	1282	1329	1519	1416	1472	1383	1826
D as % of GDP	9.6%	11.9%	12.6%	20.1%	20.6%	13.9%	17.3%	22.7%	26.8%	24.8%	29.2%	24.9%	26.7%	22.2%	29.7%
D1-Grants Received	**2095**	**1793**	**1919**	**2148**	**1806**	**1259**	**1469**	**6092**	**9667**	**12099**	**12506**	**15273**	**17984**	**16585**	**21912**
D1 as % of Total Deficit (D)	27.8%	19.0%	20.1%	16.2%	12.9%	14.7%	13.5%	44.3%	54.2%	65.0%	57.8%	74.8%	82.6%	76.9%	72.2%
D1 as % of Total Revenue (T)	13.6%	9.7%	9.1%	13.0%	13.0%	15.7%	17.3%	57.3%	70.0%	70.5%	75.9%	85.6%	104.4%	85.3%	121.7%
D1 as % of GDP	2.7%	2.3%	2.5%	3.3%	2.7%	2.0%	2.3%	10.1%	14.5%	16.1%	16.9%	18.6%	22.1%	17.1%	21.5%
Project Grants (P)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4661**	**5089**	**7321**	**7002**	**9444**	**9018**	**10283**	**12428**
P as % of Total Deficit (D)	0%	0%	0%	0%	0%	0%	0%	33.9%	28.5%	39.4%	32.3%	46.3%	41.4%	47.7%	41.0%
P as % of GDP	0%	0%	0%	0%	0%	0%	0%	7.7%	7.7%	9.8%	9.5%	11.5%	11.1%	10.6%	12.2%
Non-Project Grants (N-P)	**2095**	**1793**	**1919**	**2148**	**1806**	**1259**	**1469**	**1431**	**4578**	**4777**	**5504**	**5830**	**8966**	**6302**	**9496**
N-P as % of Total Deficit (D)	27.8%	19.0%	20.1%	16.2%	12.9%	14.7%	13.5%	10.4%	25.7%	25.7%	25.4%	28.6%	41.2%	29.2%	31.3%
N-P as % of GDP	2.7%	2.3%	2.5%	3.3%	2.7%	2.0%	2.3%	2.4%	6.9%	6.4%	7.4%	7.1%	11.0%	6.5%	9.3%
D2-External Borrowing (net)	**2375**	**4578**	**4444**	**4995**	**2943**	**2149**	**2205**	**5123**	**6486**	**6171**	**9312**	**5099**	**3021**	**3631**	**9300**
D2 as % of Total Deficit (D)	31.5%	48.6%	46.5%	37.7%	21.1%	25.1%	20.3%	37.2%	36.4%	33.2%	43.0%	25.0%	13.9%	16.8%	30.7%
D2 as % of GDP	3.0%	5.8%	5.9%	7.6%	4.3%	3.5%	3.5%	8.5%	9.8%	8.2%	12.6%	6.2%	3.7%	3.7%	9.1%
D3-Domestic Financing (net)	**3066**	**3054**	**3196**	**9901**	**5264**	**5162**	**7389**	**2569**	**1379**	**121**	**22**	**36**	**1754**	**1338**	**-882**
D3 as % of Total Deficit (D)	40.7%	32.4%	33.4%	74.7%	37.7%	60.2%	68.1%	18.7%	7.7%	0.7%	0.1%	0.2%	8.1%	6.2%	-2.9%
D3 as % of GDP	3.9%	3.8%	4.2%	15.0%	7.7%	8.4%	11.8%	4.2%	2.1%	0.2%	0.0%	0.0%	2.2%	1.4%	-0.9%
Basic Data															
Total Resident Population (in '000)	12130	12449	12776	13112	13456	13810	14174	14100	13900	14000	14252	14420	14790	15583	16614
GDP Deflator	100.0	102.7	122.2	138.5	160.6	238.2	266.6	650.0	949.8	1320.8	1809.5	2504.3	3836.7	5620.7	8476.0
Exchange Rate (Mt/US$, end of year)	33.8	35.8	37.8	40.2	42.4	43.2	39.7	289.4	528.6	819.7	1038.2	1845.4	2742.1	5238.4	6552.5
Notes															
Sources: CNP, *Anuario Estatistico*, various years; World Bank, October 1990. All data is expressed in million Meticais, per calendar year and in constant 1980 prices, unless otherwise stated. 1994 data are estimates.															
Compatible information for the pre-1980 period is not available. Only a select breakdown for current expenditure is shown. Domestic financing mainly includes subsides to loss making entreprises before 1987.															

Table A.2: Output, Consumption and Debt Variables

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Output & Growth															
GDP, cp (bn Mt)	**78.2**	**79.4**	**75.6**	**66.0**	**67.9**	**61.5**	**62.6**	**60.5**	**66.5**	**75.0**	**74.1**	**82.1**	**81.5**	**97.0**	**102.1**
GDP, % change	na	1.5%	-4.7%	-12.7%	2.9%	-9.4%	1.7%	-3.3%	9.8%	12.9%	-1.2%	10.8%	-0.8%	19.1%	5.2%
GDP per capita, cp (Mt)	6447	6375	5918	5033	5048	4457	4417	4291	4781	5358	5236	5694	5509	6226	6144
GDP per capita, % change	na	-1.1%	-7.2%	-15.0%	0.3%	-11.7%	-0.9%	-2.8%	11.4%	12.1%	-2.3%	8.8%	-3.3%	13.0%	-1.3%
Index: GDP per capita, cp	100.0	98.9	91.8	78.1	78.3	69.1	68.5	66.6	74.2	83.1	81.2	88.3	85.4	96.6	95.3
GSP, cp (bn Mt)	**82.1**	**84.1**	**78.8**	**64.4**	**58.2**	**53.9**	**55.0**	**56.7**	**60.2**	**62.4**	**na**	**na**	**na**	**na**	**na**
GSP, % change	na	2.4%	-6.3%	-18.3%	-9.6%	-7.4%	2.0%	3.1%	6.2%	3.7%	na	na	na	na	na
GSP per capita, cp (Mt)	6768	6756	6168	4912	4325	3903	3880	4021	4331	4457	na	na	na	na	na
GSP per capita, % change	na	-0.2%	-8.7%	-20.4%	-11.9%	-9.8%	-0.6%	3.6%	7.7%	2.9%	na	na	na	na	na
Index: GSP per capita, cp	100.0	99.8	91.1	72.6	63.9	57.7	57.3	59.4	64.0	65.9	na	na	na	na	na
Consumption															
Total Consumption, cp (bn Mt)	**77.8**	**78.5**	**78.0**	**74.0**	**73.7**	**65.1**	**64.7**	**65.8**	**68.7**	**72.2**	**65.2**	**58.6**	**57.0**	**69.1**	**63.7**
Total Consumption per capita, cp (Mt)	6414	6307	6107	5642	5478	4714	4567	4666	4944	5159	4610	4062	3851	4432	3834
Total Consumption as % of GDP	99%	99%	103%	112%	109%	106%	103%	109%	103%	96%	88%	71%	70%	71%	62%
Index: Total Consumption per capita, cp	100.0	98.3	95.2	88.0	85.4	73.5	71.2	72.8	77.1	80.4	71.9	63.3	60.0	69.1	59.8
Private Consumption, cp (bn Mt)	**64.0**	**62.5**	**62.6**	**58.4**	**59.4**	**55.1**	**54.5**	**56.4**	**58.4**	**59.7**	**53.4**	**46.3**	**44.5**	**55.8**	**48.8**
Private Consumption per capita, cp (Mt)	5276	5023	4898	4455	4413	3990	3844	4000	4200	4266	3776	3208	3007	3579	2940
Private Consumption as % of GDP	82%	79%	83%	89%	87%	90%	87%	93%	88%	80%	72%	56%	55%	57%	48%
Index: Private Consumption per capita, cp	100.0	95.2	92.8	84.4	83.6	75.6	72.9	75.8	79.6	80.9	71.6	60.8	57.0	67.8	55.7
Public Consumption, cp (bn Mt)	**13.8**	**16.0**	**15.4**	**15.6**	**14.3**	**10.0**	**10.2**	**9.4**	**10.3**	**12.5**	**11.8**	**12.3**	**12.5**	**13.3**	**14.9**
Public Consumption per capita, cp (Mt)	1138	1285	1209	1188	1064	724	723	666	743	893	834	855	844	853	894
Public Consumption as % of GDP	18%	20%	20%	24%	21%	16%	16%	16%	16%	17%	16%	15%	15%	14%	15%
Index: Public Consumption per capita, cp	100.0	112.9	106.2	104.4	93.6	63.6	63.5	58.6	65.3	78.5	73.3	75.1	74.2	75.0	78.6
Private as % of Public Consumption	464%	391%	405%	375%	415%	551%	532%	600%	565%	478%	453%	375%	356%	419%	329%
Foreign Debt															
Total Foreign Debt Stock, cp (bn Mt)	na	na	na	na	na	50.7	47.1	173.6	234.3	272.5	284.5	368.1	360.3	467.0	na
Total Foreign Debt Stock as % of GDP	na	na	na	na	na	82%	75%	287%	353%	363%	384%	448%	442%	481%	na
Foreign Debt Stock per capita, cp (Mt)	na	na	na	na	na	3668	3319	12311	16854	19467	20107	25524	24360	29970	na
Basic Data															
Total Resident Population (in '000)	12130	12449	12776	13112	13456	13810	14174	14100	13900	14000	14151	14420	14790	15583	16614
GDP Deflator	100	103	122	139	161	238	267	650	950	1321	1809	2504	3837	5621	8476
Consumer Price Index	100	104	122	137	157	232	261	719	1114	1559	2294	3070	4792	6883	11706
Exchange Rate (Mt/US$, end of period)	32.8	35.8	37.8	40.2	42.4	43.2	39.7	289	529	820	1038	1845	2742	5238	6553
Notes															

Sources: CNP, *Anuarios* and *Informacao Estatisticas*, various years; Banco de Mocambique, *Boletim Estatistico*, no 7, 1995; World Bank, December 1992; Ratilal, 1990.

Pre-1980 data is generally not available. The exceptions are GSP cp in bn Mt 111.9 (1973), 91.5 (1974), 71.4 (1975) and 75 (1977) and a population estimate for 1975 of 10627000.

All indices are set at 100 in 1980. cp=constant 1980 prices, mn=million; bn=billion; Mt=Meticais; na=not available/applicable.