GROWTH

GROWTH AND SURVIVAL OF SMALL SOUTHERN AFRICAN FIRMS

By

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A DISSERTATION

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ABSTRACT

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Small enterprises are a ubiquitous feature of the economies of many developing countries. This study is the first to examine the dynamics of their survival and growth using economic theory and modern econometric techniques. This dissertation examines these issues using unique data sets from five countries in southern Africa.

The theory of firm survival (due to Jovanovic, 1982) implies an inverse relationship between the probability a firm fails and the firm's size and growth rate. Additional explanatory variables, based on empirical evidence from earlier studies, allow for differences in the characteristics of enterprises and their proprietors.

Using data sets from surveys conducted in Swaziland and Zimbabwe in 1991, I estimate a proportional hazards model describing the failure rates of a sample of approximately 8,500 firms. There is an inverse relationship between enterprise growth rates and the failure hazard. However, the size of the enterprise is unrelated to its probability of failing. The sector where it operates influences the hazard, as does its location. Access to formal credit does not improve its survival chances; and female-headed firms are at no survival disadvantage compared to their male counterparts.

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Jovanovic's theory also implies that firm growth will be an inverse function of firm age and size. The impacts of these and other explanatory variables on firm growth are examined in an ordinary least squares framework, using data from 1,673 enterprises located in two South African townships, Swaziland, Lesotho, Botswana, and Zimbabwe. There is strong evidence of an inverse relationship between firm age and growth, and between firm size and growth. In addition to these factors, the sector and location of an enterprise have an influence on its growth rate, and in two countries, the firms run by female proprietors grow more slowly than those run by males. Sample selection is unimportant.

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DEDICATION

This dissertation is lovingly dedicated to my wife Karen, who suffered at least as much as I did throughout my graduate studies. Without her patience and forbearance this work would not have been possible.

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Many people have helped bring this dissertation to its fruition. These debts are too numerous to mention in their entirety. I do, however, wish to gratefully acknowledge the special contributions of a smaller cast. Professor Carl Liedholm, my dissertation advisor, worked tirelessly with me at every stage of the research, suggesting new directions and changes which have greatly improved the quality of this document. Professor Daniel Hamermesh also contributed much of his time and energy to the molding of this dissertation. I am also grateful to him for the time he allowed me to spend "under his wing" throughout my years at Michigan State. I also thank the other members of my dissertation committee, Professors Peter Schmidt and Donald Mead, who always found time to read my work and comment on it. Additionally, the discussions I have had with my colleagues, especially Thomas Klier, Patricia Pollard, and David Schimmelpfennig, have been invaluable. I also acknowledge my debt to Joan Parker, whose creative data collection ideas, and helpful comments contributed greatly to this work.

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United States Agency for International Development during the data collection part of this work, and from the Center for International Business Education and Research at Michigan State University during the data analysis and writing phase.

Although not directly involved in the details of my dissertation, my family's support and encouragement have been vital to its completion. In particular, I thank my wife Karen, who had to put up with prolonged absences on my part during the field work, as well as the usual trials and tribulations that accompany graduate school. Finally, I acknowledge the lifetime of love and encouragement of my parents, Noel and Ron McPherson.

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CHAPTER I

INTRODUCTION

A visit to most developing countries will make clear to even the unobservant visitor that micro and small enterprises (MSEs)[1] are a ubiquitous feature on the landscape of many of these economies. These enterprises are frequently one-person operations, often operating from the proprietor's home. The most common sorts of enterprises in southern Africa are small textile manufacturers (e.g., knitters, tailors, weavers and crocheters), beer brewers, vegetable hawkers, and basket weavers. In general, these enterprises have low initial capital, as well as skill, requirements. In most countries, at least two-thirds of the proprietors of MSEs are women.

Many African governments are beginning to realize the increasing importance of the MSE sector for income generation as well as for making income distribution more equitable. African population growth rates are astoundingly high; in southern Africa these range from 2.6 percent to 3.8 percent

[1] For purposes of this discussion, MSEs are those non-farm income-generating activities with 50 or fewer workers.

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annually.[2] With the rate of formal sector job creation lagging well behind the increase in the labor supply, and with the marginal product of agricultural labor very low, Africans are increasingly turning to the MSE sector for all or part of their incomes. Indeed, recent studies of the MSE sectors in several southern African countries indicate that as many as one-quarter of the working age population in each country are involved in this sector.[3]

Now that the importance of MSEs has become clear, policy-makers, members of the donor community, and researchers have begun to examine what is known about these enterprises. Early research regarding small enterprises in developing countries began in the 1950s (see for example, Hoselitz, 1959), and occasional work was pursued throughout the 1960s. However, widespread research on this topic has been undertaken only for the past two decades. This proliferation of empirical studies of the small enterprise sector was spawned by an employment study conducted by the International Labor Organization (ILO) in urban areas of Kenya (ILO, 1972). This study identified an important but ignored part of the urban employment scene: the many small scale manufacturers and traders who operated extralegally. This sector has become known by the phrase

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[2] See World Bank (1991). To better understand the magnitude of the problem, consider that it takes only about 27 years for a population growing at a rate of 2.6% per year to double in size.

[3] See Fisseha and McPherson (1991) and McPherson (1991).

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coined by this early work: the "informal sector"[4]. The suggestion in the Kenya study that the urban informal sector needed to be examined led to surveys funded by the ILO of informal enterprises in Freetown, Sierra Leone; Lagos and Kano, Nigeria; Kumasi, Ghana; Colombo, Sri Lanka; Jarkarta, Indonesia; and many others in the 1970s.[5] Subsequently, other international organizations began studies of small enterprises[6] including not only urban firms, but rural ones as well. To name only a few, in Africa, studies have been completed in Nigeria (Aluko, Oguntoye, and Afonja, 1972a, 1972b), Sierra Leone (Liedholm and Chuta, 1975), Kenya (Child, 1977), Egypt (Davies, Seale, Mead, Badr, Sheikh, and Saidi, 1984) and Zambia (Milimo and Fisseha, 1986). In Asia, Deb and Hossain (1984) have studied MSEs in Bangladesh, Ho (1980) has considered the cases of Taiwan and Korea, and Little, Mazumdar, and Page (1987) focused their work on Indian MSEs.

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[4] Attempts to define the informal sector have always produced controversy, since the boundaries of the sector are by no means clear. The ILO offers one possible definition: "..the informal sector is one where free entry to new enterprises exists; enterprises in this sector rely on indigenous resources; they are family owned and small scale; they use labour-intensive and adapted technology; their workers rely on non-formal sources of education and skills; and finally they operate in unregulated and competitive markets." (ILO, 1981; pp. 15-16)

[5] For details on these surveys, and the urban informal sector in general, see Sethuraman (1981).

[6] While most small enterprises belong to the informal sector, the two groups are not the same. In these studies, as well as in this dissertation, the small enterprise sector is based simply on the number of workers engaged in the activity.

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Several surveys of small enterprises have also been conducted in Latin America, including Colombia (Cortes, Berry, and Ishaq, 1987), Honduras (Stallman and Pease, 1983), and Jamaica (Fisseha and Davies, 1981). Typically, these studies restricted themselves to some particular feature of the sector: for example, some considered only particular industry groupings and others included only rural enterprises.

In addition to this vast accumulation of knowledge about small enterprises from countries around the developing world, other specific aspects of the sector were taken up in the literature. The recognition of the importance of considering an enterprise in the context of its surroundings led to the application of subsector analysis to MSE research. These studies examine how enterprises in a given subsector are linked with their suppliers and their customers, and how they compete with each other. Consideration is also given to the impact of the legal and regulatory environment on MSEs. For example, Haggblade (1984) looked at the sorghum beer industry in Botswana, while in Thailand, studies of the furniture (Boomgard, 1983) and silk (Haggblade and Ritchie, 1991) sectors have been undertaken. These studies have repeatedly yielded interesting and useful results.

Another topic of interest which has been pursued involves the relative efficiency of MSEs. In their 1987 review, Liedholm and Mead assemble information regarding efficiency for small manufacturing enterprises in several countries in

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the developing world, including Sierra Leone, Egypt, Jamaica, Honduras, and Bangladesh.[7] They explore several measures of efficiency, including social benefit-cost ratios, and net return per hour. They report important differences according to firm size, the sector in which the firm operates, and firm location.

According to the authors, in many but not all manufacturing sectors, efficiency increases with size up to fifty workers, and thereafter declines. That is, MSEs as a group may be more efficient than larger scale enterprises, but within the MSE category, the micro firms may be less efficient than the small firms. Often the largest jump in efficiency is between the one-person enterprises and those with two workers. This "U"-shaped efficiency-size curve is somewhat controversial, however. Findings from Korea (Ho, 1979) and Colombia (Cortes, et al., 1987) indicate that for some industries efficiency increases with size. Little, et al. (1987) find that once other factors are controlled for, firm size is not related to efficiency in most industries. They conclude that "the absence of a significant relationship between firm size and technical efficiency means that neither a positive nor a negative case can be made for small firms on the grounds of superior or inferior economic efficiency".

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[7] It should be noted that all of the studies summarized in Liedholm and Mead (1987) are based on static data.

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Enterprises in certain sectors seem to be relatively more efficient as well. The studies cited in Liedholm and Mead (1987) only include manufacturing enterprises; nevertheless, the findings are important and useful. In most countries considered, MSEs in the metalworking and non-metallic mineral processing sectors, and to a lesser extent the wood processing sectors are the most efficient. On the other end of the spectrum, in most of the countries enterprises involved in textile and wearing apparel production are the least efficient, closely followed by food and beverage processors.

Liedholm and Mead (1987) present information on two locational characteristics as well. First, the average home-based enterprise is less efficient than the average firm located elsewhere. Second, rural enterprises tend to be less efficient than those in urban areas. The authors emphasize that exceptionally efficient home-based and rural enterprises certainly exist; their conclusions are based on averages.

Many other topics involving small enterprises have also been examined in the recent past. These include data collection methodology, the impact of the policy and regulatory environment on small enterprises, and the demand for products manufactured by MSEs.

This vast literature has illuminated many previously unknown facets of MSEs, and has been able to make some limited, but important policy recommendations. However, these many areas of study of MSEs have at least one common

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shortcoming. Each of the studies listed above (as well as the many that were not) concentrates on firms at one point in time. Little or no attention is given to issues involving how these enterprises grow and change over time.

Recognizing the failure of the field to address dynamic issues, new surveys were designed to collect appropriate data. These new studies began in 1990 with a country-wide survey of MSEs in Lesotho (Fisseha, 1991), and continued with the work of Liedholm and McPherson (1991) in South Africa, Fisseha and McPherson (1991) in Swaziland, Parker and Dondo (1991) in Kenya, McPherson (1991) in Zimbabwe, and Daniels and Fisseha (1992) in Botswana. The data that have been gathered make an in-depth study of how small firms change over time possible for the first time. In addition to addressing the subject of MSE dynamics, these data collection efforts have yielded some lessons regarding survey methodology.

This dissertation reports on these new findings. Its primary objective is to extend the knowledge frontier regarding small enterprises beyond static issues to dynamic ones. In doing so, this research is intended to provide guidance to both policy-makers and to researchers. For the former, knowledge of how firms change over time should be a crucial input into the decision-making process of those who would assist MSEs. For the latter, this dissertation may stimulate discussion of new analysis and data collection techniques so that issues raised below can be examined in

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greater detail by others. Although the contributions of this work are primarily empirical, the results to be presented may also provide the groundwork for formal modeling work in the future.

This dissertation has two specific objectives. The first involves the issue of firm survival. It attempts to address the question, "What factors influence a firm's chances of failing?". The second objective is to understand growth among MSEs better. It considers the concept of growth and its measurement, and what characteristics of firms and their proprietors lead to growth.

This dissertation is divided into four primary parts. In Chapter II, the context in which southern African MSEs exist is presented. This chapter also describes the methodology used in the surveys that generated the data, in addition to some simple descriptive findings regarding small enterprises. Chapter III considers issues surrounding MSE survival. The analysis in this chapter is unique: this model has never before been used to study firm lifetimes in either developed or developing countries. Factors which influence growth in individual firms are the subject of Chapter IV. As noted above, data on this topic are available for five countries, making possible some interesting cross-country comparisons. A final chapter presents some general conclusions and policy implications, and makes some recommendations for future research on MSEs.

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CHAPTER II

MICRO AND SMALL ENTERPRISES IN SOUTHERN AFRICA: A BACKGROUND

2.1 Introduction

In the last two years, Michigan State University, in collaboration with local institutions, has conducted five surveys of micro and small enterprises (MSEs) in the southern African region. It is from these extensive studies that the data used for this dissertation are taken. This chapter is designed to provide background information that may help to put the findings of the following chapters into perspective. To this end, the following section presents a brief discussion of the characteristics of the countries under study. Section 2.3 describes in a general way the survey method used for data collection in each of the countries, and section 2.4 reports some of the findings of these surveys. A final section contains some concluding remarks.

2.2 A Review of Regional Similarities and Differences

Regardless of the political positions of the countries in the southern African region with respect to South Africa, each

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of these smaller economies is dominated by its neighbor to the south. Four of the countries in this study, South Africa, Swaziland, Lesotho, and Botswana, are members of the Southern African Customs Union (SACU). Among other things, SACU has facilitated the entry of large South African firms into member states. As a result, MSEs in these countries may be forced into lower-return sectors in which they do not have to compete with large-scale foreign firms. Although it is not a member of SACU, Zimbabwe's economy is also dominated by large, white-owned enterprises. Prior to independence in 1980, these large-scale enterprises were granted privileges which allowed them to control the most lucrative markets. The effect on small enterprises has been the same as in the SACU countries. In addition to being forced to compete with large firms, MSEs in southern Africa have faced a legal and political environment that is at best ambivalent, and at worst hostile. Believing the informal sector, to which most MSEs belong, to be counterproductive to the development process the governments in the region have enforced a variety of restrictions or prohibitions respecting the activities of small enterprises.

South Africa is also a major force in the regional labor market. Each country sends some of its workers to the South African mines. Some countries, such as Lesotho, depend heavily on remittances from migrant workers. Even as Zimbabwe and Botswana have reduced the number of migrant workers, their

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economies have been affected. In particular, as Downing and Daniels (1992) point out, the decrease in workers abroad has served only to increase the competition in the MSE sector, as many of these former migrant laborers return home and begin small enterprises.

In addition to dominating the region's product and labor markets, the South African economy has considerable influence in the regional capital market. Lesotho, Swaziland and South Africa belong to the Rand Monetary Area, in which a common currency is accepted.[8] South African investment in Botswana is also heavy, especially in the mining sector.[9] Zimbabwe's economy is also heavily dependent on South African capital. According to Tortensen (1982), "penetration of the Zimbabwean economy by South African capital spans most sectors".

There are other similarities between the countries studied here, as well. Besides South Africa, all of the countries studied in this work are landlocked, and most depend heavily on the transportation network that traverses South Africa for shipment of imports and exports. The countries have broadly similar climates, and therefore similar agricultural patterns, although there are certainly some differences owing primarily to dissimilarities in altitude. These countries also have much in common when one considers

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[8] Nominally, Swaziland and Lesotho each have their own currency. However, these are pegged to the rand, and the rand is legal tender in both countries.

[9] Tortensen (1982).

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their colonial heritage: all are former British territories. The countries are shown in Figure 2.1.

In spite of these similarities, there are stark differences between the countries under study in this dissertation. In order to put the findings of later chapters into perspective, a brief discussion of the ways in which southern African countries are dissimilar is warranted.

2.2.1 South African Townships

The townships in South Africa were established as a part of the mechanism of apartheid. The two townships covered in this dissertation, Mamelodi and Kwazakhele, are located on the outskirts of Pretoria and Port Elizabeth, respectively. Statistics at the township level are difficult to obtain, although a picture that is probably reasonably accurate can be pieced together from smaller studies.

The 1985 population of each township is approximately 120,000.[10] Of those in the formal sector work force, many work in heavy industry or as domestic help in white households. Because of the urban nature of the townships, agriculture is not an important part of the economies of these communities as it is in other countries in the region. Not

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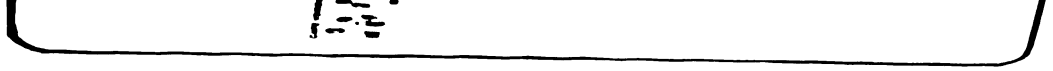
[10] Liedholm and McPherson (1991).



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surprisingly, the government has constrained the development of business within the townships, including restrictions on the establishment of manufacturing concerns and strict regulations regarding the pervasive mobile vendors.[11] In addition to the constraints placed on business from legislation, the violent and unsettled social environment has often resulted in hardship for township businesses and residents. Perhaps reflecting the harshness of life in the townships, residents may be worse off than the average person living in some of the other countries in the region. Estimates of the annual per capita income fall into the general range of $450 - $500.[12]

2.2.2 Swaziland

Swaziland, a country of about 735,000[13] people, is roughly the size of Delaware, and is surrounded on three sides by South Africa. It is a monarchy, independence having been achieved in 1968. Swaziland is a relatively stable environment politically (Shillington, 1987). In general the government encourages investment and business growth, making

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[11] Davies (1987).

[12] VISTA (1990) estimates annual per household income in Kwazakhele at $2,714 in 1990. The same study lists the average household size as 5.6 persons, so per capita income is $485. The report admits that income under-reporting may be problematic. McGrath (1990) reports 1980 per capita "black" income country-wide as $457.

[13] World Bank, 1990.

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use of tax incentives and other policies. Swaziland's government takes a relatively less active regulatory stance (Davies, et al., 1985).

Like many countries in the region, Swaziland's economy relies heavily on agricultural production. In addition to supporting the majority of the populace, agriculture is also a major source of foreign exchange. While raw sugar is the major source of export earnings, exports of asbestos, wood pulp and canned fruit are also important. Although Swaziland does not rely on repatriated earnings from Swazi miners abroad as much as many southern African countries, the economy is still dependent on South Africa. Most large-scale industry, including most manufacturing concerns as well as the lucrative tourism sector, is dominated by South African firms. Additionally, the fact that 95% of Swaziland's imports come from South Africa demonstrates the former country's reliance on the latter (Davies, et al, 1985).

With the population so small, Swaziland's domestic market is not very large. Still, the annual per capita income, at $810 for 1988 (World Bank, 1990) is larger than that in many countries in the region. The per capita incomes of Swaziland and the other countries studied in this dissertation are presented in Table 2.2. Swaziland also has a relatively well-developed transport and road system, an easier task to accomplish due to the compact nature of the country.

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2.2.3 Lesotho

Of the countries studied in this thesis, Lesotho is the most heavily dependent on South Africa, and the poorest. Slightly larger (the size of Maryland) and more populous (1.7 million people) than Swaziland, only 9% of its land area is arable, owing to its mountainous terrain. Indeed, all of Lesotho is at least 1,000 meters above sea level.[14] Lesotho is nominally a monarchy, but is actually controlled by a military council. Lesotho became independent in 1966 (Shillington, 1987).

Lesotho sends roughly 150,000 migrant workers to South Africa, mainly to work in the mines. While repatriated earnings are an important part of the Basotho economy, GNP per capita in 1988 was only $420, ranking Lesotho among the poorest 30 countries worldwide (World Bank, 1990). The dependence on South Africa for employment for a substantial proportion of the work force has led to a retardation of the industrial development of the country relative to its neighbors in the region. This fact, coupled with Lesotho's lack of natural resources[15], paints an uncertain picture of the country's future.

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[14] Statistics from Barclay's Bank, 1988.

[15] Water is the only natural resource Lesotho has in abundance.

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2.2.4 Botswana

Botswana is a much larger country than either Swaziland or Lesotho: it is roughly the size of France. Although it has almost twenty times the land area of Lesotho, it has only 1.3 million inhabitants, compared with 1.7 million for Lesotho. Partly this results from the fact that the Kalahari desert consumes 69% of the land.[16]

Since independence from Britain in 1966, Botswana has been a democracy, generally free of political unrest. Its economy is less dependent on agriculture than those of Swaziland or Lesotho. Only 3% of GDP in 1988 derived from agriculture, while 55% resulted from industry (World Bank, 1990). Botswana has a well-developed mining sector, exporting diamonds, copper, nickel, and other minerals. The development of the mining sector has dramatically reduced the number of migrant miners in South Africa, from approximately 30,000 in 1970 to less than 15,000 by the mid-1980s.[17] GNP per capita is $1,010 (1988), the highest in the region except South Africa (World Bank, 1990).

2.2.5 Zimbabwe

Zimbabwe had the most recent and most violent birth of the countries being considered. The white minority government issued a Unilateral Declaration of Independence from Britain

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[16] Statistics taken from Barclay's Bank of Botswana, 1982.

[17] Shillington, 1987, p. 190.

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in 1965. In response to Zimbabwe's (then Southern Rhodesia) racial policies, the international community imposed stringent sanctions. Only after a bloody and protracted civil war ended in 1980 was Zimbabwe born. The sanctions had some positive impacts on the country. Most notably, sanctions helped speed the development of the industrial capacity as well as that of the national infrastructure. The period of the sanctions also began a tradition of central planning of the economy, a legacy that continued during the period of socialism which began after 1980. Only recently has Zimbabwe begun to liberalize her economy.[18]

The country is the northern-most country in this study, and except for South Africa, the largest in population with 9.3 million people in 1988 (World Bank, 1990). Zimbabwe is much larger in terms of land area than Swaziland or Lesotho, but smaller than Botswana. Although suffering more from the current drought than most countries in the region, typically Zimbabwe is food self-sufficient. In many years, Zimbabwe exports grains, particularly maize, to her neighbors. As in Botswana, the mining sector is well-developed in Zimbabwe, with gold and asbestos as leading exports. Her fairly recent independence has left Zimbabwe with a well-developed industrial sector. President Mugabe has been largely successful in persuading the skilled workers and capitalists

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to remain, or those that fled the country after the civil war to return.

In spite of Zimbabwe's diversified economy and well-developed industrial sector, it is the poorest country studied in this dissertation, except Lesotho. 1988 per capita income was $650 dollars (World Bank, 1990). In part, this may be explained by Zimbabwe's higher birth rate over the last twenty years.

2.2.6 Other Regional Differences

The countries in this study have also demonstrated widely different patterns of economic growth over the last several decades. As Table 1.1 shows, the most rapidly growing economy overall has been Botswana, while the most sluggish growth has been in South Africa. There are also noticeable differences when GDP growth is disaggregated by sector. For example, growth in agriculture ranges from 2.5% per year in Zimbabwe to -5.9% in Botswana. Similar disparities exist in the other sectors as well.

Table 2.1
Average Annual Growth Rates of GDP By Major Sector
(in Percent)

Country	GDP		Agriculture		Industry		Manufacturing		Services	
	65-80	80-88	65-80	80-88	65-80	80-88	65-80	80-88	65-80	80-88
South Africa	3.8	1.3	N/A	1.7	N/A	0.2	N/A	0.2	N/A	2.6
Swaziland	4.2	3.3*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lesotho	5.7	2.9	N/A	1.8	N/A	1.6	N/A	12.4	N/A	4.1
Botswana	14.2	11.4	9.7	-5.9	24.0	15.1	13.5	5.0	11.5	10.3
Zimbabwe	5.0	2.7	N/A	2.5	N/A	1.7	N/A	2.1	N/A	3.4

SOURCES: World Bank, 1989, 1990.
UNDP, 1989.

* Data only through 1987.
N/A means "not available".

Table 2.2
Per Capita Gross National Product, 1988

Country	1988 GNP Per Capita (in US Dollars)
South Africa	$2,290
Swaziland	$810
Lesotho	$420
Botswana	$1,010
Zimbabwe	$650

SOURCE: World Bank (1990)

2.3 Survey Methodology

From late 1990 to 1992, Michigan State University conducted five surveys of MSEs in southern Africa. The countries involved are Swaziland, Lesotho, Botswana, Zimbabwe and 2 townships in South Africa, Mamelodi and Kwazakhele. Details of the findings of these surveys are reported in

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Liedholm and McPherson (1991), Fisseha and McPherson (1991), Fisseha (1991), Daniels and Fisseha (1992) and McPherson (1991). Each of these was conducted in largely the same manner.[19] The four country-wide surveys employed a stratified cluster sampling technique. This method involves the designation of several strata, usually based on size of the population. For example, a typical survey divided the country into urban areas, rural areas, and smaller towns[20]. Within each stratum, clusters were chosen at random. Most of the time clusters were defined by the national census of each country. For example, rural areas in Swaziland are divided into enumeration areas. From a list of all such areas, a number were drawn at random. Once the clusters within each stratum were identified, the data collection began. Within each cluster, every household and shop was visited by an enumerator, and data were gathered on any enterprises that were identified.

Because they were not country-wide exercises, the surveys of enterprises in Mamelodi and Kwazakhele were slightly different. These were censuses: every shop and household within the boundaries of the township were enumerated.

Two or three instruments were used in each survey. The first was a questionnaire aimed at existing enterprises.

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[19] The author was directly involved in the management of each of the surveys except Botswana.

[20] For survey purposes, "urban" is defined as cities with 20,000 or more inhabitants.

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Administered in all countries, it gathered basic data regarding the business and its proprietor. An example of a basic questionnaire can be found in Appendix 1. A second instrument, designed to collect more detailed data on firm and proprietor characteristics, was a supplementary questionnaire given to a subset of existing MSEs. In order to learn about the survival chances of small firms, an innovative survey procedure developed by Parker and Dondo (1991) in Kenya was employed. This involved administering a third questionnaire to all persons in the sample area who once ran enterprises which are now closed. This questionnaire was used in the Swaziland and Zimbabwe surveys. These new data make possible the analysis of failure probabilities utilized in Chapter III.

The surveys were conducted in the native language of the respondents. Teams of enumerators, often university students, were hired and trained in survey techniques. Oversight of these teams was the primary function of field supervisors. Other survey personnel included an overall survey director and data entry specialists.[21] The actual number of MSEs enumerated in each country is presented in Table 2.3.

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[21] For further detail on survey methodology, see Liedholm (1991).

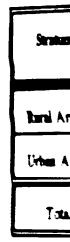

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Table 2.3
Number of Enterprises Enumerated

Stratum	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Rural Areas*	N/A	1,046	5,212	851	1,815
Urban Areas	5,253	1,713	2,055	473	3,760
Total	5,253	2,759	7,267	1,324	5,575

SOURCE: Survey Data

Surveys of this sort provide important information. Nonetheless, as with all surveys, they are potentially subject to certain limitations. Imprecision is introduced into a survey in two ways: sampling error, resulting from the design of the survey, and non-sampling error, which comes from the survey's execution. Casley and Lury (1987) point out that, at least in surveys conducted in developing countries, non-sampling error tends to be much greater than sampling error. The sources of each type of error in the surveys used in this dissertation, as well as what steps were taken to minimize them, will be considered in turn.

Sampling error arises because it is unlikely that any sample describes the population from which it is drawn perfectly accurately. Obviously, sampling error can be reduced by increasing the sample size.[22] Unfortunately,

[22] Casley and Lury (1987) state that a doubling of the sample size will decrease the sampling error by a factor equal to the square root of the sample size.

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surveys generally suffer from financial and time constraints. As a result, the surveys used to generate these data rely on stratified cluster sampling, described above. The strata are chosen in such a way as to group together MSEs that are similar to one another. In other words, the variance of any variable should be small within strata but large between strata. This allows the survey to sample fewer enterprises for the same level of precision. In practice, however, the choice of strata is seldom a simple one, since these variances are not known beforehand. The extent to which stratification reduces sampling error depends on the appropriateness of the choice of strata.[23] The researcher, then, must make the most of existing knowledge of the survey area. In the design of each of these surveys, local experts, such as census officers, were regularly consulted.

An additional source of sampling error is the use of random cluster sampling. In order to maximize the gains in precision from stratification, enterprises would need to be randomly chosen within each stratum. This is not feasible,

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[23] *Ex post,* these variances can be calculated, and a rough idea of the appropriateness of the stratification can be achieved. As an example, for Zimbabwe the variance of the average annual growth rate of employment for all strata together is .493. This is higher than the variance within six of eight strata. The exceptions were the urban industrial and commercial areas, with variances of 1.917 and .695 respectively. Given that only a tiny fraction of all MSEs are located in industrial and commercial areas, this indicates that the choice of strata was a reasonably good one in this case.

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given the lack of a sampling frame[24] and given the vast resources required to carry out such a scheme. It is usually the case that cluster sampling reduces the precision of estimates relative to random sampling. As noted by Cochran (1977), the loss of precision is lower the more homogeneous are MSEs within each cluster. As a result, these five surveys chose clusters at the smallest level possible. For example, in urban areas, a cluster might consist of a small neighborhood consisting of households with roughly the same incomes.

A final source of sampling error in these surveys should also be mentioned. In conducting a survey, not every enterprise within a selected cluster could be enumerated. For example, approximately 30% of households visited were closed; that is, interviewers found no one home at the time. In the work that follows, it is assumed implicitly that the "open" households were representative of all households. In their 1991 survey, Parker and Dondo managed to resurvey closed households. They discovered that the characteristics of MSEs in open and closed households are largely the same.

The more serious problem is usually the non-sampling error. Because it is unusual to find an MSE which keeps records, it is necessary to rely on the memory of the

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[24] If all MSEs registered with the government, and the registration list were available, enterprises could be randomly selected. However, the vast majority of MSEs are not registered.

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respondent. Given that this research focuses on changes at the firm level over time, information about the business at the time it started had to be gathered. In order to minimize recall error, the surveys only included questions about "stock" variables, such as number of workers. Though interesting, "flow" variables, such as sales, costs, or labor hours, were not included. Despite this, some recall error is inevitable.

2.4 General Survey Findings

The surveys described in the previous section permit a much closer consideration of southern African MSEs than has ever been possible before. Two important issues, firm survival and firm growth, are taken up in detail in the following chapters. Before delving into these matters, it may be instructive to consider some simple descriptive statistics compiled from these surveys. In this way, a clearer understanding of the nature of MSEs in the region can be reached. Additionally, these simple findings may provide some direction to the empirical work of Chapters III and IV.

2.4.1 Magnitude

Table 2.4 presents some general statistics regarding the magnitude and importance of the MSE sector in each of the countries under study. It is obvious from the table that the MSE sector is an important part of the economic structure of

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each country. In the two townships, which represent the smallest survey area of the five considered, an estimated 8,000 MSEs were operating at the time of the survey. Almost 850,000 small enterprises were estimated to exist in Zimbabwe in 1991. A significant proportion of the working age population in each country is employed in the MSE sector, ranging from 17% in Botswana to 33% in Zimbabwe. Except for Botswana, in each case for which statistics are available, the estimated employment in MSEs is substantially larger than the estimated employment in the formal sector.

Table 2.4
MSE and Labor Force Magnitudes
(in thousands)

	South Africa: 2 Townships[a]	Swaziland	Lesotho	Botswana	Zimbabwe
Survey Results					
No. of MSEs	8	51	103	49	845
MSE Employment	16	101	161	106	1,568
National Statistics					
Population Age 15 or More	N/A	424	906	634	4,724
Formal Sector Employment	N/A	68	72	161[b]	907

SOURCES: Liedholm and Mead (1992)
World Bank, 1990

NOTES: [a] It should be noted that township data are urban in nature, and are not strictly comparable to the other countries.
[b] Botswana Central Statistics Office, 1989.

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2.4.2 Sectoral Distribution of MSEs

Small enterprises are involved in a wide variety of activities, as Table 2.5 demonstrates. For the urban South African townships, the majority of MSEs are engaged in retail trading, with tiny, often mobile, vendors being the most common enterprises.[25] For Swaziland, Lesotho and Zimbabwe, manufacturing concerns are the most prevalent. Within manufacturing there exists no clear pattern of prevalence across countries. In Swaziland, the most frequently encountered manufacturing enterprises are those involved in wood and grass processing (especially weavers of grass baskets and mats), while in Lesotho food and beverage processing is the dominant sector (mainly brewers of traditional beer). On the other hand, the knitters, weavers and tailors of the textiles production sector are the most commonly found manufacturing concerns in Zimbabwe. Interestingly, the sectoral pattern of Botswana is more similar to that of the South African townships, even though the latter are strictly urban. In each country, the construction, transport and real estate sectors make up only a small fraction of all MSEs. The share of the service sector in all enterprises ranges from 3% in Lesotho to 7% in the townships. By way of comparison, the most common manufacturing sectors in India in 1971 were non-metallic mineral processing, food and beverage processing, and

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[25] This may be partially attributable to the prohibition by the government of manufacturing concerns within the townships (Davies, 1987).

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textile and wearing apparel production.[26] Liedholm and Mead (1987), citing studies from around the world, report that firms involved in small scale industry tend to be engaged in food and beverage processing, textiles, and wood products.

Table 2.5
Sectoral Distribution of MSEs
(Percent of All MSEs)

Sector	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Food and Beverage Processing	3.6	8.3	34.0	13.9	7.2
Textile and Wearing Apparel Production	6.9	16.9	14.1	8.2	33.3
Wood and Grass Processing	1.3	33.0	4.4	1.3	20.2
Non-Metallic Mineral Processing	0.8	1.1	1.8	1.1	4.0
Fabricated Metal Production	1.2	0.3	0.4	0.9	2.2
Other Manufacturing	3.2	1.1	3.0	1.9	2.7
ALL MANUFACTURING	16.9	60.8	57.7	27.3	69.7
Construction	0.6	0.9	4.1	0.2	4.1
Wholesale Trading	0.2	•	0.4	0.5	0.1
Retail Trading	59.1	31.9	27.0	51.5	21.9
Hotels, Restaurants and Bars	11.1	0.2	2.3	12.9	0.6
ALL TRADE	70.3	32.2	29.7	64.9	22.6
Transport	2.7	0.3	0.5	0.8	0.2
Real Estate	2.3	0.6	5.1	2.8	•
Other Services	7.1	5.2	2.9	4.0	3.4

SOURCES: Liedholm and Mead (1992)
Survey Data

[26] Little, Mazumdar, and Page (1987), p. 65.

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The sectoral distribution of MSEs is also a function of location, as Table 2.6 makes clear. In Swaziland, Lesotho, and the South African townships, urban enterprises are more likely to be engaged in the trade sector, while rural firms tend to be small manufacturers. There are, however, exceptions to this pattern: small trading concerns are prevalent in both urban and rural areas in Botswana, while in Zimbabwe, small manufacturers dominate both locations.

Table 2.6
Sectoral Distribution of MSEs by Location

Sector	South Africa: 2 Townships		Swaziland		Lesotho		Botswana		Zimbabwe	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Manufacturing	16.9	N/A	33.2	65.8	36.1	60.9	22.9	29.2	64.6	72.1
Construction	0.6	N/A	0.5	1.0	2.8	4.3	0.5	0.0	1.4	5.4
Trade	70.3	N/A	55.8	27.9	40.7	28.3	62.8	66.4	28.8	19.7
Services	7.1	N/A	5.8	5.1	20.4	6.5	7.4	2.3	4.6	2.8

SOURCE: Survey Data

2.4.3 Location of MSEs

Two locational characteristics of MSEs are interesting. The first involves the distribution of enterprises into urban and rural locations. The majority of small enterprise activity seems to occur in the rural areas of each country. Given that a large proportion of the people of the region

inhabit the outlying areas, this is not surprising. The percent of all MSEs that operate in rural areas is lowest in Zimbabwe at 58%, and highest in Lesotho at 80%. Distributions in this range for manufacturing firms are reported for India (Little, et al., 1987), and Liedholm and Mead (1987) report similar results for MSEs engaged in manufacturing in developing countries throughout the world. A second aspect of MSE location involves the type of premises in which the firm operates. As can be seen in Table 2.7, for each country, the vast majority of MSEs are run from the proprietor's home. In each case, at least two-thirds of the MSEs are home-based. This prevalence of home-based enterprises (HBEs) suggests that many proprietors lack the capital to run a shop in the commercial district. It may also be the case that many proprietors must manage their families concurrently with their businesses, and that this juggling is easier to accomplish from the home.

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Table 2.7
Location of Premises
Southern African MSEs

Location of Premises	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Home or Homestead	71.1	67.7	71.0	68.3	78.0
Commercial District	7.0	6.1	8.0	16.1	8.0
Traditional Market	2.2	12.1	5.0	2.6	3.0
Roadside or Mobile	19.7	12.9	16.0	12.7	11.0
Other Locations	0.0	1.2	0.0	0.3	0.0

SOURCE: Survey Data

2.4.4 Size Distribution of MSEs

Most southern African MSEs are quite small, if size is measured in terms of numbers of workers. Information regarding average MSE size, as well as the size distribution, is presented in Table 2.8. MSEs in this region are quite similar in this respect: in all countries, the average MSE consists of about two workers, including the proprietor. In every case, more than ninety percent of the MSEs are made up of five or fewer workers, and less than two percent have twenty or more workers. The paucity of enterprises in the ten to fifty workers category, often called "the missing middle", is typical of eastern and southern Africa (Liedholm, 1990).

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Table 2.8
Size Distribution of Enterprises
(Percent of All MSEs)

Number of Workers (including working proprietors)	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
1	46.6	68.8	79.5	58.0	69.6
2-5	50.1	28.4	18.0	32.3	26.9
6-10	2.8	1.4	1.6	6.0	2.3
11-19	0.4	0.9	0.5	2.2	0.7
20-50	0.1	0.5	0.4	1.5	0.5
Average Number of Workers	2.1	1.9	1.9	2.2	1.8

SOURCE: Liedholm and Mead (1992)
Survey Data

2.4.5 Proprietor Gender

MSEs in this region differ substantially according to the gender of the proprietor. A common feature of the enterprises in this study is that the majority have female proprietors: in every case, at least two-thirds of the MSEs are run by women. According to Downing and Daniels (1992), the disproportionate share of female proprietors may be the result of minimal opportunities in the formal sector for women. An additional feature of the regional MSE landscape is that in every case the average size of enterprises run by women is smaller than that of male-run MSEs. It is unclear whether this size difference is because females have priorities other than the growth of their enterprises (involving, for example, their families), or because these firms face obstacles which their

male counterparts do not. Some of the features of MSEs disaggregated by gender are presented in Table 2.9.

Table 2.9
MSE Characteristics by Proprietor Gender

Characteristic	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Percent of All Proprietors Who Are Female	67.0	84.0	72.0	69.0	67.0
Avg. Number of Workers, Female-Run MSEs	1.7	1.6	1.3	1.8	1.5
Avg. Number of Workers, Male-Run MSEs	2.6	2.3	2.1	3.8	2.3

SOURCE: Survey Data

2.4.6 MSE Growth[27]

The net growth of MSEs is made up of three components: births, growth of existing MSEs, and MSE closures. This section addresses the second of these parts. It is notable

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[27] In this section, as in the chapters to come, the growth rate of an enterprise is calculated as

$$\frac{\frac{A-B}{B}}{C}$$

where A = number of workers at the time of the survey
B = number of workers at start-up, and
C = firm age in years.

This method of calculation provides an upper bound of the growth rates. Dividing the top half of the denominator by workers at start leads to higher average growth rates than would result from, for example, dividing A-B by an average size. This choice does not change the rankings of countries, and the regression results of Chapter IV are unaffected. The measurement and definition of growth are discussed in detail in Chapter III, section 3.2.

how rapidly existing MSEs, on average, grow. Table 2.10 presents the average annual growth rate in employment of non-failing firms for several countries in Africa, including the five to be scrutinized in later chapters. For those countries in which country-wide data were collected, these growth rates range from a high of 11.4% in Botswana to a low of 5.9% in Lesotho. While the table demonstrates considerable variation across countries, all rates are quite high; each is higher than the growth rate of formal sector employment for that country. Liedholm and Mead (1987) present manufacturing growth rates for MSEs in other developing countries that are somewhat lower, but these are aggregate figures which account for net change in employment in all firms, including new entrants and firm closures, and so are not strictly comparable.

It is important to note that in spite of the staggering growth rates presented in Table 2.10, the majority of MSEs do not grow at all. This is made plain by the data presented in Table 2.11. Apparently, those firms which grow do so in dramatically rapid fashion.

Table 2.10 also shows that growth rates tend to vary by enterprise location. Specifically, rural MSE growth rates tend to be substantially lower, on average, than those of MSEs in urban areas. In most cases, the urban rates are greater than the rural rates by a factor of nearly two.

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MSE growth rates show considerable variation by sector. This information for the five countries in this study is provided in Table 2.12. In most cases, the manufacturing sector as a whole is the slowest growing sector, while the service sectors in each country tend to have the fastest average growth rates. Interestingly, this is not the pattern reported by Little, Mazumdar, and Page (1987) for Taiwan over the 1967-1971 period, where manufacturing employment was the fastest-growing sector at 10.7% per year.

Table 2.10
Average Annual Growth Rates of African MSEs

Country	Average Annual Growth Rate of MSEs		
	Urban	Rural[a]	Entire Country
Kenya	21.2%	N/A	N/A
Lesotho	12.2%	4.3%	5.9%
South Africa	23.9%	N/A	N/A
Swaziland	12.3%	5.2%	6.6%
Zimbabwe	9.0%	6.7%	7.4%
Botswana	17.4%	8.7%	11.4%
Nigeria[b]	15.6%	N/A	N/A
Niger	8.9%	5.4%	6.4%
Ghana[b]	11.9%	N/A	N/A

SOURCES: Liedholm and Mead (1992)
Survey Data

NOTES: [a] Rural includes rural areas and secondary towns.
[b] Manufacturing enterprises only.

Table 2.11
Composition of Employment Change in African MSEs

Country	No Change	Expanded	Contracted
Kenya[a]	59.6%	37.6%	2.8%
Lesotho	73.6%	18.2%	8.2%
South Africa[a]	49.4%	48.3%	2.3%
Swaziland	68.9%	28.3%	2.3%
Zimbabwe	77.0%	19.3%	3.7%
Botswana	65.8%	26.8%	4.8%
Nigeria[b]	32.0%	46.0%	22.0%
Sierra Leone	58.0%	39.0%	3.0%

SOURCES: Liedholm and Mead (1992)
Survey Data

NOTES: [a] Urban data only
[b] Manufacturing enterprises only

Table 2.12
MSE Growth Rates By Major Sector
(in Percent)

Sector	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Food and Beverage Processing	19.5	7.3	1.1	6.1	15.9
Textile and Wearing Apparel Production	13.0	3.6	5.9	19.2	3.3
Wood and Grass Processing	43.3	5.4	5.6	27.6	4.0
Fabricated Metal Production	38.1	18.3	55.7	15.0	6.2
ALL MANUFACTURING	21.1	5.6	4.0	11.9	5.6
Retail Trading	25.1	7.6	9.6	11.4	11.9
Hotels, Restaurants and Bars	28.6	24.2	1.1	4.8	0.9
ALL TRADE	25.6	7.6	9.0	10.0	11.6
SERVICES	21.9	9.8	9.1	15.0	16.5
TOTAL, ALL ENTERPRISES	23.9	6.6	5.9	11.4	7.4

SOURCE: Liedholm and Mead (1992)
Survey Data

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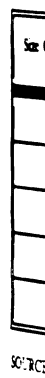

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In addition to varying by sector and location, survey data indicate that MSE growth rates are different according to firm age and firm size. Tables 2.13 and 2.14 demonstrate that in general, growth rates are inversely related to both enterprise age and initial size.

Table 2.13
Growth Rates and Initial MSE Size

Size Category (Workers at Start)	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
1 Worker	26.0	8.0	5.6	11.3	8.9
2 to 5 Workers	14.1	1.9	5.9	12.0	10.4
6 to 10 Workers	13.6	7.6	-6.1	8.9	6.7
11 to 19 Workers	-14.8	6.4	5.4	3.2	3.1
20 to 50 Workers	-9.3	4.0	-0.4	-1.4	-3.4

SOURCE: Survey Data

Table 2.14
Growth Rates and MSE Age

Age Category (Years Since Firm Start-up)	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
1 Year and Less	46.2	8.8	7.6	14.4	22.0
2 Years	28.8	8.4	9.1	12.1	10.9
3 Years	24.7	9.4	14.1	14.5	11.2
4 to 10 Years	17.1	7.5	2.7	10.7	6.1
11 Years and Older	6.5	4.0	2.2	4.4	2.9

SOURCE: Survey Data

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Finally, in each case growth rates of MSEs with female proprietors are significantly lower than those which are run by males. Growth rates for male-run firms are almost 50% higher than those of female-run enterprises in South Africa and Swaziland, and over three times higher in Lesotho. The growth rates stratified by gender are shown in Table 2.15.

Table 2.15
Growth Rates and Proprietor Gender

Growth Rates of MSEs With:	South Africa: 2 Townships	Swaziland	Lesotho	Botswana	Zimbabwe
Female Proprietors	20.6	5.7	3.4	8.6	6.0
Male Proprietors	30.0	8.3	11.2	16.2	10.0

SOURCE: Survey Data

2.4.7 MSE Closures

Some descriptive information regarding closed enterprises is available for the cases of Swaziland and Zimbabwe. To start with, MSEs do not all close for the same reasons, as shown in Table 2.16. It is interesting that only half of the closures are due to "bad business conditions". About one-quarter in each country shut down for personal reasons (such as for health reasons). It is important that not all closures are of economically non-viable firms. Further consideration of the reason for closure is taken up in Chapter III.

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Table 2.16
Reasons for Closure of MSE

Reason For Closure	Swaziland	Zimbabwe
Business Conditions Bad	56%	47%
Better Options	6%	7%
Personal Reasons	22%	28%
Government Action/Natural Disaster	26%	6%
Other	0%	12%
Total	100%	100%

SOURCE: Liedholm and Mead (1992)

A striking result is the relationship between firm age and firm closure. As Table 2.17 shows, the largest proportion of closures occur at the younger ages. Almost 60% of the closed enterprises in both countries were three or fewer years old when they shut down.

In Zimbabwe, failed firms had a smaller average number of workers when they started (1.6) than enterprises still in existence at the time of the survey (2.1). Interestingly, this pattern is not repeated in Swaziland, where failed firms started out, on average, with 1.4 workers, and existing firms began with an average of 1.3.

The sectoral distribution of failed and existing enterprises is also quite different in each country. In both Swaziland and Zimbabwe, the percent of failed enterprises

which are in the trade sector is over 50%, while among the current enterprises this proportion is less than one-third.

Table 2.17
Age Distribution of Closed Enterprises

Age at Closure (in Years)	Swaziland	Zimbabwe
Less than 1	20.9%	13.3%
1	16.2%	17.7%
2	12.3%	16.5%
3	7.4%	10.2%
4	8.0%	9.1%
5	4.1%	6.4%
6	3.9%	5.4%
7	3.1%	3.7%
Greater than 7	24.1%	17.7%

SOURCE: Liedholm and Mead (1992)

2.5 Concluding Remarks

On the surface, MSEs in southern Africa are strikingly similar. Most are very small, and most are rural and based in the proprietor's home. The majority of MSE proprietors in each country is female. There are less obvious similarities in the sectoral distribution of MSEs, as well. These unifying characteristics, however, tend to obscure important differences across the region, some of which are surely manifest in the MSE sectors of each country. Each country has a unique history and culture, and there are important and

sometimes radical differences in the political structures across the region. These countries are also heterogeneous in their macroeconomic structures, and per capita incomes vary widely. Although this dissertation will not delve into these differences in any systematic way, some consideration will be given to the issue of whether or not the growth and survival patterns of the regions's MSEs differ by country.

From the descriptive statistics presented in sections 2.4.6 and 2.4.7 above, it appears that MSE growth, as well as survival depend on several different aspects of the firm and its proprietor. Firm growth seems to vary by location, sector, initial size, firm age and proprietor gender. Similarly, survival may depend on sector and age. The relationships between these factors and both growth and survival have been considered separately, and as a result important interrelationships that may exist have been ignored. In the chapters to come, issues involving MSE growth and survival will be examined in a more systematic way. Such an analysis will provide a broader and deeper perspective into the ways in which MSEs evolve over time.

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CHAPTER III

THE HAZARDS OF SMALL FIRMS IN SOUTHERN AFRICA

3.1 Introduction

Over the course of time, firms in every setting are born, survive for a period of time, and ultimately shut down. Unfortunately, very little is understood about the factors which influence the duration of firm survival; indeed, this issue has not been studied in developed countries. This chapter attempts to fill some of that void by examining which characteristics of a MSE and its proprietor lead to survival of the enterprise, and which lead to failure. To this end, a unique set of data is examined using an analysis technique which has until now not been used to study firm dynamics. An improved understanding of these issues would greatly enhance the ability of governments and assistance agencies to promote MSEs.

The following section presents what theory exists on enterprise dynamics, and buttresses this theory with some observations from past empirical studies. Section 3.3 explains one method of analysis useful for studying enterprise survival: hazard modeling, and section 3.4 describes the data.

Section 3.5 presents and interprets the results, and section 3.6 discusses an extension of the model that considers different reasons for firm closure. A final section provides some conclusions and suggests directions for future research.

3.2 Theories and Hypotheses

Early examinations of firm behavior primarily involved simple comparative statics. Subsequently, attempts were made to explain the evolution of market structures: these fall under the rubric "stochastic theory". In this class of models, a firm is assumed to draw each period from some distribution a value for the upcoming period's costs. Should the firm repeatedly be 'lucky' and have low-cost draws, it will grow and survive. These models were based on the stylized fact that firm growth and firm size are independent. The results of the stochastic models gave a theoretical base to this observation, frequently called Gibrat's Law. Empirical studies by Hart and Prais (1956) and Simon and Bonini (1958) found evidence supporting Gibrat's Law, at least among larger firms in the United States and Great Britain. Later studies found serious fault with the earliest versions of stochastic theory, both in terms of the assumptions of the theory, and the observed facts about business dynamics. Particularly troubling was the finding that firm growth and firm size seemed to be inversely related. Some attempts were

made to explain away this stylized fact, in particular by Mansfield (1962), who claimed that if the exit of smaller, slow-growing firms were allowed for, Gibrat's Law would still obtain. Lucus (1978) introduced differential levels of managerial ability into the model, but continued to assume that Gibrat's Law operates.

The failure of the theory to explain the inverse relationship between firm growth and firm size has led to a search for a new theoretical framework which could incorporate these considerations. The most important such contribution is the "learning model" of Jovanovic (1982).[28] In the learning model, firms are assumed to possess an innate and immutable cost parameter. This parameter can be thought of in several possible ways, perhaps most clearly as the level of managerial ability of the firm's proprietor. Although the distribution of this parameter for all firms is known to each firm, each firm is unsure of its own true cost. In addition to costs stemming from managerial inefficiency, firms also face randomly occurring costs in every period. As each period passes, a firm updates its beliefs about its true managerial ability based on the previous period's profits and costs. If at any time these beliefs imply that the firm's expected return will be less than the returns from the next best alternative, the firm will exit the industry. If a firm's

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[28] The technical aspects of this model are discussed in Chapter IV.

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true cost is low, it is likely that the update that it receives will be positive, and the firm will survive and grow. If, on the other hand, a firm is actually inefficient, the evidence will eventually lead the firm to exit. Put simply, inefficient firms decline and exit, while efficient firms survive and grow. Pakes and Ericson (1989) describe this process as the industrial organizational equivalent to Darwin's theory of natural selection.

Jovanovic's model implies two testable hypotheses which are pertinent to the study of failure:

> 1. A firm's probability of failing will be decreasing with firm size. This is the case because bigger firms are more likely to have received positive clues about their true costs and have survived - the inefficient firms are likely to have perished already. Empirical studies of enterprises in Nigeria, Sierra Leone, Colombia, the Philippines and the United States provide support for Jovanovic's predictions.[29]
>
> 2. Enterprise failure rates should decrease with growth rates, since firms with higher growth rates tend to be larger. Growth represents, in some sense, success, and implies that the enterprise must have received positive clues about its true efficiency level. Phillips and Kirchoff (1988) find that this inverse relationship holds for small businesses in the United States.

While an improvement over earlier attempts to understand the dynamics of industries, the learning model is not without its shortcomings, and as such it appears able only to offer general guidance to the researcher of small enterprises in a developing country context. Firstly, the cost parameter

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[29] Figures reported in Liedholm and Parker (1989), p. 18.

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cannot be changed. If we think of this parameter as measuring managerial ability, its immutability implies that the multitude of training programs over the years for developing country entrepreneurs have been in vain.[30] Secondly, the empirical implications of the model, while quite testable, are very general. The researcher is given little guidance as to the specific sorts of variables that might influence growth and survival of firms. It is possible that Jovanovic's model could be extended to account for some of the observed regularities which are noted below. For example, locational aspects and some characteristics of proprietors (e.g., gender) could be considered as costs, and demand shocks could be included in the theoretical framework. A more fundamental problem with Jovanovic's model is that it implicitly deals with firms in developed countries. Do the entrepreneurs of microenterprises in the developing world actually seek to maximize profit, or do they instead maximize household utility? In other words, these enterprises may be quite different from the familiar "neoclassical" firm, and a new theory may be necessary to describe their behavior.

Since this paper proposes no new theory, for further clues about these variables it is useful to consider the results of several empirical studies. The type of business in

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[30] Pakes and Ericson (1989) have extended the Jovanovic model to include the possibility of human capital investment. While this "active learning" model is perhaps a step in the right direction, it seems to have few testable implications.

which an enterprise is engaged may exert some influence over its probability of failure. Phillips and Kirchoff (1988) cite studies of small firms in the United States that demonstrate differences in mortality rates across sectors, with the highest rates in construction, manufacturing and retail trade. Other evidence from Nigeria also points to sectoral differences in firm mortality.[31]

It is also the case that the location of an enterprise may help explain its lifespan. Cortes, Berry and Ishaq (1987) suggest that enterprises located in urban areas may face different failure probabilities than their rural counterparts. This may be a result of differences in demand conditions, degree of competition, or ability to procure inputs.[32] Strassmann (1987) suggests that home-based enterprises in commercial areas generate more income than similar enterprises in more remote areas. Additionally, other spatial effects may influence the chances of failing, for the some of the same reasons. First, the type of business premise (e.g., in the home, in a shop in a commercial district, mobile) may matter. A second locational aspect that bears consideration is the regional distribution of enterprises.

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[31] Frishman (1988).

[32] The empirical evidence on this point is somewhat contradictory, with some studies showing a higher mortality amongst urban enterprises, and some in which the opposite is true. See Liedholm and Parker (1989), p. 19.

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It may also be the case that the ways in which MSEs are linked with other businesses, both upstream and downstream, have an impact on the failure rates. According to Mead (1991), increased specialization can lead to an increased expected return (and thus better survival chances). However, it may also imply a new set of risks, which come about from an increased reliance on persons and businesses outside the enterprise. For example, when a fully-integrated weaver of grass mats or baskets begins to specialize in the weaving aspect, she will be able to produce more, and possibly better quality, output than when she also had to harvest the grass herself. However, she now depends on other people for her input supply.

With respect to the gender of the proprietor, Downing (1990) speculates that since a larger proportion of female-earned income goes towards supporting the family than that earned by males, female proprietors are, on average, more cautious. They are, Downing believes, more likely to diversify into other business activities. If female entrepreneurs are more cautious, then it may be that the chances of their enterprises failing are lower than those of males. On the other hand, being female may lead to a higher probability of failure if discrimination against women is prevalent.

In summary, this research examines the following hypotheses, which come both from theoretical and empirical sources:

1) Enterprise size is inversely related to the probability of failing.

2) Failure rates vary by sector.

3) The location of the enterprise, especially whether it is urban-based or rural, influences its probability of failing.

4) The linkages of MSEs with their customers and suppliers have an influence on the probability of failure.

5) The gender of the proprietor is a significant determinant of the survival chances of an enterprise.

3.3 Hazard Modeling

While there are other ways to study the survival patterns of MSEs, one highly attractive method for analyzing this aspect of firm behavior is known as duration, or hazard modeling. To date, this technique has never been employed to examine firm survival in either developed or developing countries.[33] Hazard models were initially employed by industrial engineers and biostatisticians. More recently these models have been used by social scientists studying such events as recidivism, divorce and job tenure. In economics,

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[33] Only a paper by Behrman and Deolalikar (1989) examines exit behavior among firms in developing country. They do not, however, employ hazard techniques.

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While one could use ordinary least squares to examine enterprise survival, this path has at least two shortcomings. First of all, there will generally be enterprises in the data set which have not yet failed (incomplete observations are referred to as "censored"). The OLS method would ignore this fact and count all observations as complete, which is to say as having failed. Given that 80% of the observations in these data sets are censored, estimates from OLS methods could be quite misleading. A second shortcoming of OLS in the analysis of survival times is that it is not possible to include explanatory variables that vary over time.

Both the problem with censoring and the difficulty of including time-varying explanatory variables are handled quite easily by hazard models. In this class of models, the dependent variable can be thought of as the probability that a firm fails, given that it was still alive at the beginning of the period. This conditional probability, the hazard rate, is defined in discrete time as follows:

(3.1)
$$h(t_i) = \frac{p(t_i)}{S(t_i)}$$

where

$h(t_i)$ = discrete-time hazard rate
$p(t_i)$ = probability of firm i failing between times t-1 and t
$S(t_i)$ = probability that firm i survives until time t

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The hazard is easily estimated by dividing the number of failures in the sample by the number of firms which were in the "risk set". The risk set is made up only of those enterprises which are at risk of failing, i.e., those which have not already failed. The estimated hazard rate can be thought of as the probability of failing during the period conditioned on being in the risk set.[34] Hazard models can be in discrete or continuous time, and parametric or non-parametric approaches are available for each.

If time is measured in discrete intervals, the model reduces to a simple dummy dependent variable framework, with the dependent variable taking on a value of zero for each period a firm is alive, and a value of one in the period in which the firm dies. Because each firm contributes exactly what information is known about it, the censoring problem is naturally handled. It is also a simple matter to introduce explanatory variables that vary over time. While the discrete-time case is the simplest to understand, it becomes cumbersome if there are many firms in the sample, or if each firm lives many periods. For example, if there were 20,000 firms in a data set[35] each of which lived an average of 5

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[34] This definition of the hazard is true in discrete-time models.

[35] These numbers are not excessively high. Surveys of only those firms currently in existence have counted between 5,000 in two South African townships (Liedholm and McPherson, 1990) to 30,000 in Niger (Fisseha, 1989). A recent survey in Kibera, Kenya which counted both existing businesses and now dead ones

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years, the total number of observations would approach 100,000. Should time be measured in months, the difficulties would be even more staggering.

If data-entry and computational constraints are binding, it may be wise to consider a continuous-time method. In this case, the hazard rate would effectively be the probability of a firm failing during some arbitrarily small period:[36]

(3.2)
$$h(t) = \lim_{s \to 0} p(t, t+s)/S(t)$$

where

p(t,t+s) = probability of a firm failing between t and t+s, and

S(t) = probability of a firm surviving until time t.

Allison (1984) asserts that analyzing data using a continuous-time framework will yield results quite similar to those from a discrete-time model. This being the case, it is in large part the size of the data set that should determine which model to use. Given that the data sets which will be examined here involve several thousand observations, the continuous-time approach will be followed.

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enumerated some 15,000 total enterprises. A country-wide survey would likely count substantially more.

[36] Allison (1984) points out that while it may be useful to consider the hazard rate as an instantaneous probability of failure, it is actually a density.

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One of the most widely used hazard models is known as the proportional hazards model. Its popularity stems from its relative simplicity and flexibility. The proportional hazards assumption implies that ratio of any two individuals' hazards is a constant regardless of time.

The hazard rate for this model can be expressed as:

(3.3) $$h(t|x) = h_0(t)\, g(x, \beta).$$

where x is a vector of possibly time-varying characteristics, and β is a vector of coefficients. In this expression, $h_0(t)$ can be thought of as the hazard rate when $g(x,\beta) = 1$. $h_0(t)$ is generally known as the "baseline" hazard. While $g(X,\beta)$ can be any function of the data, it is commonly assumed that

(3.4) $$g(x, \beta) = \exp(x\beta),$$

which gives:

(3.5) $$h(t|x) = h_0(t) \exp(x\beta).$$

The baseline hazard can be assumed to follow any number of distributions, including the Weibull, exponential, log-normal, or Gompertz. Should there exist reason to believe the baseline hazard follows one of these (or some other) pattern, estimation of β (and the unknown parameters in the chosen baseline hazard) can be accomplished using maximum likelihood

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estimation. Estimation under these circumstances is known as parametric.

In many cases, however, assuming a distribution for $h_0(t)$ is overly restrictive. Some of the distributions named above (i.e., Weibull, Gompertz) are monotonic. The exponential distribution implies a hazard which is constant over time. Should the data actually suggest a U-shaped hazard, or some other non-monotonic shape, parametric techniques may incorrectly restrict the model.

Cox (1972) suggests a more flexible approach, which allows for the estimation of the coefficients without resorting to any assumptions about the baseline hazard.[37] This is achieved by means of a "partial likelihood" technique.[38] If at every time at which a failure occurs only one enterprise fails, the probability that it is enterprise i that fails is given by:

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[37] Allison (1984) reports that the coefficient estimates emerging from the parametric models and those from a Cox proportional hazards model are typically quite close to one another. This implies that if one is interested primarily in the coefficient estimates, the choice of the model is relatively unimportant.

[38] As Chung, Schmidt and Witte (1990) note, the likelihood is "partial" since not all information is used. Specifically, only the order of survival times matters: the exact times of censoring or failure are not considered.

(3.6)
$$\frac{h(t|x_i)}{\sum_{j\in R(t_i)} h(t|x_j)} = \frac{h_0(t)\exp(x_i\beta)}{h_0(t)\sum_{j\in R(t_i)}\exp(x_j\beta)} = \frac{\exp(x_i\beta)}{\sum_{j\in R(t_i)}\exp(x_j\beta)}$$

where $R(t_i)$ is the risk set at time t_i. The partial likelihood is the product over all failures:

(3.7)
$$L = \prod_{i=1}^{N} \frac{\exp(x_i\beta)}{\sum_{j\in R(t_i)}\exp(x_j\beta)}$$

In principle, the probability of having more than one failure occur at a single point in time is zero in a continuous-time setting. However, "ties" frequently occur in practice. If there are ties, the likelihood function becomes slightly more complex.[39]

The log-likelihood can be maximized numerically to provide estimates of the coefficients. While such estimates are less efficient than those which might be produced by maximizing the likelihood function simultaneously with respect to $h_0(t)$ and β, Efron (1977) shows that under fairly general conditions, this efficiency loss is not great.

Given an estimate of the coefficient vector, one can also estimate the baseline hazard, or equivalently, the survivor function. Such computations would, for example, permit estimates of the hazard itself for enterprises with certain

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[39] The form of this likelihood function can be found in Lawless (1982).

characteristics. Given the nature of our data collection approach, and the biases resulting from it, only the estimates of the coefficients will be considered in this chapter. The nature of these biases will be examined below.

3.4 The Data

3.4.1 Introduction

The data were generated from country-wide surveys of the Kingdom of Swaziland and Zimbabwe, each conducted in 1991. Information on existing and closed micro and small enterprises was collected, yielding over 2,700 useable observations from Swaziland and just under 5,800 from Zimbabwe. These data are unique: before these surveys, no information about MSEs on a national level in these countries existed with respect to currently operating enterprises, and no data of any kind were available regarding now-closed MSEs.

3.4.2 Limitations of the Data

While these data sets are unique, they nevertheless have their shortcomings, a topic addressed in Chapter II, section 2.3. It is instructive to consider the potential biases specific to the study of survival which may result from using retrospective data. It is possible, for example, that there is a systematic underreporting of past, failed enterprises.

This could result for several reasons. Entrepreneurs may simply not remember having run a business in the past, particularly if it was long ago, or short-lived. It could also be the case that the respondent does not consider an especially short-lived venture worth reporting. In addition unpleasant events, such as a business failure, may not be remembered. Finally, if there is any stigma attached to having failed at a business, there may be incentive to not admit any such enterprises to the interviewer. Should any of these factors be significant, the reported number of failures would be less than the true number. Should one be interested in calculating the actual hazard rates from the data, this could represent a serious difficulty. Specifically, the calculated hazard rates would understate the true hazard.

If one is interested in the effect of various factors on the hazard rate, rather than the hazard itself, the above-mentioned underreporting bias would be problematic only if particular sorts of individuals are more likely to report enterprise failures than are others. For instance, if males are not as likely as females to admit to having had a business failure, the coefficients on the gender-based dummy variables may be incorrect. While there is no particular reason to believe that this is the case here, it is important to recognize the possibility.

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3.4.3 Checking the Adequacy of the Model

The proportional hazards specification is attractive in large part because of its flexibility. Since no assumptions are made about the baseline hazard, the estimates of the coefficients will not suffer from bias due to a misspecification of the baseline. There remain, however, some concerns about the proportional hazards specification.

The problem of heterogeneity in hazard models has been widely discussed in the literature. Heterogeneity occurs when enterprises have different distributions of the hazard. The inclusion of independent variables is an attempt to control for the problem. Nevertheless, in the present case, there are almost certainly some variables that have been omitted. For example, profitability of the enterprise, and changes in input and output prices faced by the firm seem likely to influence hazard. Unfortunately, such data are not available. This means that there remains some heterogeneity for which the model does not control. Struthers and Kalbfleisch (1986) examined the impact of omitted variables in the proportional hazards framework. They found that the coefficients estimated will be asymptotically biased towards zero, with the bias small unless the coefficients of the omitted variables are large. While they do not prove it, the authors speculate that the asymptotic variance of the coefficients that are estimated in the presence of omitted variables is smaller than it would be if all relevant variables were included. If this is the

case, the impact on the t-statistics is ambiguous. In short, then, the absence of important variables will cause the coefficients that are estimated to understate the true impact of the included variables, and the reliability of the significance tests is called into question.

It is also important to assess the correctness of the proportional hazards assumption. This can be accomplished in several ways, but most simply by examining plots of the estimated log-log survival function against time.[40] For example, if the proportional hazards assumption is correct, the plot of this function for female-run enterprises should be parallel to that of male-run firms. A more formal test involves adding time-dependent terms representing interactions between duration and various explanatory variables. A significant coefficient on any of these interaction terms indicates a violation of the proportional hazards assumption, and at the same time corrects for the violation. This test was applied to the data and it revealed some scattered evidence of non-proportionality. In the sections that follow, the presence of non-proportional hazards has been controlled for.

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[40] For details of this test, see Allison (1984) and Lawless (1982).

3.4.4 Variables

In order to test the hypotheses put forth above, a number of variables were used. To capture the impact of size on the hazard rate, the number of workers in the enterprise at the time of failure or censoring was used. The growth of the enterprise was measured as the average annual percentage growth in employment.

To capture variation in the hazard across sectors, a set of dummy variables representing sectors at the 2-digit International Standard Industrial Classification (ISIC) level. The excluded category, to which the sectoral variables will be compared, is retail trading.

Locational aspects are modeled with 3 sets of dummy variables. The first set uses the information that MSEs are located either in the home, in commercial areas, along roads (but not in commercial areas), or they are mobile. The reference category is home-based MSEs. A dummy variable for urban-based enterprises constitutes the second type of locational variable. The third type is composed of dummies representing locations in the ecological zones found in each country (4 in Swaziland, 5 in Zimbabwe).

Backward linkages are represented by a group of 4 dummy variables, which represent the 5 possible ways the MSE can procure its main input: by making or gathering it, by buying unprocessed raw materials, by buying semi-processed raw materials, by buying finished products for resale or by some

other manner, with the buying finished products serving as the base category. Forward linkages are represented by a dummy variable taking on the value of 1 if the MSE sells directly to the final consumer, and 0 if it sells to an intermediate buyer.

Characteristics of the proprietor are represented by dummies for proprietor gender and ethnicity. Other dummies model whether the enterprise had access to credit, either formal or informal.

3.5 Results

3.5.1 Simple Hazard Function

Before examining the effects of the variables described above on the hazard, it is instructive to consider a graph of the simple hazard function, which does not account for these exogenous influences.[41] The patterns for Swaziland and Zimbabwe are shown in Figure 3.1.[42] The graph is interesting for at least two reasons. First, the shape of the function is unusual, and is not in accord with the theoretical predictions of Jovanovic, who posited a monotonically decreasing hazard in his model of business dynamics. For these data, the hazard functions are clearly non-monotonic. For Swaziland, the

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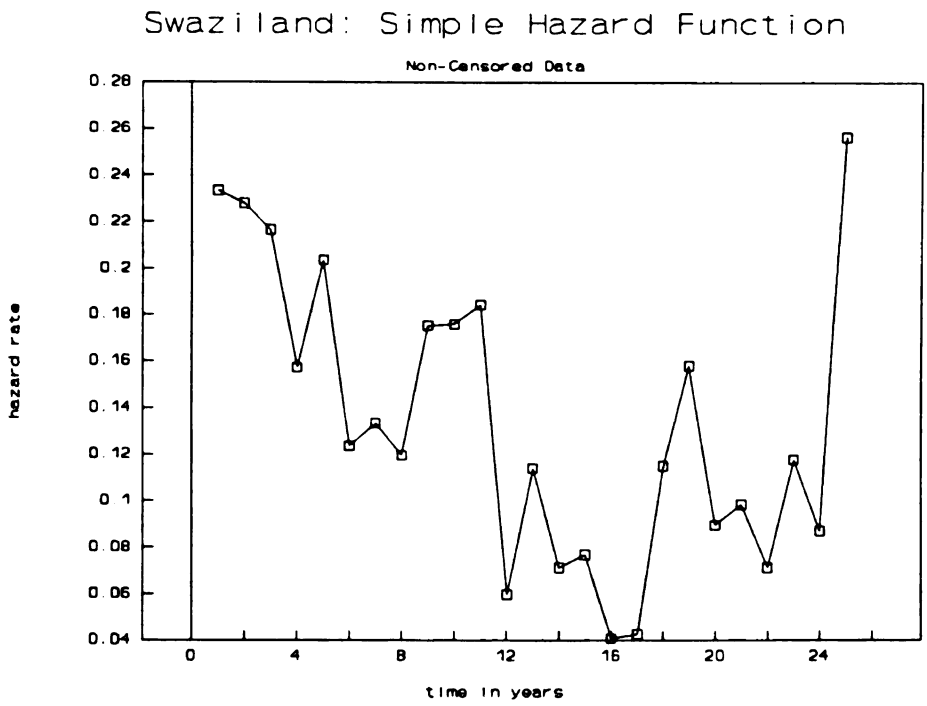
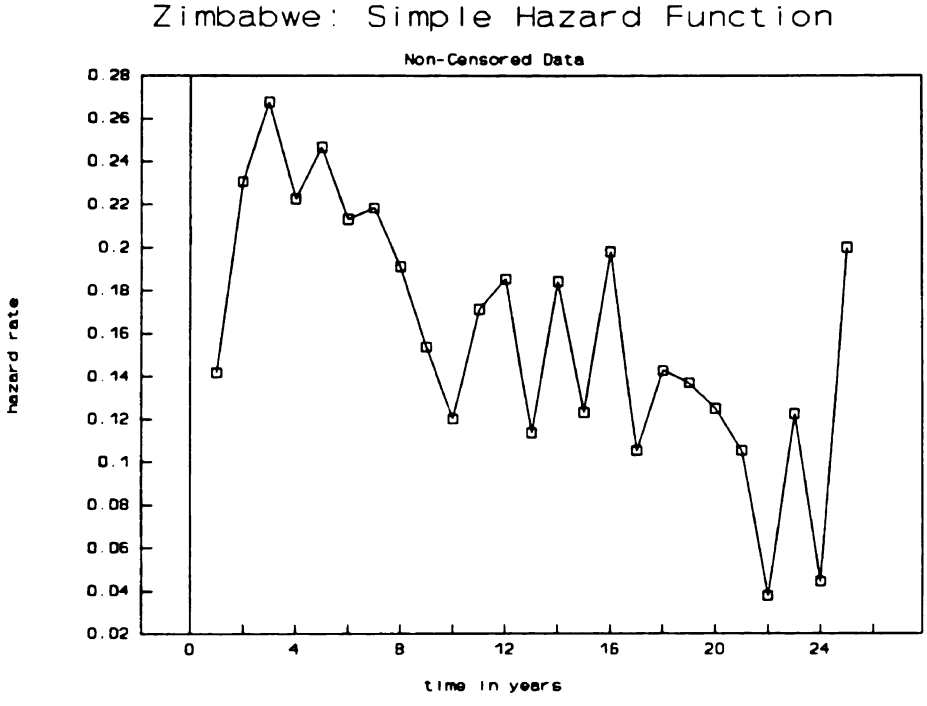
[41] These are graphs of the Kaplan-Meier estimates of the hazard rate.

[42] These hazard functions represent only those MSEs which have already closed. The analogous pictures when censored data are included have the same shapes, but are shifted downward.

Figure 3.1


Swaziland: Simple Hazard Function
Non-Censored Data
hazard rate
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0
4
8
12
16
20
24
time in years


Zimbabwe: Simple Hazard Function
Non-Censored Data
hazard rate
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
4
8
12
16
20
24
time in years

function initially decreases as enterprises age, indicating that if a MSE can survive its first few years, its chances offailing diminish. Interestingly, the hazard increases for the first several years for Zimbabwean MSEs before declining. A somewhat more surprising result is the statistically valid jump in the hazard that occurs around ages 23 to 25. It is possible that enterprise failures of this vintage are more likely to be due to voluntary closures, as successful proprietors pull up stakes and invest in a new endeavor, or as a result of changes in the personal life of the proprietor. A quick check of the reasons for enterprise failure between ages 15 and 25 reveals that almost two-thirds of the failures were for either voluntary reasons, or for reasons of personal health. Failures for market-related reasons were cited in only one-third of the middle-aged deaths.

The second item to note involves the value of the hazard rate itself. Across the board, the hazard rates seem low compared with prior experience.[43] In the difficult start-up period, the highest hazard is only about .27. Estimates this low may imply that our prior beliefs about enterprise failure rates are incorrect. However, it seems much more likely that the low hazards reflect shortcomings of the sampling technique. As noted above, underreporting of firm deaths might explain the low hazards of Figure 3.1. The figure, then, is perhaps best thought of as a rough guide to the shape

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[43] See, for example, Liedholm and Parker (1989).

of the hazard. The true curve would be an upward shift of the curve resulting from underreporting. If such underreporting is especially prevalent for short-lived enterprises, the hazard function would shift up proportionally more at the younger ages.[44] Since the low hazard rates shown in Figure 3.1 imply that underreporting may be problematic, the analysis which follows does not concentrate on estimates of the hazard or survival rates themselves, but rather on estimates of the coefficients of the variables that may influence the hazard. Since there is no particular reason to suspect that particular groups of individuals are less likely to report past enterprises than are others, the impact of underreporting on these coefficient estimates is likely to be unimportant.

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[44] Interestingly, the shape and vertical position of the hazard function does not seem to be particularly sensitive to underreporting. If it is assumed that some proportion of failures is forgotten, and that this proportion is the greatest for short-lived firms, then:
$F_t^* = F_t [1 + ae^{-bt}]$,

where F^*_t = true number of failures at time t
F_t = observed number of failures at time t
a = addition to observed failures at time 0
b = rate at which memory decays.

For all reasonable choices of a and b, the shape of the function stays largely the same. Even for large values of a (a=20 implies that 94% of first year failures are forgotten), the hazard rate (including censored cases) for firms of duration 1 is .26.

3.5.2 Results From the Proportional Hazards Model

Given the non-monotonic hazard function, it is not at all clear which distribution to assume if one is to employ parametric techniques.[45] For this reason, the approach here will be to use Cox's proportional hazards model, which does not require any distributional assumptions on the baseline hazard. In any case, as noted in footnote 37, the coefficient estimates are not usually sensitive to the model choice.

The results are reported in Table 3.1.[46] Each coefficient is the partial derivative of the log of the hazard function with respect to the associated regressor. Interpreting the coefficients, then, involves exponentiating them. For example, the coefficient for the urban dummy variable for Swaziland is -.289. Since exp(-.289) = .749, it can be said that the hazard for urban-based MSEs is 74.9% of that of MSEs in the outlying areas, if other factors are held

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[45] The empirical hazard function, as shown in Figure 3.1, does not necessarily demonstrate the appropriate distribution when regressors are included. It does, however, provide a rough first approximation.

[46] The chi-square test rejects the hypothesis that the coefficients are not jointly significant in both countries. The test statistics are 294.09 for Swaziland and 580.79 for Zimbabwe.

constant.[47] For continuous variables, such as the growth rate or the enterprise size, if β is the estimated coefficient,

Table 3.1 Proportional Hazards Model: Results	Country			
Regressor	Swaziland		Zimbabwe	
	Coefficient and T-statistic	exp^{β}	Coefficient and T-statistic	exp^{β}
Average annual growth rate of employment, in percent	-.044 ** (-10.260)	.957	-.052 ** (-9.625)	.949
Number of workers in MSE at close or time of censoring	-.004 (-.128)	.996	.028 * (1.913)	1.028
SECTORAL FACTORS				
Dummy variable for MSEs in the food and beverage processing sector (ISIC 31)	-.268 (-1.190)	.765	-.758 ** (-2.783)	.469
Dummy variable for MSEs in the textile production sector (ISIC 32)	.025 (.153)	1.025	-1.343 ** (-9.259)	.261
Dummy variable for MSEs in the wood and wood processing sector (ISIC 33)	-.326 (-1.499)	.722	-1.723 ** (-6.748)	.179
Dummy variable for MSEs in the paper, printing and publishing sector (ISIC 34)	N/A	N/A	-11.031 (-.055)	0.000
Dummy variable for MSEs in the chemical, rubber, and plastics sector (ISIC 35)	.198 (.196)	1.219	-.897 (-.874)	.408
Dummy variable for MSEs in the non-metallic mineral processing sector (ISIC 36)	.089 (.149)	1.093	-1.307 ** (-2.648)	.271
Dummy variable for MSEs in the fabricated metal processing sector (ISIC 38)	-.499 (-.668)	.607	-.804 ** (-2.530)	.448
Dummy variable for MSEs in miscellaneous manufacturing sectors (ISIC 39)	.052 (.143)	1.053	-.957 ** (-3.572)	.384
Dummy variable for MSEs in the construction sector (ISIC 50)	-.135 (-.223)	.874	-.722 ** (-2.179)	.486
Dummy variable for MSEs in the wholesale trade sector (ISIC 61)	-11.477 (-.026)	0.000	-.404 (-.400)	.668
BASE CATEGORY: Retail Trade (ISIC 62)	*	*	*	*
Dummy variable for MSEs in the hotels, restaurants, and bars sector (ISIC 63)	.328 (.458)	1.388	-.799 (-1.580)	.450

[47] Similarly, $1/e^{\beta}$ represents the percent by which the hazard of the excluded group (non-urban firms, in this case) is different than the group for which the dummy variable equals one. For more detail, see Allison (1984), p. 28.

Table 3.1 Proportional Hazards Model: Results	Country			
Regressor	Swaziland		Zimbabwe	
	Coefficient and T-statistic	exp^{β}	Coefficient and T-statistic	exp^{β}
Dummy variable for MSEs in the transport sector (ISIC 71)	.685 (1.056)	1.984	.325 (.749)	1.384
Dummy variable for MSEs in the real estate sector (ISIC 83)	-12.376 (-.071)	0.000	-11.787 (-.023)	0.000
Dummy variable for MSEs in the service sector (ISIC 93, 95)	-.876 ** (-2.393)	.416	-.822 ** (-3.303)	.440
LOCATIONAL FACTORS				
Dummy variable for MSEs located in commercial districts	-.955 ** (-7.090)	.385	-.582 ** (-5.181)	.559
Dummy variable for MSEs located along roads or paths	-.428 (-1.547)	.652	-.756 ** (-3.335)	.470
BASE CATEGORY: Home-Based MSEs	•	•	•	•
Dummy variable for MSEs that are mobile	.440 ** (3.374)	1.553	-.054 (-.539)	.947
Dummy variable for MSEs located in urban areas	-.289 ** (-2.377)	.749	-.135 * (-1.670)	.874
Dummy variable for MSEs located on the Highveld	.011 (.080)	1.011	N/A	N/A
Dummy variable for MSEs located on the Middleveld	-.330 ** (-2.539)	.719	N/A	N/A
BASE CATEGORY: MSEs located on the Lowveld	•	•	•	•
Dummy variable for MSEs located on the Lubombo Plateau	-.200 (-.633)	.819	N/A	N/A
Dummy for Zimbabwean ecological zone I.	N/A	N/A	-.291 (-1.045)	.748
BASE CATEGORY: Zimbabwean ecological zone II.	•	•	•	•
Dummy for Zimbabwean ecological zone III.	N/A	N/A	-2.097 ** (-5.764)	.123
Dummy for Zimbabwean ecological zone IV.	N/A	N/A	-.218 ** (-3.038)	.804
Dummy for Zimbabwean ecological zone V.	N/A	N/A	-.080 (-.442)	.923
LINKAGE FACTORS				
Dummy variable for MSEs that make or gather the majority of their inputs	-.219 (-1.099)	.803	-.174 (-.731)	.840
Dummy variable for MSEs which use primarily unprocessed inputs	-.166 (-.351)	.847	.409 * (1.688)	1.505

Table 3.1 Proportional Hazards Model: Results	Country			
Regressor	Swaziland		Zimbabwe	
	Coefficient and T-statistic	$\exp^{\beta}$	Coefficient and T-statistic	$\exp^{\beta}$
Dummy variable for MSEs which use primarily semi-processed inputs	-.188 (-1.248)	.829	-.007 (-.049)	.993
BASE CATEGORY: MSEs which buy finished products for resale	•	•	•	•
Dummy variable for MSEs with some other arrangement for inputs	-.717 (-1.531)	.488	-.354 • (-1.741)	.702
Dummy variable for whether the MSE sells its product directly to the final consumer	-.190 (-1.027)	.827	.269 (1.150)	1.309
PROPRIETOR CHARACTERISTICS				
Dummy variable for MSEs with female proprietor(s)	-.187 (-.970)	.829	.232 • (1.854)	1.261
Dummy variable for MSEs with mixed-gender joint proprictorship	.511 (1.229)	1.667	.769 •• (2.337)	2.158
BASE CATEGORY: MSEs with male proprietors	•	•	•	•
Dummy variable for whether proprietor is a Swazi	-.197 (-.477)	.821	N/A	N/A
Dummy variable for whether proprietor is a black Zimbabwean	N/A	N/A	-.053 (-.225)	.948
OTHER ENTERPRISE CHARACTERISTICS				
Dummy variable for MSEs which have received credit from formal sources	-.791 (-1.368)	.453	.108 (.242)	1.114
Dummy variable for MSEs which have received credit from informal sources (friends, family, moneylender)	.492 •• (2.976)	1.636	.037 (.259)	1.038
SAMPLE SIZE	2,707		5,729	

• = significant at the 90% level
•• = significant at the 95% level

$100[e^{\beta}-1]$ gives the percent change in the hazard for a unit change in the explanatory variable, other things equal. Table 3.1 presents the calculation of $\exp(\beta)$ along with the estimated coefficients and t-statistics. In the discussion which follows, it should be remembered that a negative (positive) coefficient implies that the regressor has the

effect of lowering (raising) the hazard, or raising (lowering) the survival period.

The results presented in Table 3.1 provide some insight into the hypotheses detailed in section 3.2 above. That firm size and hazard are inversely related is an outcome predicted by Jovanovic's "learning" theory, and is supported by empirical work in several countries. It is surprising, then, that in Swaziland the size of an enterprise seems to have no influence on a firm's survival chances, and in Zimbabwe the relationship is actually a positive one.[48] It may be that while bigness has some advantages, such as access to reliable input sources, increased consumer awareness of the firm and its products, and economies of scale, larger firms are more likely to be caught in regulatory nets. In addition, larger firms may be less efficient than their smaller counterparts.[49]

Not surprisingly, enterprises which grow most rapidly stand a lesser chance of failing. As Table 3.1 shows, a 1% increase in the average annual growth rate of employment implies a 4.3% decrease in the hazard in Swaziland, and a 5.1% decrease for Zimbabwe, *ceteris paribus*. Growth seems to be an indicator of success.

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[48] One could also measure size as the number of workers when the enterprise began its life. If initial size rather than size at close is used as a regressor, none of the coefficients or standard errors change significantly.

[49] Evidence of the relative efficiency of small firms is presented in Liedholm and Mead (1987).

Controlling for other factors, hazard rates do seem to vary by sector, with enterprises in the service sectors in Swaziland having hazard rates that are 41.6% of enterprises in the retail trade sector. In Zimbabwe, the influence of the sectoral dummies is even more clear. Enterprises in most sectors have lower hazard rates than those in the retail sector, other things held constant. The wood and wood processing sector in Zimbabwe seems to be a particularly safe place relative to the retail trade sector: MSEs in this sector have hazards that are 17.9% of MSEs in the retail trades. In the next section, the influence of sector on hazards will be examined in greater detail.

The third hypothesis, that the location of enterprises has an impact on survival chances also receives strong support. Home-based enterprises in Swaziland and Zimbabwe have hazards that are respectively 159.7% and 78.9% higher than MSEs located in commercial districts. Mobile enterprises stand a significantly lesser chance of surviving in Swaziland than home-based MSEs. Zimbabwean MSEs which are located beside a road have lower hazards than MSEs located in the home. These results indicate that the advantage of proximity to the demand source that firms in commercial districts have outweighs the disadvantage of the increased competition found there relative to MSEs run from the home. That mobile enterprises (at least in Swaziland) are more likely to fail than home-based enterprises may be the result of the physical

costs of being constantly on the move, as well as harassment by police.[50]

The hypothesis that rural firms are more likely to fail than their urban counterparts also receives support from both countries. Urban enterprises have hazard rates that are 74.9% of those in rural areas in Swaziland, and urban MSEs in Zimbabwe have hazard rates that are 87.4% of those of their rural cousins. Perhaps this is because of the relative inability of rural enterprises to participate in markets near areas with the highest incomes. In addition, other factors held constant, the ecological zone in which MSEs are found has a significant influence on the hazard.

In a recent study, Mead (1991) implied that the degree of specialization would have an impact on the failure hazard. Yet, those enterprises which are more specialized either on the input side or on the output side seem no more likely to survive than more integrated MSEs. This result is generally true for both countries, although for Zimbabwe, MSEs buying unprocessed inputs seem somewhat more likely to fail than enterprises that buy finished products for resale. As discussed above, while increasing specialization may lead to a decrease in the hazard if expected returns increase, specialization may imply new risks in the form of reliance on

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[50] In both countries, the "hawkers" are required to have a license. In order to escape recognition by the authorities, and in order not to pay the license fee, many vendors avoid getting this license.

other persons. In the data analyzed here, it may be that these factors are balancing each other.

As for the gender of the proprietor, female-run firms in Swaziland are at no perceivable disadvantage relative to MSEs run by men, although it appears that Zimbabwean MSEs run by women are more likely to fail. As suggested above, the survival chances of female-run enterprises may depend on two competing factors: women may be more risk-averse than men, but they may face discrimination in their activities to which male entrepreneurs are not subjected. Apparently, these factors balance each other in Swaziland, while the discrimination effect outweighs the risk-aversion effect in Zimbabwe. MSEs that are joint proprietorships with at least one member of each gender stand a greater chance of failing in Zimbabwe, other things equal, than male-run firms.

Several other interesting findings emerge from our analysis. One of the more intriguing has to do with the relationship of enterprise survival and access to credit. Shortages of operating capital, and to a lesser extent investment capital, are frequently cited as possible constraints to the success to small enterprises. This analysis shows that access to formal credit sources confers no particular survival advantage on MSEs in either country. Furthermore, Swazi enterprises which have borrowed money from informal sources at least once in the past have hazard rates that are significantly higher than those MSEs which have never

borrowed from any source. Apparently, having to resort to family, friends, or moneylenders for funds is the mark of a desperate enterprise.[51] Finally, in neither country does the ethnic origin of the proprietor have an effect on the hazard.

3.5.3 The Impact of Country on Hazard

The analysis so far has considered the two countries separately. While this stratification permits an examination of the impact of particular regressors on the estimated hazard of each country (e.g., the regional location factors), it does not allow for differences across countries. Such differences are to be expected: Zimbabwe and Swaziland each have unique cultural, political and economic characteristics, as noted in Chapter II. In order to examine any differences in the hazard caused by differences in country of location, the data were combined, and a dummy variable taking on the value of one for Zimbabwean MSEs and zero for those in Swaziland was included. The results of this exercise are presented in Table 3.2. Not surprisingly, the results generally underline the findings discussed above. Of major interest is the coefficient on the country dummy variable. Its insignificance implies that MSEs

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[51] Two points should be noted with respect to the credit variables. First, since very few people have access to credit in these countries, it would be hasty to make policy statements based on these results. Also, the data do not contain information on the purposes or uses of the credit. Such information might better explain the hazard than the variables used here.

in Zimbabwe and Swaziland are not different in terms of their failure probabilities. Although it is not possible here, it would be of interest to examine whether this result holds across other countries, within and without of southern Africa.

In order to glean as much information as possible about the influence of sector on the hazard, the pooled proportional hazards model was run fourteen times, substituting a different reference case in each run. This permits a ranking of sectors according to which leads to the lowest hazard rates, holding all else constant. This ranking, arranged

Table 3.2
The Influence of Country on Hazard: Zimbabwe and Swaziland Combined

Regressor	Coefficient and T-statistic
Firm Growth Rate	-.048 ** (-16.725)
Firm Size	.028 ** (2.473)
SECTORAL DUMMIES	
Food and Beverage Processing	-.624 ** (-3.888)
Textile and Wearing Apparel	-.788 ** (-7.386)
Wood Production and Processing	-.978 ** (-6.385)
Chemicals and Plastics	-.105 (-.178)
Non-Metallic Mineral Processing	-.877 ** (-2.593)
Metal Fabrication	-.538 ** (-2.070)
Miscellaneous Manufacturing	-.539 ** (-2.663)
Construction	-.577 ** (-2.029)

Table 3.2
The Influence of Country on Hazard: Zimbabwe and Swaziland Combined

Regressor	Coefficient and T-statistic
Wholesale Trade	-.945 (-.939)
BASE CATEGORY: Retail Trade	•
Hotels, Restaurants and Bars	-.344 (-.901)
Transportation	.517 (1.516)
Real Estate	-12.561 (-.080)
Services	-.739 •• (-3.760)
LOCATIONAL DUMMIES	
Market Locations	-.944 •• (-11.514)
Roadside Locations	-.618 •• (-3.695)
BASE CATEGORY: Home-Based Enterprises	
Mobile MSEs	.066 (.863)
Urban Locations	-.222 •• (-4.031)
Dummy for Zimbabwean MSEs	-.012 (-.198)
LINKAGE DUMMIES	
Makes or Gathers Own Inputs	-.328 •• (-2.307)
Buys Unprocessed Inputs	.089 (.426)
Buys Semi-Processed Inputs	-.241 (-2.381)
BASE CATEGORY: Buys Finished Products for Resale	•
Has Other Input Arrangements	-.487 •• (-2.920)
Sells Directly to Final Consumer	-.056 (-.404)
PROPRIETOR CHARACTERISTIC DUMMIES	
Female Proprietor	.103 (1.051)

Table 3.2
The Influence of Country on Hazard: Zimbabwe and Swaziland Combined

Regressor	Coefficient and T-statistic
Mixed Gender Joint Proprietorship	.589 ** (2.334)
BASE CATEGORY: Male Proprietorship	*
Proprietor in Majority Ethnic Group	-.064 (-.338)
OTHER ENTERPRISE CHARACTERISTICS	
Access to Formal Credit Sources	.692 (1.636)
Access to Informal Credit Sources	.193 * (1.853)
REGRESSION STATISTICS	
Sample Size	8,517

from lowest to highest hazard sectors is as follows:

1. Real Estate
2. Wood Processing
3. Wholesale Trade
4. Non-Metallic Mineral Processing
5. Textile and Wearing Apparel Production
6. Services
7. Food and Beverage Processing
8. Construction
9. Miscellaneous Manufacturing
10. Metal Fabrication
11. Hotels, Restaurants, and Bars
12. Chemicals and Plastics Production
13. Retail Trade
14. Transportation

It should be noted that the differences between the rankings are not significant in some cases. For a complete listing of the coefficients and t-statistics for each regression, see Appendix Table A. In general however, MSEs in the transportation and retail trade sectors are more likely to fail than MSEs in most other sectors. Wood processing firms tend to survive longer than most other MSEs.

A final insight into the influence of sector on failure rates comes from aggregating the sectoral categories to the one-digit ISIC level (i.e., manufacturing, construction, trade, transportation, and services). At this level, it becomes apparent that manufacturing, construction, and service-based firms as a whole are less likely to fail, other things equal, than firms involved in trade. The results of this regression are presented in Appendix Table B.

3.6 A Simple Model of Competing Risks

Clearly, enterprises fail for different reasons. Some are forced out of business by competitors or unreliable input sources, while the proprietors of others may choose to close the business for personal reasons, or because a better opportunity presents itself. It is reasonable to believe that the factors that cause each sort of failure are different, or at least have differential impacts on the cause-specific hazards.

To analyze these effects, a proportional hazards model is employed for each failure type. Deaths from some other cause than the topic of study are treated as censored observations. This is a reasonable way to proceed, as long as the causes of death are independent.[52] In this spirit, the failure types in the data set were aggregated into two categories: death due to business failure (e.g., low demand, high competition, expense or unavailability of inputs) and closures resulting from other reasons (old age, poor health, starting a new business).

The results for Swaziland and Zimbabwe together are presented in Table 3.3. In general, the results show that these explanatory variables more often influence failure from market-related causes than from personal or non-business reasons. This is not surprising given that the theoretical and empirical guidance used to develop this analysis

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[52] Should the causes not be independent, a selection model can be used.

Table 3.3
Competing Risk Model: Regression Results From Swaziland and Zimbabwe

Variable	Failure from All Causes	Failure from Non-Market Causes	Failure from Market Causes
Average annual growth of employment, in percent	-.049 ** (-16.725)	-.046 ** (-8.941)	-.050 ** (-14.006)
Number of workers in MSE at close	.028 ** (2.473)	.043 * (2.617)	.018 (1.124)
SECTORAL FACTORS			
Dummy variable for MSEs in the food and beverage processing sector (ISIC 31)	-.624 ** (-3.888)	-.384 (-1.524)	-.735 ** (-3.511)
Dummy variable for MSEs in the textile production sector (ISIC 32)	-.788 ** (-7.386)	-.554 ** (-3.199)	-.914 ** (-6.745)
Dummy variable for MSEs in the wood and wood processing sector (ISIC 33)	-.978 ** (-6.385)	-.798 ** (-3.302)	-1.064 ** (-5.336)
Dummy variable for MSEs in the chemical, rubber, and plastics sector (ISIC 35)	-.105 (-.178)	.876 (1.209)	-.965 (-.948)
Dummy variable for MSEs in the non-metallic mineral processing sector (ISIC 36)	-.877 ** (-2.593)	-.657 (-1.224)	-.920 ** (-2.111)
Dummy variable for MSEs in the fabricated metal processing sector (ISIC 38)	-.538 ** (-2.070)	-.054 (-.120)	-.745 ** (-2.339)
Dummy variable for MSEs in miscellaneous manufacturing sectors (ISIC 39)	-.539 ** (-2.663)	-.191 (-.563)	-.686 ** (-2.728)
Dummy variable for MSEs in the construction sector (ISIC 50)	-.577 ** (-2.029)	.028 (.064)	-.888 ** (-2.314)
Dummy variable for MSEs in the wholesale trade sector (ISIC 61)	-.945 (-.939)	.451 (.443)	-12.118 (-.039)
BASE CATEGORY: MSEs in the Retail Trade Sector (ISIC 62)	•	•	•
Dummy variable for MSEs in the hotels, restaurants, and bars sector (ISIC 63)	-.344 (-.901)	-.407 (-.572)	-.312 (-.691)
Dummy variable for MSEs in the transport sector (ISIC 71)	.517 (1.516)	.944 * (1.815)	.343 (.753)
Dummy variable for MSEs in the real estate sector (ISIC 83)	-12.561 (-.080)	-11.354 (-.072)	-12.646 (-.064)
Dummy variable for MSEs in the service sector (ISIC 93, 95)	-.739 ** (-3.760)	-.348 (-1.207)	-.985 ** (-3.610)
LOCATIONAL FACTORS			
Dummy variable for MSEs located in commercial districts	-.944 ** (-11.514)	-.895 ** (-6.455)	-.965 ** (-9.431)
Dummy variable for MSEs located along roads or paths	-.618 ** (-3.695)	-.219 (-.877)	-.874 ** (-3.866)
BASE CATEGORY: Home-Based MSEs	•	•	•

Table 3.3
Competing Risk Model: Regression Results From Swaziland and Zimbabwe

Variable	Failure from All Causes	Failure from Non-Market Causes	Failure from Market Causes
Dummy variable for MSEs that are mobile	.066 (.863)	.357 ** (2.980)	-.127 (-1.277)
Dummy variable for MSEs located in urban areas	-.223 ** (-4.031)	-.058 (-.629)	-.309 ** (-4.443)
Dummy variable for MSEs located in Zimbabwe	-.012 (-.198)	-.199 ** (2.057)	.107 (1.377)
LINKAGE FACTORS			
Dummy variable for MSEs that make or gather the majority of their inputs	-.328 ** (-2.307)	-.132 (-.597)	-.499 ** (-2.636)
Dummy variable for MSEs which use primarily unprocessed inputs	.089 (.426)	-.664 (-1.410)	.372 (1.587)
Dummy variable for MSEs which use primarily semi-processed inputs	-.241 ** (-2.381)	-.254 (-1.534)	-.247 * (-1.930)
BASE CATEGORY: Buying Finished Products for Resale	*	*	*
Dummy variable for MSEs with some other arrangement for inputs	-.487 ** (-2.920)	-.406 (-1.483)	-.569 ** (-2.683)
Dummy variable for whether the MSE sells its product directly to the final consumer	-.056 (-.404)	-.117 (-.550)	.036 (.193)
PROPRIETOR CHARACTERISTICS			
Dummy variable for MSEs with only female proprietors	.103 (1.051)	.538 ** (2.948)	-.038 (-.322)
Dummy variable for MSEs with mixed-gender joint proprietorship	.589 ** (2.334)	1.067 ** (2.273)	.428 (1.422)
BASE CATEGORY: Male Proprietorships	*	*	*
Dummy variable for whether proprietor belongs to the majority ethnic group	-.064 (-.338)	.645 (1.627)	-.322 (-1.435)
OTHER ENTERPRISE CHARACTERISTICS			
Dummy variable for MSEs which have received loans from a formal financial institution	.692 (1.636)	-.271 (-.647)	-.121 (-.335)
Dummy variable for MSEs which have received loans from an informal source (friends, family, moneylender)	.193 (1.853)	-.185 (-1.068)	.160 (1.210)
Sample Size	8,519	8,519	8,519

* = significant at the 90% level
** = significant at the 95% level

implicitly considers only market-related failures. Several particular results are noteworthy. The direct relationship between enterprise size and hazard only holds for non-market related failures. It was suggested above that being larger may be costly, and that the costs may stem from two factors: becoming more visible to authorities, and becoming less efficient. This result may indicate that it is the former cost that is more important.

The influence of sector and location is much stronger if failure is through market causes than if the enterprise closes for non-business reasons. Apparently, if a proprietor is going to close for reasons of personal health or because a better opportunity presents itself, the sector and location of the enterprise are unimportant. Interestingly, firms in Zimbabwe are less likely to close for non-market reasons than MSEs in Swaziland, while country of location does not influence either the overall or the market-related hazard. A final finding involves mobile enterprises. Relative to home-based enterprises, mobile enterprises are not more likely to fail when the data are pooled. The competing risk model reveals that mobile enterprises are at greater risk of non-market failure than home-based MSEs, but are not at greater risk of market-related closure.

Finally, women-run MSEs are no more likely to close than those run by men when the cause of closure is not considered.

But on closer examination, proprietor gender does influence non-market closures. It may be the case that a proportion of female proprietors operates MSEs in order to finance expenses such as clothing or school fees for their children. When the need for these monies is gone, these MSEs close. When only market-related failures are considered, MSEs run by women are no more likely to fail than male-run enterprises.

Extending the analysis by examining a simple competing risks model seems to provide insights which are unavailable otherwise. Specifically, the competing risks framework does a much better job explaining the influences on business-related failures. If one is interested in understanding why proprietors close businesses when presumably they were not forced to do so, a different set of explanatory variables, as well as a different theory, is called for.

3.7 Conclusions

The results of this analysis add to the understanding of small enterprises in several ways. Counter to Jovanovic's theory of firm evolution, size and the probability of enterprise failure are not negatively related. Given this finding, it is interesting that failure hazard and growth rates are inversely related, as the theory postulates.

In addition to testing some of the empirical implications of Jovanovic's theory, the results presented above add to the

body of empirical evidence on firm survival. With respect to enterprise characteristics, the sector in which a firm is involved has an influence on its survival chances. While no consistent patterns emerge when the countries are considered separately, when the data are pooled, some details become apparent. At the disaggregated sectoral level, MSEs in the retail trade and transportation sectors are at a higher risk of failing, *ceteris paribus*, than firms in most other sectors. Enterprises engaged in wood processing seem to have lower hazards than those in many sectors. When the sectors are aggregated, manufacturing, services, and construction have lower hazards than retailers.

Location, too, has a strong influence on firm survival. In particular, home-based enterprises seem to have higher hazards than most other premises. Urban-based enterprises face lower hazard rates, and the type of agricultural zone in which the enterprise is found exerts some influence on its survival chances, controlling for other factors. Hazards rates do not seem to vary across countries, once other factors are controlled for. Surprisingly, the impact of forward and backward linkages has little or no impact on hazards.

The relationship between access to credit sources and survivability is another interesting finding, and one which may have important policy implications. Those enterprises which had received loans from the formal sector had no greater chance of surviving than those MSEs which had no access to

credit of any sort. In Swaziland, enterprises which reported receiving loans from informal sources had a higher hazard than those without any credit access.

Considering the factors relating to the proprietor of the enterprise, it appears that female-run MSEs are at no disadvantage in terms of survival relative to enterprises with male proprietors, when only market-related closures are considered. The ethnicity of the proprietor has no effect on survival chances.

CHAPTER IV

GROWTH OF AFRICAN SMALL ENTERPRISES

4.1 Introduction

In the previous chapter, some of the factors which influence an individual firm's survival chances were explored. This says nothing, however, about how such an enterprise might change while it is in existence. This chapter takes up this latter topic, addressing the factors which may lead to firm growth. This issue is non-trivial: which firms tend towards growth and which to stagnation may be an important consideration in decisions regarding the allocation of assistance.

The next section examines some of the reasons why firms should grow, and considers the literature on the subject. In Section 4.3, the concept of growth is discussed. Section 4.4 describes the data and variables to be used in the analysis, and the results are presented in sections 4.5, 4.6 and 4.7. A final section offers some concluding thoughts.

4.2 Why Do Micro and Small Enterprises Grow?

In Chapter II, the average growth rates of MSEs in several southern African countries were presented. This simple analysis revealed remarkably high average rates for each country, at least among those firms which survive. What factors cause these large average growth rates among existing firms? To date no theory specific to the growth of MSEs in developing countries has been written. Nevertheless, it may be useful to review what theory does exist on firm growth in order to guide the analysis which follows and to point the way to a more complete and appropriate theory.

Traditional neoclassical economics posits that workers are added until the value of the marginal product of the last worker is equal to the wage paid to that worker. This implies that firm growth will occur as a reaction to changes in technology, the wage rate, or the price of the product. As a result, if one is interested in why small firms in developing countries grow, this simple theory suggests that one's attention must focus on the factors that have an impact on supply and demand for the product produced by the MSE.

The "stochastic" models extended this simple static model by making it more dynamic: consideration is given to the evolution of firms over time. These models also introduced firm-specific costs. As discussed in the previous chapter, firms in the stochastic framework draw each year's growth rate from a distribution. "Lucky" firms repeatedly draw high rates

and grow over time. These models were based on Gibrat's Law, the stylized fact that firm growth and firm size are independent. However, researchers began to find fault with the assumptions of the stochastic models, and empirical work demonstrated that Gibrat's Law does not hold.

This stochastic model was superseded in the theoretical literature by Jovanovic's (1982) "learning model", which was discussed briefly in the previous chapter. In this framework, firms which are efficient (including managerial efficiency) grow over time, expanding each period when their managers observe that their guesses about their costs turn out to overstate their true costs. Formally, firms are assumed to have a strictly convex cost function, $c(q_t)$. But total costs have a stochastic efficiency multiplier in addition:

(4.1) $$TC(q_t) = C(q_t) \cdot S(\theta + \epsilon_t)$$

where θ can be seen as a firm-specific efficiency parameter (e.g., managerial ability) such that high values of θ mean low efficiency levels and high costs, and the ϵ_t are firm-specific shocks[53]. While the manager is unsure of the value of her own θ, she is aware of the distribution of θ for all firms. In

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[53] The cost function has the following properties: $c(0)=0$, $c'(0)=0$, $c'(q)>0$, $c''(q)>0$, and $\lim_{q\to\infty} c'(q) = \infty$. S is positive, continuous and strictly increasing, with $\lim_{(\theta+\epsilon_t)\to-\infty} S(\theta+\epsilon_t) = \alpha_1 > 0$ and $\lim_{(\theta+\epsilon_t)\to-\infty} S(\theta+\epsilon_t) = \alpha_2 < \infty$. Finally, both θ and ϵ are normally distributed.

the first period, all managers predict that their efficiency level is average. As time goes by each firm learns about the parameter in a Bayesian updating process.

The first-order condition for the profit maximizing firms is

(4.2)
$$c'(q_t) - \frac{p_t}{x_t^*} = 0,$$

where p_t is the period t product price and x_t^* is the expected value of $S(\theta+\epsilon_t)$. By the implicit function theorem,

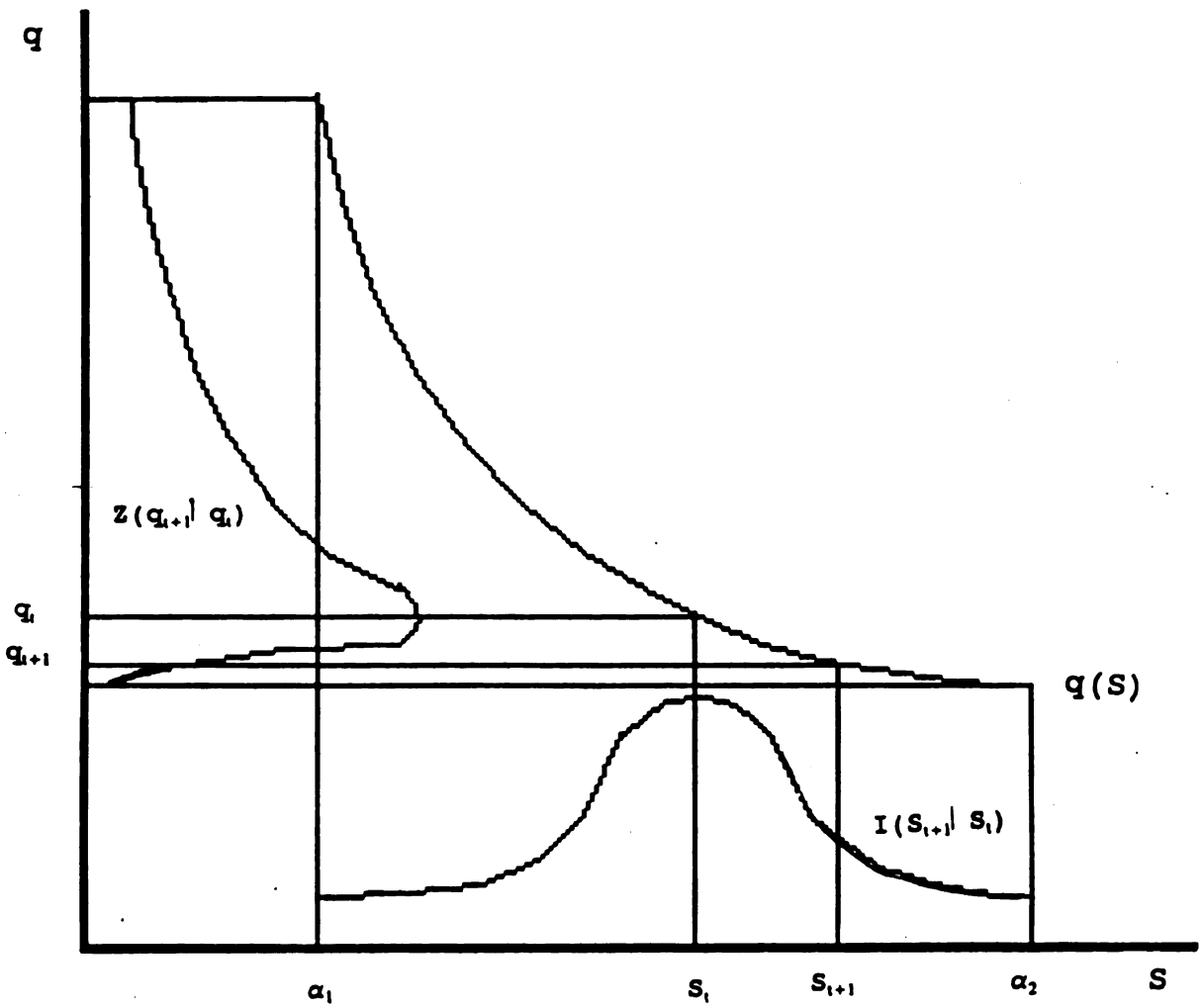
(4.3)
$$\frac{\partial q}{\partial x_t^*} = \frac{-c'(q)}{x_t^* c''(q)} < 0$$

and

(4.4)
$$\frac{\partial^2 q}{\partial x_t^{*2}} = \frac{1}{x_t^*}\left[\frac{c'c'''}{(c'')^2} - 2\right]\frac{\partial q}{\partial x_t^*} <> 0$$

From (4.3), we know that the slope of the function q(S) is negative, although since the sign of the second derivative is ambiguous, the function may be either concave or convex. Following Dunne, et al. (1989), the predictions of the learning model with respect to growth can be more readily seen in a graphical presentation. Figure 4.1 depicts one possible shape of the q(S) function. The distribution $I(S_{t+1}|S_t)$ is the information-updating density which predicts next period's value of S based on the realized value of S this period. This

Figure 4.1



density, in conjunction with the q(S) function, determines the predicted size density function $Z(q_{t+1}|q_t)$.

What does Figure 4.1 tell us about the relationships between growth rates and firm size and age? As a successful firm ages, its manager's estimate of θ becomes increasingly accurate. This reduces the variance of the information-updating density, which in turn reduces the probability that q_{t+1} will be widely different from q_t. Therefore, on average, of the firms which survive, older firms grow more slowly than younger ones. With respect to firm size, bigger firms grow more slowly controlling for firm age. To see this, note that bigger firms have small values of θ. Such firms have less and less room for further increases, given that the information distribution has a lower bound of α_1.

Empirical evidence from the U.S. (Evans, 1987; Dunne, et al., 1989) and from the developing world (see Chapter II) has repeatedly supported the inverse relationship between firm growth and both firm age and size that is posited by Jovanovic's theory. In addition to firm age and size, demand and supply factors, such as sector and location, influence the growth decisions of individual firms, although they are not explicitly modeled by Jovanovic.[54] The learning model assumes all firms produce a homogeneous product. Firms in different

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[54] Jovanovic assumes demand to be deterministic, and the only firm-specific cost is that associated with managerial inefficiency. There is no technological change in this model.

sectors face different product demands, as well as being different on the cost side (e.g., inputs are more or less costly to obtain; competition is more or less stiff). Therefore, if we intend to consider a group of heterogeneous MSEs, we must allow for differences in sector. Sectoral differences in growth rates have been shown by Phillips and Kirchoff (1988) for small firms in the U.S. and by Chuta (1990) for enterprises in Nigeria. With respect to location, a firm's proximity to demand sources and to concentrations of competition must influence its profitability. Additionally, the location of the premises may imply differential costs regarding rent payments. For example, home-based enterprises (HBEs) may pay less in rental costs than a shop in the commercial district.

The Jovanovic model has been criticized for the immutability of the efficiency parameter. In that model, managers are born with an efficiency level, and while they learn what that level is over time, they cannot alter it. Pakes and Ericson (1987) extended the basic model to allow this parameter to be changed through human capital formation. Those firms with managers possessing greater stocks of human capital should be more efficient, and therefore should grow relatively faster.

There is an extensive literature regarding the determinants of the supply of entrepreneurship. Not only have economists taken an interest in this topic, sociologists and

psychologists have studied the issue as well. While it is not the point of this chapter to test these various theories,[55] they indicate that the socio-economic background of the proprietor may be an important determinant of her entrepreneurial ability and aggressiveness. The performance of a firm (including its growth) likely depends in part on the ability of its proprietor. For example, Cortes, Berry and Ishaq (1987) argue that while older proprietors are likely to be more experienced than younger ones, they also may be "less inclined or less able to make their firms grow".[56] For metalworking firms in Colombia, proprietor age and firm growth rates are inversely related. Another example involves proprietor gender. Since traditionally female-generated funds are used to cover the family's basic needs, female proprietors may avoid taking the risks involved with firm expansion.[57]

Several groups of factors, then, may influence the profitability of MSEs, and therefore their growth. These factors can be summarized in the following hypotheses:

1. In Jovanovic's model, firm growth is inversely related both to firm age and firm size.
2. The sector in which the MSE operates influences its growth.

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[55] Theories of entrepreneurship are nicely summarized in "Hunting the Heffalump", Kilby's essay in Entrepreneurship and Economic Development.

[56] Cortes, et al., p. 165.

[57] See Downing (1990) or Horn (1991).

3. Firm location helps determine a firm's growth rate.

4. The level of human capital in the firm's proprietor, as well as her socio-economic characteristics has an influence on firm growth.

In the analysis that follows, these hypotheses will be examined in light of a new data set from several African countries. Before proceeding to the analysis, however, issues of measurement of variables and the nature of the data must be discussed. These are taken up in the next two sections.

4.4 What Is Growth?

Growth of MSEs can be measured in several ways, including growth in sales, profits, or number of workers. If measurement error were not problematic, defining growth in terms of sales or profits might be preferable to a labor-based measure from an accuracy standpoint.[58] However, the data sets which are to be used in this study rely on a retrospective technique. Since most proprietors of MSEs do not keep records, they would be unable to report their sales or profits even at the present time. Expecting that their guesses as to sales ten years ago would be accurate is folly, to say the least. As a result, the measurement of growth in this work is in terms of changes in the numbers of workers. Interestingly, growth in sales and growth in the number of workers have been

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[58] Growth in the number of workers is much more "lumpy" than growth in, say, sales. A firm might increase its sales a great deal before it adds another worker.

shown to be highly correlated in at least one instance. In her detailed study of two manufacturing sectors in the Kibera slum near Nairobi, Kenya, Parker (1991) reports that these measures have a correlation coefficient of .428, significant at the .001 level.[59] Should these measures be correlated for the countries studied in this paper, using the somewhat less accurate labor force measure of growth will not be terribly costly.[60]

In the analysis which follows, growth is defined as an average annual percentage change in employment from the time the enterprise began to the time of the survey. That is,

(4.5)

$$Growth = \frac{\frac{(A-B)}{B}}{C} \cdot 100$$

where A = Workers at time of survey
B = Workers at start of business
C = Age of firm in years.

Calculating average annual growth rates in this manner may hide fluctuations in employment levels over smaller spans of time. For example, a firm may have begun as a single-person operation, grown rapidly for a time, but then shrink back to one person. Should this be so, measuring growth using only the endpoints would mask important parts of the growth

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[59] See Parker (1991), p. 12.

[60] Summarizing studies of U.S. firms, Hamermesh (1993) states that employment adjusts to output shocks fairly rapidly, although there is some evidence that firms alter hours worked before changing employment levels.

process. Although data on this matter are sparse, the data set from Zimbabwe used in this analysis indicates that employment peaks and troughs within firms are not common. Only 8.1% of a sample of Zimbabwean proprietors reported that their MSEs had had such peaks or troughs.

4.5 Data and Explanatory Variables

The data collection approach was discussed in detail in Chapter II. For the analysis in this chapter, information from five countries was used. These countries are all located in southern Africa: Swaziland, Lesotho, Botswana, Zimbabwe and two South African townships. Each survey was conducted in largely the same manner, and for the most part, the same information was gathered in each country. Still, since the survey process is evolutionary, questions were added or omitted from the basic questionnaire as time passed. As a result, not all variables are available for each country.

How were the variables to be used in the analysis constructed? Some useful descriptive statistics can be found in Table 4.4 at the end of this chapter, but a simple explanation of these regressors may be important in addition.

The first set of variables has to do with firm age and size. Age is measured in years from the birth of the firm to the time of the survey. Firms started within twelve months of the survey date are considered to be one year old. Size is measured by the number of regular workers when the MSE was

started. In addition to these variables, a complete set of firm age-firm size quadratic and interaction terms are included. This follows Evans (1987) and Dunne, et al. (1989), who found such terms to be significant in studies involving U.S. data.

The second category of variables which is important has to do with the sector to which the MSE belongs. In the analysis that follows, a series of dummy variables reflecting membership in sectors at the 2-digit International Standard Industrial Classification (ISIC) level is employed. In all cases, the reference case is retail trading.

The third aspect of MSEs that may influence firm profits is enterprise location. Location is modeled using several sets of dummy variables. The first set involves location of the premises (home-based, commercial-district, or non-permanent). The second and third reflect two aspects of the regional location: the placement of MSEs in urban or rural categories, and in ecological/agricultural zones. For the South African data, a variable is added to distinguish enterprises located in Mamelodi township from those in Kwazakhele township.

A fourth category of variables affecting profitability involves the level of human capital embodied in the proprietor. Data on level of education, ownership of other MSEs (either concurrently or in the past), level of training and membership in a business support group are used to

construct several dummy variables. In addition, years of experience in the current MSE or in a similar activity is used to measure the accumulation of human capital.

Several variables are used to model the proprietor's socio-economic background. Dummy variables are used to control for proprietor gender, ethnicity and marital status. Household size is also considered[61] as is proprietor age, measured in years.

4.6 Growth of Survivors

As a first step, it is useful to analyze the data concerning only those firms which have survived. Considering only the survivors has at least two advantages. First, it is interesting *per se* to examine the factors which lead to growth in successful firms. Second, while some information is available on closed businesses, many of the variables that would be interesting to test were not generated in the survey of defunct MSEs.

The data from all countries are analyzed using ordinary least squares regression of growth on the variables discussed above:

$$GROWTH_j = \alpha + \sum_{i=1}^{8} \beta_i AGESIZE_{ij} + \sum_{i=9}^{22} \gamma_i SECTOR_{ij} + \sum_{i=23}^{29} \delta_i LOC_{ij} + \sum_{i=30}^{34} \theta_i HK_{ij} + \sum_{i=35}^{42} \phi_i SE_{ij} + \sum_{i=43}^{45} \lambda_i OTHER_{ij} + \epsilon_{ij} \quad (4.6)$$

[61] The concept of household used in these surveys includes only those people who 'eat from the same pot', whether or not they are related.

where

AGE-SIZE= Firm age and size, along with a complete set of quadratic and interaction terms. Specifically, these variables are (AGE), (SIZE), $(AGE)^2$, $(SIZE)^2$, (AGE*SIZE), $(AGE*SIZE)^2$, (AGE^2*SIZE) and $(AGE*SIZE^2)$.

SECTOR = 14 dummy variables representing the 2-digit ISIC sector in which the MSE operates,

LOC = 14 dummy variables representing various aspects of the MSE's location,

HK = 8 variables measuring the level of human capital in the proprietor,

SE = 5 variables measuring aspects of the proprietor's socio-economic background and

OTHER = 3 dummy variables measuring other aspects of the firm.

Since Jovanovic's model predicts that the variance of the growth rate is inversely related to firm age, there is reason to expect heteroskedasticity on theoretical grounds. To control for this, White's consistent estimator of the covariance matrix is used.[62]

Table 4.1 presents the ordinary least squares regression results, with the coefficients and T-statistic listed for each variable. The value of the R-square statistics range from a low of .16 in Zimbabwe to a high of .29 in Botswana. For each country the F-statistic implies that the hypothesis that

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[62] White's estimator is as follows:

$$Var(\beta) = (X'X)^{-1} \sum_i e_i^2 x_i' x_i (X'X)^{-1}$$

where e_i is the i^{th} OLS residual, and x_i is the i^{th} row of X.

Table 4.1
Growth Regression Results

Variable	Country: Coefficient and T-Statistic				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
CONSTANT	158.860 ** (4.911)	21.362 (1.599)	-32.700 (-.594)	47.841 ** (2.554)	-29.390 (-1.027)
FIRM AGE AND SIZE					
Firm Age	-16.392 ** (-3.652)	.613 (.641)	-6.671 (-.988)	-1.802 (-.825)	-2.130 (-1.003)
Size	-107.200 ** (-3.766)	5.890 (1.080)	-20.448 (-1.470)	-15.500 * (-1.722)	.063 (.005)
(Firm Age)(Size)	14.604 ** (3.017)	-2.140 ** (-2.407)	4.330 (1.363)	-.539 (-.291)	.203 (.132)
$(\text{Firm Age})^2$	.434 ** (2.180)	-.055 ** (-2.022)	.541 (1.395)	-.044 (-.577)	.047 (.989)
$(\text{Size})^2$	18.774 ** (3.188)	-1.137 ** (-2.541)	1.209 * (1.760)	.579 (.670)	.025 (.019)
$(\text{Firm Age})^2(\text{Size})$	-.466 * (-1.944)	.084 ** (2.845)	-.385 * (-1.755)	.054 (.715)	-.024 (-.724)
$(\text{Firm Age})(\text{Size})^2$	-3.119 ** (-2.936)	.299 ** (2.985)	-.650 ** (-2.074)	.154 (.765)	-.076 (-.472)
$(\text{Firm Age})^2(\text{Size})^2$	.107 ** (2.148)	-.013 ** (-2.817)	.056 ** (2.030)	-.007 (-1.041)	.005 (1.193)
$\frac{\partial Growth}{\partial Age}\Big\|_{Age_{mean}}$	-2.171 ** (-3.710)	-1.288 ** (-2.980)	-.565 (-.347)	-1.966 (-1.548)	-1.591 ** (-3.107)
$\frac{\partial Growth}{\partial Age}\Big\|_{Age_{max}}$	-3.099 (-.580)	1.543 ** (2.032)	2.641 (.247)	-.127 (-.055)	1.399 (1.343)
$\frac{\partial Growth}{\partial Age}\Big\|_{Age_{min}}$	-2.084 ** (-2.415)	-1.898 ** (-3.104)	-.918 (-.329)	-2.220 (-1.479)	-1.949 ** (-2.885)
$\frac{\partial Growth}{\partial Size}\Big\|_{Size_{mean}}$	-23.566 ** (-4.786)	-.64545 ** (-2.265)	-11.512 ** (-2.545)	-10.813 ** (-2.674)	-.743 (-.256)
$\frac{\partial Growth}{\partial Size}\Big\|_{Size_{max}}$	122.102 ** (3.122)	3.965 (1.037)	-67.190 * (-1.670)	20.206 * (1.666)	-5.353 (-1.211)

Table 4.1
Growth Regression Results

Variable	Country: Coefficient and T-Statistic				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
$\frac{\partial Growth}{\partial Size}\|_{Size_{min}}$	-26.025 ** (-4.678)	-5.097 ** (-2.206)	-10.636 ** (-2.318)	-14.347 * (-1.754)	-.553 (-.175)
SECTORAL DUMMIES					
Food and Beverage Processing	-11.886 (-1.220)	-5.275 (-1.389)	26.762 (1.460)	-2.988 (-.505)	11.941 (1.474)
Textile and Wearing Apparel Production	-.834 (-.078)	-.847 (-.166)	25.928 * (1.686)	6.990 (.746)	-.446 (-.107)
Wood Production and Processing	27.005 * (1.770)	.457 (.106)	270.130 (1.255)	-24.117 (-1.619)	1.562 (.230)
Paper, Printing and Publishing	22.391 * (1.756)	N/A	2.574 (.092)	N/A	N/A
Chemicals and Plastics	N/A	N/A	N/A	N/A	6.648 (.415)
Non-Metallic Mineral Processing	9.193 (.598)	-16.818 ** (-2.406)	31.524 (.939)	69.041 ** (2.413)	2.085 (.191)
Metal Fabrication	-18.941 (-1.449)	-3.800 (-.590)	43.696 (1.001)	-2.785 (-.183)	-3.796 (-.471)
Miscellaneous Manufacturing	-7.565 (-.604)	.171 (.021)	.940 (.039)	-15.264 (-1.101)	-.049 (-.006)
Construction	44.831 (1.221)	N/A	38.943 (.888)	N/A	53.838 (1.025)
Wholesale Trade	7.906 (.629)	-.407 (-.028)	N/A	-22.155 * (-1.795)	N/A
BASE CATEGORY: Retail Trade	*	*	*	*	*
Hotels, Restaurants and Bars	2.910 (.397)	17.825 ** (2.508)	13.414 (.670)	-7.802 (-1.210)	-13.887 (-1.069)
Transportation	-15.614 (-1.281)	24.640 ** (2.057)	18.852 (.355)	-1.539 (-.080)	9.457 (.519)
Real Estate	-45.050 ** (-5.326)	-12.001 * (-1.951)	4.101 (.197)	-10.230 (-1.316)	N/A
Services	14.005 (.960)	22.600 (1.614)	-1.341 (-.091)	-5.208 (-.411)	40.869 (.909)
LOCATIONAL DUMMIES					
Commercial District	4.512 (.413)	15.214 * (1.958)	1.792 (.059)	16.377 ** (2.008)	13.621 ** (2.327)
Traditional Market	-36.173 ** (-2.307)	4.867 (.847)	10.026 (.602)	-.417 (-.054)	9.034 (.967)

Table 4.1
Growth Regression Results

Variable	Country: Coefficient and T-Statistic				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
Non-Fixed Locations	-2.879 (-.260)	2.315 (.621)	61.054 (1.530)	-1.442 (-.184)	9.052 (1.550)
BASE CATEGORY: Home-Based Locations	•	•	•	•	•
Other Locations	N/A	20.694 (1.066)	63.790 ** (3.170)	N/A	N/A
Manzlodi Township	1.627 (.259)	N/A	N/A	N/A	N/A
Highveld Region	N/A	-10.499 ** (-2.391)	N/A	N/A	N/A
Middleveld Region	N/A	-6.479 * (-1.753)	N/A	N/A	N/A
BASE CATEGORY: Lowveld Region	•	•	•	•	•
Lubombo Plateau	N/A	-4.779 (-.630)	N/A	N/A	N/A
Zimbabwean Ecological Zone I	N/A	N/A	N/A	N/A	-6.619 (-.698)
BASE CATEGORY: Zimbabwean Ecological Zone II.	•	•	•	•	•
Zimbabwean Ecological Zone III	N/A	N/A	N/A	N/A	1.701 (.283)
Zimbabwean Ecological Zone IV	N/A	N/A	N/A	N/A	-1.862 (-.331)
Zimbabwean Ecological Zone V	N/A	N/A	N/A	N/A	1.420 (.230)
Urban Areas	N/A	7.873 ** (2.948)	64.178 (1.523)	2.347 (.345)	10.294 (1.361)
BASE CATEGORY: Rural Areas	•	•	•	•	•
Secondary Towns	N/A	1.504 (.431)	29.912 (1.464)	-7.226 (-1.219)	1.617 (.256)
HUMAN CAPITAL VARIABLES					
Years of Experience	N/A	.429 * (1.875)	N/A	1.956 (1.585)	N/A
Dummy for Completion of Primary School	N/A	.499 (.161)	N/A	3.351 (.720)	4.405 (1.031)
Dummy for Completion of Secondary School	N/A	2.554 (.695)	N/A	18.062 (1.631)	14.864 * (1.720)
Dummy for Ownership of Multiple MSEs	3.006 (.627)	4.912 (1.270)	44.572 ** (2.226)	-3.833 (-1.012)	-3.211 (-.795)

Table 4.1
Growth Regression Results

Variable	Country: Coefficient and T-Statistic				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
Dummy for Ownership of Defunct MSE	N/A	3.421 (1.162)	N/A	N/A	4.215 (.928)
Dummy for Training	10.674 (.664)	-8.164 * (-1.794)	67.806 ** (2.406)	3.190 (.318)	9.653 (1.333)
Dummy for Membership in Business Support Group	N/A	2.437 (.295)	N/A	N/A	N/A
SOCIO-ECONOMIC VARIABLES					
Dummy for Female Proprietorship	-25.183 ** (-2.494)	-9.957 * (-1.856)	-21.445 (-1.319)	-10.489 (-1.556)	-2.113 (-.272)
Dummy for Belonging to Majority Ethnic Group	N/A	-13.731 (-1.263)	10.008 (.313)	N/A	11.833 (.708)
Proprietor Age	N/A	N/A	.068 (.187)	-.406 * (-1.847)	.570 (1.428)
Dummy for Marital Status of Proprietor	N/A	-3.665 (-1.232)	N/A	.103 (.023)	N/A
Household Size	N/A	.242 (1.027)	N/A	.564 (1.010)	.190 (.521)
REGRESSION STATISTICS					
Sample Size	246	277	599	206	345
R-Square	.195	.276	.181	.291	.162
F-Statistic	1.88	2.25	4.04	2.13	1.60

jointly the coefficients are insignificant can be rejected.

Several particular results for each country bear mention. In general, the relationship between firm age and growth follows the inverse pattern posited by Jovanovic's learning theory. The partial derivatives evaluated at the minimum values and the means of age are negative and significant for South Africa, Swaziland, and Zimbabwe, although it appears that in Lesotho and Botswana firm age does not influence

growth once other factors are controlled for. In only one case, where the partial for Swaziland is evaluated at its maximum value, is the relationship positive and significant. A similar pattern is found in the relationship between firm growth and firm size. At the means and minimum levels for four of the countries, the partial derivatives are negative and significant, as the learning theory implies. There is no significant relationship between growth and size for Zimbabwe. For South Africa and Botswana, however, the partial derivative evaluated at the maximum is positive and significant. This may indicate that at some fairly large size, the relationship between size and growth may become a positive one, at least in these two cases. In short, there is little evidence that Gibrat's law holds for these firms. At least for smaller firms, the inverse relationship generally holds. This strong evidence of inverse associations between growth and age, and growth and size supports the findings of Evans (1987).

Second, in most countries, the sector in which an enterprise operates helps to explain its growth, controlling for the influence of other factors. As to which sectors matter, no clear pattern emerges across countries. For example, in the South African townships, MSEs involved in real estate have growth rates lower than those in the reference category, retail trades, while enterprises engaged in wood production and processing and paper, printing and publishing grow more rapidly than retail firms. Swazi MSEs in the

transportation and hotel, restaurant and bar sectors grow more rapidly and those in the non-metallic mineral processing and real estate sectors less rapidly than MSEs involved in retail trading. In Lesotho, MSEs in the textile and wearing apparel sector grow more rapidly than enterprises in retailing, while in Botswana, wholesalers grow more slowly and non-metallic mineral processors more slowly than the reference case. Interestingly, sectoral influences are absent in Zimbabwe. In the following section, the issue of the impact of sector on growth will be taken up in greater detail.

The third set of results has to do with the influence of location on MSE growth rates. The previous chapter demonstrated that location has a strong influence on the survival chances of African MSEs. Location also explains differences in the growth rates of small firms. In three countries, MSEs located in commercial districts grow more rapidly than home-based enterprises, perhaps indicating that access to high-income customers gives a significant edge to MSEs. South African firms set up in the traditional markets tend to have a lower growth rate than HBEs, although the relationship is not significant in the other countries. Regional variables are not important in Zimbabwe or South Africa, but the regional aspect of location is important in Swaziland. Swazi MSEs on the highveld and middleveld have growth rates that are 10.5% and 6.5% lower, respectively than those on the lowveld. This may indicate differences in demand

or supply conditions according to what region of the country the MSE finds itself.[63] In addition, urban-based firms in Swaziland have growth rates that are almost 8% higher than MSEs in rural areas, *ceteris paribus*. Urban locations neither help nor hinder MSEs in other countries, however.

The evidence regarding the impact of human capital on MSE growth rates is mixed. For Swaziland and Botswana, the two countries for which data were collected, the regression results indicate a small but positive relationship between growth and experience in similar activities, although the significance level of the coefficient in the Botswana regression is marginal. Enterprises with proprietors who have had formal business training grow 68% faster in Lesotho than those with untrained managers, but training has a significant negative impact for firms in Swaziland, and no significant effect whatever in the other countries. Zimbabwean proprietors who have completed secondary school run faster-growing firms than those proprietors with no schooling, but education does not influence growth elsewhere. Firms in Lesotho with proprietors who currently run at least one other

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[63] It is interesting to note how the values of the main exports from each region have changed in recent years. Much of the lowveld economy is tied to the sugar industry. From 1978 to 1987, the value of exports of raw sugar has increased more on average than the earnings from the sale of two main exports of the highveld, asbestos and wood pulp. The value of sugar exports also grew more than the value of exports of citrus fruit and canned fruit from the middleveld (FAO, various years; Swaziland Geological Survey Annual Report, various years).

MSE grow 45% more rapidly than firms with more focused owners, perhaps indicating that experience gained in other businesses is useful.

The results regarding the socio-economic characteristics of proprietors are also mixed. Although female-run firms in South Africa and Swaziland grow more slowly than those run by males, proprietor gender does not matter for any of the other countries. Still, it would seem hasty to dismiss Downing's (1990) contention that female entrepreneurs in Africa tend to be more cautious managers. Ethnicity of the proprietor is relatively unimportant as a determinant of MSE growth. Cortes, Berry, and Ishaq (1987) argue that older proprietors are unable or unwilling to expand their enterprises. This notion is supported in Botswana, where an additional year of proprietor age decreases the growth rate by 0.4%. However, proprietor age has no effect on firm growth in any of the other countries in which this information was collected. Neither marital status nor household size has an impact on growth in any of the countries in which they were measured.

4.7 Differences Across Countries

In order to take advantage of all available data, the analysis so far has involved separate regressions for each country. Although this has yielded some interesting insights into the factors contributing to MSE growth, it has made it

difficult to understand whether growth rates differ across countries, controlling for other factors. On the surface, MSEs in southern Africa seem to be remarkably similar in terms of product type and quality, marketing, and production technology: still, the countries under consideration here represent markedly different environments, as Chapter II made clear. While it is beyond the scope of this dissertation to attempt to separate out these complex and interrelated issues, it is useful to control for the influence of country on growth.

To examine this issue, the data from the five countries were pooled, and a single regression equation was estimated. All of the regressors common to each data set were included in addition to four dummy variables modeling country in which the MSE is found. The regression results are presented in Table 4.2. The most interesting result is that the coefficients on all of the country dummies are negative and significant. This indicates that MSEs in all countries grow more slowly than those in the South African townships, even after controlling for firm age, size, sector, locational and other factors.

Other findings reinforce those presented in the previous section. The inverse relationships between firm age and firm size and growth continue to hold in general. The pooled data reveal, however, that when evaluated at the maximum values, both partial derivatives are positive and significant.

Sectoral factors matter, with MSEs involved in construction and services growing faster than retail traders, and firms in real estate activities growing less rapidly. A ranking of which sectors seem to have the fastest growing MSEs, analogous to the ranking presented in Chapter III, also sheds light on the influence of sector on firm growth. This ranking is constructed by running the pooled regression

Table 4.2
The Influence of Country on Growth

Variable	Coefficient and T-Statistic
CONSTANT	37.124 ** (5.795)
FIRM AGE AND SIZE	
Firm Age	-1.655 ** (-3.414)
Size	-4.244 * (-1.698)
(Firm Age)(Size)	.070 (.210)
$(\text{Firm Age})^2$	.026 ** (2.221)
$(\text{Size})^2$	.123 (1.378)
$(\text{Firm Age})^2(\text{Size})$	-.002 (-.194)
$(\text{Firm Age})(\text{Size})^2$	-.008 (-.669)
$(\text{Firm Age})^2(\text{Size})^2$	.0003 (.659)
$\frac{\partial Growth}{\partial Age}\Big\|_{Age=\_\_\_}$	-1.201 ** (-6.552)

Table 4.2
The Influence of Country on Growth

Variable	Coefficient and T-Statistic
$\frac{\partial Growth}{\partial Age}\Big\|_{Age_{min}}$	2.018 ** (2.939)
$\frac{\partial Growth}{\partial Age}\Big\|_{Age_{max}}$	-1.512 ** (-5.901)
$\frac{\partial Growth}{\partial Size}\Big\|_{size_{min}}$	-3.560 ** (-5.190)
$\frac{\partial Growth}{\partial Size}\Big\|_{size_{max}}$	4.121 ** (10.400)
$\frac{\partial Growth}{\partial Size}\Big\|_{size_{min}}$	-3.662 ** (-4.995)
SECTORAL DUMMIES	
Food and Beverage Processing	2.454 (1.081)
Textile and Wearing Apparel Production	2.017 (.636)
Wood Production and Processing	-1.109 (-.428)
Paper, Printing and Publishing	-1.928 (-.410)
Chemicals and Plastics	4.405 (1.199)
Non-Metallic Mineral Processing	15.437 (1.422)
Metal Fabrication	2.994 (.258)
Miscellaneous Manufacturing	-1.629 (-.366)
Construction	21.541 * (1.820)

Table 4.2
The Influence of Country on Growth

Variable	Coefficient and T-Statistic
Wholesale Trade	-.602 (-.094)
BASE CATEGORY: Retail Trade	•
Hotels, Restaurants and Bars	.137 (.036)
Transportation	6.536 (.890)
Real Estate	-7.967 ** (-2.849)
Services	11.969 * (1.941)
LOCATIONAL DUMMIES	
Commercial District	13.591 ** (4.969)
Traditional Market	9.188 ** (3.113)
Non-Fixed Locations	3.487 (1.371)
BASE CATEGORY: Home-Based Locations	•
Other Locations	34.294 ** (3.064)
Dummy for MSEs in Swaziland	-15.775 ** (-4.271)
BASE CATEGORY: MSEs in South Africa	•
Dummy for MSEs in Lesotho	-18.705 ** (-4.727)
Dummy for MSEs in Botswana	-12.469 ** (-2.956)
Dummy for MSEs in Zimbabwe	-14.572 ** (-3.145)
Urban Areas	6.513 ** (2.897)
HUMAN CAPITAL VARIABLES	
Dummy for Ownership of Multiple MSEs	.495 (.217)
Dummy for Training	9.378 ** (3.021)
SOCIO-ECONOMIC VARIABLES	

Table 4.2 The Influence of Country on Growth	
Variable	**Coefficient and T-Statistic**
Dummy for Female Proprietorship	-10.024 ** (-3.980)
REGRESSION STATISTICS	
Sample Size	1819
R-Square	.121
F-Statistic	7.26

fourteen times, alternating the sector which serves as the reference category. Arranged from fastest to slowest growing, the sectors are arrayed as follows:

1. Construction
2. Non-Metallic Mineral Processing
3. Services
4. Transportation
5. Chemicals and Plastics Production
6. Metal Fabrication
7. Food and Beverage Processing
8. Textile and Wearing Apparel Production
9. Hotels, Restaurants, and Bars
10. Retail Trade
11. Wholesale Trade
12. Wood Processing
13. Miscellaneous Manufacturing
14. Real Estate

This ranking does not take into account statistical significance: the coefficients and t-statistics for each regression used to generate this ranking are presented in Appendix Table C. In addition to this extension, it is illuminating to aggregate the sectors up to the one-digit ISIC level, as was done in Chapter III. This analysis supports the finding that construction and services are faster growing, and

real estate more stagnant, but adds the finding that as a whole MSEs in manufacturing sectors do not grow at rates significantly different from those in trade. The results of this regression are presented in Appendix Table D.

Firms located in commercial districts are at a growth advantage when all countries are combined. Firms in traditional market settings also have higher growth rates: this result was not apparent when each country was considered separately. Urban-based firms grow faster than those in the outlying areas.[64] With respect to the proprietors, those with training had faster-growing firms, although when the countries were analyzed separately, the evidence regarding the impact of training on growth was conflicting. Finally, when the data are aggregated in this way, it becomes clear that female-run MSEs grow more slowly than those run by men. Whether because of discrimination or because female proprietors are more cautious managers, for this sample, firms with female proprietors grow 10% more slowly than those run by males.

4.8 Growth and Sample Selection

To this point, the determinants of MSE growth have been examined with the implicit assumption that firms do not fail. As the first chapter showed, some MSEs are more likely to survive than are others. Firms that fail are not part of the

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[64] All MSEs in the South African townships were considered to be urban.

data sets that are analyzed in this chapter: only the "winners" are selected. Although failing to control for sample selection can lead to serious estimation problems, many studies have assumed the problem away. A few attempts have been made to address sample selection, beginning with Mansfield (1962), who argued that Gibrat's Law still holds if the exit of firms is considered. More recently, in his empirical study of U.S. firms, Evans (1987) controls for sample selection using a model suggested by Heckman (1976). In order to test whether sample selection bias is problematic in the data under study in this dissertation, the Heckman approach, commonly called the Heckit model, will be estimated.

The Heckit technique assumes there is a model that applies to the underlying data. However, the dependent variable is only observed if the value of some indicator exceeds a threshold level. For the present case, firm growth is only observed if a firm survives and is included in the data. The observed data should be treated as if they were sampled from the 'selected' subpopulation: if they are not, bias may be introduced into the model.

Formally, Heckman's model consists of an equation of interest, and a second equation which forms the selection criterion:

(4.6) $$y_{t1} = x_{t1}\beta_1 + \epsilon_{t1}$$

(4.7) $$y_{t2}^{*} = x_{t2}\beta_2 + \epsilon_{t2}$$

where y_{t2}^* is an unobserved threshold variable. Although y_{t2}^* is not observed, an indicator of it is:

(4.8)
$$y_{t2} = 1, \text{ if } y_{t2}^* > 0$$
$$= 0, \text{ if } y_{t2}^* \leq 0$$

In words, y_{t1} is observed if and only if $y_{t2} = 1$. For the selected sample, it can be shown that

(4.9)
$$E[y_{t1} | y_{t1} \text{ is observed}] = x_{t1}\beta_1 + \sigma_{12}\lambda_t,$$

where σ_{12} is the covariance between ϵ_{t1} and ϵ_{t2}, and

$$\lambda_t = \frac{\phi_t}{1-\Phi_t}$$

where ϕ_t and Φ_t are the normal density and distribution functions, respectively, evaluated at $-x_{t2}\beta_2$.[65] Heckman suggests a two-step procedure for estimating the model. First a probit model is employed to estimate λ. For the data studied here, this equation is a survival/non-survival binary probit. In the second step, y_{t2} (MSE growth rates, in this case) is regressed on x_{t1} and λ in order to estimate β_1 and the coefficient on λ. In this way, estimates of the coefficients of interest are available untainted by sample selection bias. In addition, the presence of such bias is readily visible if the coefficient on λ is significantly different from zero.

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[65] The variance of ϵ_{t2} cannot be estimated, and so is normalized to one.

The results of the Heckit model for Swaziland and Zimbabwe are presented in Table 4.3.[66] The regressors in the probit equation control for sector, location, forward and backward linkages with other firms, proprietor characteristics, and access to credit sources.[67] The second stage growth equation includes all regressors from section 4.6. Of primary interest are the estimated coefficients on the sample selection term, λ. For both countries, this coefficient is not significantly different from zero, indicating that sample selection is not an important problem for these data. Not surprisingly, the coefficients in the Heckit model are quite similar to those presented in Table 4.1. In his study of U.S. firm growth, Evans (1987) also found sample selection to be unimportant.

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[66] Due to limitations of the data, only these two cases could be examined in this framework. Specifically, information regarding the determinants of firm failure was only gathered in these surveys.

[67] The probit regressors are the same as those used in the proportional hazards model of Chapter III.

Table 4.3
Regression Results: Heckit Model

Variable	Country	
	Swaziland	Zimbabwe
CONSTANT	10.856 (.457)	-58.786 (-1.318)
λ	21.167 (.905)	15.674 (.637)
FIRM AGE AND SIZE		
Firm Age	-.066 (-.039)	-2.333 (-1.084)
Size	2.267 (.301)	3.207 (.223)
(Firm Age)(Size)	-1.243 (-.733)	.416 (.220)
$(\text{Firm Age})^2$	-.019 (-.289)	.052 (.960)
$(\text{Size})^2$	-.424 (-.400)	-.162 (-.076)
$(\text{Firm Age})^2(\text{Size})$	.040 (.546)	-.030 (-.711)
$(\text{Firm Age})(\text{Size})^2$	.126 (.481)	-.120 (-.456)
$(\text{Firm Age})^2(\text{Size})^2$	-.005 (-.359)	.006 (.916)
SECTORAL DUMMIES		
Food and Beverage Processing	-3.655 (-.593)	17.135 (.870)
Textile and Wearing Apparel Production	-.926 (-.224)	8.284 (.508)
Wood Production and Processing	4.735 (.696)	12.820 (.574)
Non-Metallic Mineral Processing	-15.648 (-.820)	9.257 (.363)
Metal Fabrication	7.156 (.406)	2.650 (.138)
Miscellaneous Manufacturing	5.067 (.459)	13.206 (.739)
Construction	N/A	57.173 ** (2.865)
Wholesale Trade	10.529 (.338)	N/A

Table 4.3
Regression Results: Heckit Model

Variable	Country	
	Swaziland	Zimbabwe
BASE CATEGORY: Retail Trade	•	•
Hotels, Restaurants and Bars	13.828 (.700)	-14.921 (-.364)
Transportation	30.210 • (1.742)	7.363 (.286)
Real Estate	13.510 (.470)	N/A
Services	32.884 •• (2.575)	49.109 •• (2.882)
LOCATIONAL DUMMIES		
Commercial District	12.794 •• (2.087)	21.950 • (1.710)
Traditional Market	5.831 (1.295)	4.745 (.241)
Non-Fixed Locations	-1.322 (-.220)	10.452 (1.279)
BASE CATEGORY: Home-Based Enterprises	•	•
Other Locations	42.943 (1.378)	N/A
Highveld Region	-10.430 •• (-2.123)	N/A
Middleveld Region	-4.095 (-.797)	N/A
BASE CATEGORY: Lowveld Region	•	•
Lubombo Plateau	.920 (.086)	N/A
Zimbabwean Ecological Zone I	N/A	-.878 (-.049)
BASE CATEGORY: Zimbabwean Ecological Zone II	•	•
Zimbabwean Ecological Zone III	N/A	6.617 (.563)
Zimbabwean Ecological Zone IV	N/A	-1.265 (-.231)
Zimbabwean Ecological Zone V	N/A	3.738 (.344)
Urban Areas	9.822 •• (2.024)	8.564 (.964)
HUMAN CAPITAL VARIABLES		

Table 4.3
Regression Results: Heckit Model

Variable	Country	
	Swaziland	Zimbabwe
Years of Experience	.452 * (1.654)	N/A
Dummy for Completion of Primary School	.322 (.097)	4.674 (.486)
Dummy for Completion of Secondary School	2.719 (.754)	16.351 (1.547)
Dummy for Ownership of Multiple MSEs	5.086 (1.608)	-3.892 (-.748)
Dummy for Ownership of Defunct MSE	3.357 (1.039)	2.204 (.297)
Dummy for Training	-7.280 ** (-1.961)	13.370 ** (2.317)
Dummy for Membership in Business Support Group	2.407 (.493)	N/A
SOCIO-ECONOMIC VARIABLES		
Dummy for Female Proprietorship	-9.223 * (-1.912)	-4.896 (-.537)
Dummy for Belonging to Majority Ethnic Group	-21.934 (-2.011)	14.649 (1.152)
Proprietor Age	N/A	.596 ** (2.401)
Dummy for Marital Status of Proprietor	-2.445 (-.917)	N/A
Household Size	.265 (1.123)	.009 (.013)
REGRESSION STATISTICS		
Sample Size	274	345
R-Square	.272	.180
F-Statistic	2.25	1.82

4.9 Conclusions

Many simple statistics regarding the growth of surviving MSEs were presented in Chapter II. This chapter expands on these by considering growth in a more systematic way. Several interesting findings emerge from this exercise. Firstly, the results support the inverse relationships between firm growth and both firm age and size posited by Jovanovic (1982), and supported by other empirical studies. Secondly, the sector in which the firm is engaged is important in determining its growth rate. While no clear pattern emerges across countries when the data for each are considered separately, patterns do exist when the data are combined. Specifically, firms in the construction and service sectors seem to grow faster, and those in the real estate sector more slowly than those in retail trading. Thirdly, the location in which the firm operates influences growth. In particular, MSEs which exist in commercial districts tend to have growth rates around 14% higher than home-based enterprises. When all the data are considered together, urban-based firms grow faster than those in the rural areas. While regional factors are (excepting Swaziland) insignificant within countries, the country in which a MSE operates has a strong influence on its growth performance, perhaps reflecting the importance of the cultural, historical, economic and regulatory environment.

The fourth important finding is that MSEs with more experienced proprietors tend to grow more quickly. This human

capital dimension of growth has not been considered before. Other variables, such as completion of secondary school and training, provide some further, if sketchy, evidence of the importance of human capital accumulation in explaining MSE growth.

Fifth, in two countries, as well as when all countries are considered together, firms with female proprietors grow more slowly than male-run firms, other things equal. It is not clear whether this phenomenon is the result of discrimination against female proprietors, or of more cautious managerial decisions by women. Other socio-economic characteristics of the proprietor have only a slight impact on growth. In future work, it may be more appropriate to gather and use information about the socio-economic character of the family in which the proprietor was raised, rather than only measures of her current situation. That is, the values and education absorbed during childhood may be an important determinant of entrepreneurial supply later in life.

A final result is that sample selection does not seem to seriously bias the estimated coefficients. While following a number of firms through time would lead to more efficient estimation procedures, this result indicates that the cheaper retrospective data sets are acceptable.

To be sure, this analysis has its weaknesses. Because of the data collection method, it was not possible to measure growth in any way but in terms of labor. Many important

pieces of information could not be collected in the very short interview time of about fifteen minutes. Still, this analysis provides some important insights into the determinants of small firm growth, which may guide future research on this topic, as well as some policy decisions.

Table 4.4
Descriptive Statistics

Variable	Country: Mean and Standard Error				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
FIRM AGE AND SIZE					
Firm Age	6.472 (7.683)	8.094 (7.864)	7.439 (8.719)	5.859 (6.571)	8.803 (9.231)
Initial Firm Size	1.398 (1.692)	1.549 (1.598)	1.805 (2.760)	1.685 (1.683)	1.357 (1.080)
SECTORAL DUMMIES					
Food and Beverage Processing	.041 (.198)	.061 (.240)	.172 (.378)	.097 (.297)	.026 (.160)
Textile and Wearing Apparel Production	.089 (.286)	.220 (.415)	.214 (.410)	.141 (.349)	.438 (.497)
Wood Production and Processing	.028 (.167)	.130 (.337)	.028 (.166)	.005 (.070)	.128 (.334)
Paper, Printing and Publishing	.004 (.064)	N/A	.002 (.041)	N/A	N/A
Chemicals and Plastics	N/A	N/A	N/A	N/A	.003 (.054)
Non-Metallic Mineral Processing	.008 (.090)	.007 (.085)	.015 (.122)	.019 (.138)	.012 (.107)
Metal Fabrication	.020 (.141)	.014 (.120)	.012 (.108)	.019 (.138)	.029 (.168)
Miscellaneous Manufacturing	.037 (.188)	.043 (.204)	.028 (.166)	.029 (.169)	.064 (.245)
Construction	.012 (.110)	N/A	.048 (.215)	N/A	.020 (.141)
Wholesale Trade	.008 (.090)	.007 (.085)	N/A	.005 (.070)	N/A
Hotels, Restaurants and Bars	.159 (.366)	.007 (.085)	.030 (.171)	.083 (.276)	.006 (.076)
Transportation	.041 (.198)	.014 (.120)	.010 (.100)	.019 (.138)	.009 (.093)
Real Estate	.004 (.064)	.022 (.146)	.068 (.253)	.019 (.138)	N/A
Services	.106 (.308)	.047 (.212)	.057 (.232)	.068 (.252)	.038 (.191)
LOCATIONAL DUMMIES					
Commercial District	.065 (.247)	.108 (.311)	.093 (.291)	.199 (.400)	.157 (.364)
Traditional Market	.012 (.110)	.141 (.348)	.139 (.346)	.024 (.154)	.017 (.131)

Table 4.4
Descriptive Statistics

Variable	Country: Mean and Standard Error				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
Non-Fixed Locations	.187 (.391)	.177 (.382)	.195 (.397)	.136 (.344)	.130 (.337)
Other Locations	N/A	.007 (.085)	.125 (.331)	N/A	N/A
Mamelodi Township	.549 (.499)	N/A	N/A	N/A	N/A
Highveld Region	N/A	.343 (.476)	N/A	N/A	N/A
Middleveld Region	N/A	.448 (.498)	N/A	N/A	N/A
Lubombo Plateau	N/A	.036 (.187)	N/A	N/A	N/A
Zimbabwean Ecological Zone I	N/A	N/A	N/A	N/A	.032 (.176)
Zimbabwean Ecological Zone III	N/A	N/A	N/A	N/A	.093 (.291)
Zimbabwean Ecological Zone IV	N/A	N/A	N/A	N/A	.414 (.493)
Zimbabwean Ecological Zone V	N/A	N/A	N/A	N/A	.078 (.269)
Urban Areas	N/A	.570 (.496)	.225 (.418)	.301 (.460)	.577 (.495)
Secondary Towns	N/A	.235 (.425)	.611 (.488)	.558 (.498)	.258 (.438)
HUMAN CAPITAL VARIABLES					
Years of Experience	N/A	8.271 (8.694)	N/A	7.408 (7.623)	N/A
Dummy for Completion of Primary School	N/A	.347 (.477)	N/A	.621 (.486)	.542 (.499)
Dummy for Completion of Secondary School	N/A	.448 (.498)	N/A	.126 (.333)	.380 (.486)
Dummy for Ownership of Multiple MSEs	.256 (.437)	.181 (.385)	.104 (.305)	.223 (.417)	.290 (.454)
Dummy for Ownership of Defunct MSE	N/A	.173 (.379)	N/A	N/A	.110 (.314)
Dummy for Training	.154 (.362)	.213 (.410)	.214 (.410)	.175 (.381)	.217 (.413)
Dummy for Membership in Business Support Group	N/A	.065 (.247)	N/A	N/A	N/A

Table 4.4
Descriptive Statistics

Variable	Country: Mean and Standard Error				
	South Africa	Swaziland	Lesotho	Botswana	Zimbabwe
SOCIO-ECONOMIC VARIABLES					
Dummy for Female Proprietorship	.553 (.498)	.791 (.408)	.643 (.480)	.743 (.438)	.609 (.489)
Dummy for Belonging to Majority Ethnic Group	N/A	.928 (.259)	.973 (.161)	N/A	.957 (.204)
Proprietor Age	N/A	N/A	43.364 (13.751)	40.529 (11.636)	38.243 (13.058)
Dummy for Marital Status of Proprietor	N/A	.693 (.462)	N/A	.505 (.501)	N/A
Household Size	N/A	7.433 (5.632)	N/A	6.631 (3.689)	6.244 (3.433)
Sample Size	246	277	599	206	345

CHAPTER V

CONCLUSIONS:

IMPLICATIONS FOR POLICY AND FUTURE RESEARCH

Micro and small enterprises are a large and important part of the economies of most developing countries in the world. In the southern African countries studied in this dissertation, as much as one-quarter of the working age population in each country is involved in the MSE sector. Given the rapid expansion of the labor force, and the relatively slow growth of the formal sector, this proportion is likely to increase in the future. In the last decade, interest in this part of the economy on the part of policy makers and members of the donor community has become intense. Unfortunately, a shortage of information about even the most basic aspects of MSEs has left these officials hamstrung.

Some of these basic questions have been answered by a spate of surveys conducted by Michigan State University and local institutions in the southern African region in the last two years. Country-wide surveys have been conducted in Botswana, Lesotho, Swaziland and Zimbabwe, in addition to a

census of two South African townships. While there are certainly important differences in MSEs across countries in the region, there are some common themes. First of all, these enterprises are tiny. Although by definition firms with fifty or fewer workers are included, the vast majority of MSEs in every country has under ten workers. The average number of employees, including the proprietor, is around two for each country.

A second set of common characteristics of MSEs in this part of the world involves location. From the country-wide studies it is clear that the majority of MSEs are situated in rural areas. Given the large share of each country's population living in the outlying areas, this is not surprising. Furthermore, in both rural and urban settings the majority of MSEs are home-based. It is likely that this is a result of at least three factors: the absence of additional rent needed to maintain an enterprise in the home, the flexibility that home-based work offers in terms of family responsibilities, and the ease with which enterprises away from the commercial districts can evade the regulators and internal revenue collection.

While no common pattern emerges at a disaggregated level, in most countries a large share of the number of MSEs is

involved in petty manufacturing or trade activities. Except for Botswana, the vast majority of MSEs in the region seem to be involved in manufacturing. Commonly encountered MSEs on the manufacturing side include tailors, weavers, basket-makers, metalsmiths and carpenters. In Botswana, and in many urban areas in other countries, MSEs engaged in commerce are prevalent. The fruit and vegetable vendors, and small retailers of clothes and food are common commercial MSEs. In every country, a small but significant number of MSEs are involved in the service sector.

A final common thread revealed by recent survey work involves the gender of the proprietor of the MSE. For each country, between two-thirds and three-fourths of proprietors are female.

While these new data sets have greatly expanded the understanding of the characteristics of MSEs, they also provide a unique opportunity to explore issues of small firm dynamics. Faced with large numbers of enterprises, governments and donor agencies have been unable to effectively channel assistance to the sector. Which firms are likely to grow in the future should be an important consideration in allocation decisions, as should be an understanding of the survival chances of MSEs. This dissertation is intended as a first step towards redressing this information gap.

In Chapter III, the factors influencing firm failure were considered. To examine this issue, data from Zimbabwe and

Swaziland were analyzed in a proportional hazards framework. Originally, this model was used by engineers and biostatisticians to model survival times of machines or cardiac patients. In economics the proportional hazards model has been adopted by labor economists to study duration of spells of unemployment. However, it has never been applied to the analysis of firm survival. The work in Chapter III demonstrates that it is a highly useful tool in the study of firm dynamics.

A number of salient findings emerge from the hazard analysis. The first involves the shape of the simple hazard function. Generally, the probability of firm failure, given survival to that point, diminishes with each additional year of existence until approximately age eighteen, after which the probability increases. The negative slope of this function in the early years is not surprising: if a firm can survive the turbulent start-up years, its chances of surviving increase. The jump in the hazard at middle age was unexpected, however. Early evidence indicates that these closures are often by choice and not for reasons of low demand, high competition, costly inputs and the like.

Some particular findings are also of note. Controlling for other factors, the analysis shows that faster-growing firms are less likely to fail. Larger firms do not have lower failure hazards, as posited by Jovanovic's theory, and may even be more likely to fail. In addition, the sector in which

an enterprise operates influences its survival chances. MSEs in the manufacturing sector, especially wood processing, are less likely to fail, while those in transportation or retail trade activities have shorter survival times, other things equal. Location has a strong effect on the failure hazard, with commercial district enterprises and urban enterprises having greater survival probabilities. Interestingly, the country in which a MSE is found has no impact on its hazard, once other factors are accounted for. It should be noted, however, that this result only applies to the two countries which are considered, namely Swaziland and Zimbabwe, and might not generalize if more data were available. Finally, female proprietors are not more likely to see their enterprises fail than males for market-related reasons.

Chapter IV considered issues surrounding growth of MSEs. For this analysis, data from all five countries (Botswana, Lesotho, South Africa, Swaziland and Zimbabwe) were available. To examine the influences on a firm's average annual growth rate of employment, ordinary least squares regressions were run for each country separately, and also for all pooled together.

These regressions provide a number of important insights. First, both firm age and size are inversely related to firm growth, in most cases. At larger sizes and older ages, however, the relationships are positive. In general, this

result provides modest support for Jovanovic's "learning" theory, and mirrors Evans' findings regarding U.S. firms.

The sector and location in which an MSE operates also influence its average annual growth rate. While no clear pattern arises across countries with respect to sector, when the data are pooled the services and construction sectors appear to grow more rapidly and the real estate sector more slowly than retail trading. When the sectors are aggregated, manufacturing firms do not have growth rates that are significantly different from MSEs in trade. In general, MSEs located in commercial districts grow more quickly than home-based enterprises, and in the pooled regression urban firms grow more rapidly than those in rural areas. An equally important result is that even after controlling for other factors, the country in which a MSE is located is a significant determinant of growth. Some confluence of political, economic, historical and social factors apparently has an impact on firm-level decisions regarding growth.

The evidence surrounding the influence of human capital embodied in the proprietor on the growth rate is mixed. The number of years the proprietor has been engaged in similar business activities has a small effect in some countries, but not in others, as does the completion of secondary school. Furthermore, training of the proprietor increases a firm's growth rate, *ceteris paribus*, when all countries are pooled

together, although the effect is negative in Swaziland when the countries are considered separately.

Finally, the growth rates of MSEs with female proprietors are lower in two countries and when the data for all countries are combined. It is unknown whether this difference is the result of discrimination or of different behavior according to the gender of the proprietor, or both.

Before considering possible policy implications of this research, it is instructive to consider the findings of Chapters III and IV together. First of all, smaller firms are more likely to grow, other things equal. However, these firms are not more likely to fail. This seems to provide preliminary evidence that assistance programs must not ignore the smaller MSEs.

While sector affects both firm growth patterns and survival probabilities, no pattern is immediately discernable. While construction and services are sectors in which MSEs tend to grow rapidly, they are not sectors with especially long-surviving enterprises. Similarly, while wood processing firms have low hazards, they tend to grow more slowly than firms in other sectors. Slightly clearer trends emerge when the sectoral categories are aggregated. In this analysis, the firms in the service and construction sectors both have high growth rates and low failure probabilities, relative to trading. Manufacturing as a whole includes MSEs with better

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survival prospects than the trade sector, but the manufacturers do not grow more rapidly.

Interesting trends regarding firm location are apparent from a synthesis of the results of Chapters III and IV. MSEs situated in urban settings are both less likely to fail and more likely to have high average growth rates. Independent of this, enterprises in commercial districts also have better survival and growth chances than those located in the home. Should the goal of the assistance organization be simply to promote MSEs which are likely to survive and grow, their programs should target the urban firms in commercial areas, and avoid enterprises that are home-based or rural.

Finally, considering the findings of the earlier chapters together yields some interesting, if mixed, conclusions regarding proprietor gender. In Zimbabwe and in Swaziland, MSEs run by women are no more likely to fail for business reasons than those run by males, and female run enterprises in Swaziland have lower growth rates. Considering the hazard and growth regressions for all countries together, one can see that women-run firms are at no particular survival disadvantage, but they do tend to grow more slowly than those run by men. Unfortunately, these results do not settle the issues surrounding the impact of proprietor gender on small firm dynamics.

While knowledge of the factors leading to MSE growth and survival are necessary inputs into the policy and project decision-making process, it is not sufficient. In particular, an important part of the policy-making equation has not been examined at all: issues of productivity and efficiency of MSEs are not addressed in this dissertation. On first blush, it may appear that MSEs with characteristics that make them likely to survive and grow would be good candidates for official promotion. However, such enterprises may be low-productivity concerns which use scarce resources (particularly capital) inefficiently. In order to learn the most from the research done here, and to be able to make some cautious policy recommendations, it may be useful to refer to the findings of earlier studies regarding efficiency which were presented in Chapter I. These studies revealed that, at least for manufacturing firms in some countries, efficiency levels vary by enterprise size, sector, and location.

It must be recognized that these efficiency findings have some limitations. They are based on a small number of countries (none of which form the data sets on which in this dissertation relies), they include manufacturing firms only, and they result from data generated at one point in time. It is equally true that the analyses of Chapters III and IV are not without shortcomings. Still, it is possible to make some cautious policy recommendations. The first has to do with enterprises size. Chapter III revealed that firms in the

larger end of the MSE category are not more likely to survive than smaller firms. In Chapter IV, the contention that size and MSE growth are inversely related received support. Taken by themselves, these findings might indicate that the smallest firms may be the appropriate targets for assistance. However, given the finding that efficiency increases with size in the MSE category, and that the largest jump in efficiency often occurs between one and two worker firms, it may be more appropriate to target enterprises which have at least two workers. Of course, some of the one-person enterprises will grow in the future. For the risk-averse assistance institution, however, it may be better to wait until these firms have demonstrated growth by exceeding the one-worker level.

A second point regards enterprise age. Younger firms have higher hazards, as section 3.5.1 demonstrates. Chapter IV presents strong evidence that growth decreases with age. Although no evidence relating efficiency to firm age is available, the findings of this dissertation lend some support to the idea that the assistance should be aimed at firms that have existed for at least a few years, but which have not gotten very old.

The conclusions regarding sector are muddier. The sectors with the highest growth rates vary greatly by country, as Chapter IV makes clear, and often those sectors with the fastest growing MSEs are those cited in other countries as

being the inefficient sectors. The findings of Chapter III indicate that relative to MSEs involved in trade, those in the manufacturing sector have lower failure hazards, perhaps resulting from the relatively high barriers to entry for small manufacturers which affords these MSEs greater protection from fierce competition than in the trade sector. It may be the case that which sectors tend to have long-lived, fast-growing, and efficient MSEs depends heavily on the country of interest. It would be dangerous, then, to channel assistance to MSEs according to sector without country-specific information.

More conclusive statements are possible with respect to enterprise location. Home-based enterprises tend to be less efficient, slower-growing, and more likely to fail than MSEs located in commercial districts, regardless of the country involved. Similarly, urban firms are at a lower risk of failing and seem to be more efficient than rural firms, and may have higher growth rates.

Naturally, the choice of which sorts of MSEs to assist depends on the preferences and goals of the institution providing the assistance. For example, more risk-averse institutions may choose to trade off lower growth prospects for lower failure probabilities of older and larger firms. The information presented in the paragraphs above may be seen as a starting point in the decision-making process of policy makers and the designers of projects. This study also points out directions for future research. It is possible, for

example, that the assistance an MSE needs varies according to where it is in its life cycle. This dissertation suggests that this may be true, but does not directly address this question.

The research agenda can be usefully divided into two main categories. Firstly, new theoretical work needs to be undertaken that better explains the behavior of small firms in developing countries. While Jovanovic's learning model is a useful departure point for empirical work in this area it is inadequate in a number of ways. For example, it assumes away demand shocks which are surely important determinants of growth and survival decisions at the firm level. It does not explicitly consider locational aspects or characteristics of the proprietor, which are shown by the data to be important. In light of the findings of this research, it should be possible to extend or revise the theory of firm dynamics.

The second branch of the agenda involves empirical work. This category can itself be divided into two categories: refinement of existing data collection techniques, and the application of techniques for the first time. On the former, the data are often measured very generally. Armed with the experiences of the several surveys discussed in this work, future researchers may be able to more accurately measure firm and proprietor characteristics. When a formal theory of MSEs is developed, further guidance as to what variables are important can be obtained.

Another important extension of the state of knowledge regarding small enterprise dynamics pertains to studying firms on the subsectoral level. As noted above, sectoral patterns of growth, failure, and efficiency show significant variation between countries. This indicates a need for studies of specific subsectors in specific countries. Subsector analysis involves considering not just individual enterprises, but the ways in which MSEs in a given product line are linked to suppliers and customers, the ways they compete with other firms (including both large and small enterprises), and the impact of the legal and regulatory environment on them. Subsector studies have been completed in several countries, and these have yielded important insights into the structure of MSEs as well as useful policy prescriptions. The next logical step is to apply these methods to learn how subsectors evolve over time.

This research has also made plain the shortcomings of retrospective data collection. Reliance on such methods raises questions about accuracy of recall, and it also makes it impossible to collect detailed information on other measures of growth (e.g., growth in output or profits) as well as other explanatory variables. Future work in this area will require richer data sources. It is probably necessary that these future data sets be generated by longitudinal collection operations. For example, following a sample of enterprises forward through time would allow much more detailed and

accurate information (e.g., data on sales, costs, factor usage, etc.) to be obtained. Such an arrangement would also reduce the problem of under-reported firm failures, making possible a rough "life table" of firm survival rates. In short, improved data would permit the analysis necessary to guide the policy and assistance decisions that will affect MSEs in the future.

Micro and small enterprises are clearly an important but poorly understood part of developing economies around the world. This dissertation takes some first steps toward a more complete comprehension of how these firms change over time. Further research may make possible the promotion of MSEs, in order to improve the incomes of those involved in them, and to harness their energies toward overall economic growth.

APPENDICES

APPENDIX 1: EXISTING ENTERPRISE QUESTIONNAIRE

EXISTING ENTERPRISE QUESTIONNAIRE

( ) 1. Region : ____________
( ) 2. Stratum : ____________
( ) 3. INcome Zone : ____________
( ) 4. Enumeration Area : ____________

Date Completed: ____________
Date Proofed: ____________
Date Entered: ____________
Date verified: ____________

Seq. #: ________ Page #: ________
Enumerator: ____________
Supervisor: ____________

HOUSEHOLDS W/ NO ACTIVITY ____________
HOUSEHOLDS CLOSED ____________

5 SEQUENCE NUMBER	6 UNIQUE ID NUMBER	7 TOTAL # OF HH BUSINESSES	8 PRIMARY BUSINESS TYPE	9 PRIMARY BUSINESS CODE	10 % FAMILY INCOME(a)	11 LOCATION TYPE (b)	12 # MONTHS PER YEAR	13 # DAYS PER MONTH	USUAL NUMBER OF WORKERS: 14 # WORKING PROPRIETORS	15 # UNPAID FAMILY	16 # PAID WORKERS	17 # APPRENTICES	18 TOTAL # WORKERS	OF THE TOTAL: 19 # FEMALES	20 # PART-TIME	21 # CHILDREN UNDER 15	22 YEAR/MONTH BUSINESS WAS ACQUIRED	23 # WORKERS AT START	24 SELLS TO WHOM? (c)	25 NATURE OF INPUTS (d)	26 CREDIT SOURCE (e)	27 MEMBER BUS. SUPPORT GROUP? (1=YES, 0=NO)	28 PROPRIETOR GENDER (f)	29 PROPRIETOR CATEGORY (g)	30 SECONDARY BUSINESS TYPE	31 SECONDARY BUSINESS CODE	32 SEC. BUS. LOCATION (b)	33 # WORKERS IN SEC. BUSINESS	34 PROPRIETOR'S NAME NICKNAME BUSINESS NAME PHYSICAL ADDRESS	35 SUPPLEMENTARY QUEST.? (1=YES, 0=NO)	36 ANY DEAD BUSINESSES? (1=YES, 0=NO)

Codes:
a/ 1. Provides all of income 2. Provides more than half of income 3. Provides less than half of income 4. Provides about half of income
b/ 1. At home 2. In traditional market 3. In commercial district 4. Roadside 5. Mobile
c/ 1. Individuals 2. Urban commericial enterprises 3. Urban mfg. enterprises 4. Rural commercial enterprises 5. Rural mfg. enterprises 6. Export 7. Other
d/ 1. Makes/gathers own inputs 2. Buys unprocessed inputs 3. Buys semi-processed inputs 4. Buys finished products for resale 5. Other
e/ 0. Never received loans 1. Loans from family/friends 2. Loans from moneylender 3. Loans from bank 4. Loans from elsewhere
f/ 1. Female; sole owner 2. Male; sole owner 3. All female; joint ownership 4. All male; joint ownership 5. Mixed joint ownership
g/ 1. Swazi 2. South African 3. Indian 4. Chinese/Korean 5. European 6. Other

APPENDIX TABLE A

Sectoral Coefficients: Hazard Model With Alternative Sectoral Bases (Pooled Data)

Variable	Alternative Bases													
	Food, etc.	Textile Prod.	Wood Proc.	Chem., etc.	Min-erals	Metals	Misc. Mfg.	Const.	Whole. Trade	Retail Trade	Hotel, etc.	Trans.	Real Estate	Serv.
Food, Beverage Processing		.19 (1.28)	.37** (2.02)	-.44 (-.73)	.24 (.68)	-.07 (-.25)	-.07 (-.30)	-.01 (-.03)	.26 (.26)	-.62** (-3.89)	-.27 (-.66)	-1.18** (-3.29)	11.96 (.08)	.13 (.60)
Textile Production	-.19 (-1.28)		.18 (1.27)	-.63 (-1.06)	.05 (.15)	-.26 (1.0)	-.26 (-1.30)	-.20 (-.70)	.08 (.07)	-.79** (-7.39)	-.46 (-1.17)	-1.37** (-4.02)	11.77 (.08)	-.05 (-.27)
Wood Processing	-.37** (-2.02)	-.18 (-1.27)		-.81 (-1.35)	-.13 (-.40)	-.44 (-1.6)	-.44** (-1.97)	-.38 (-1.28)	-.11 (-.11)	-.98** (-6.39)	-.64 (-1.57)	-1.55** (-4.35)	11.58 (.07)	-.24 (-1.14)
Chemicals, Plastics	.44 (.73)	.63 (1.06)	.81 (1.35)		.68 (1.01)	.37 (.58)	.37 (.60)	.43 (.67)	.70 (.60)	-.11 (-.18)	.17 (.24)	-.75 (-1.10)	12.39 (.08)	.57 (.93)
Mineral Processing	-.24 (-.68)	-.05 (-.15)	.13 (.40)	-.68 (-1.01)		-.31 (-.76)	-.31 (-.83)	-.25 (-.59)	.02 (.02)	-.88** (-2.59)	-.51 (-1.00)	-1.42** (-3.06)	11.72 (.08)	-.10 (-.29)
Metal Fabrication	.07 (.25)	.26 (1.02)	.44 (1.61)	-.37 (-.58)	.31 (.76)		-.001 (.00)	.06 (.17)	.33 (.32)	-.54** (-2.07)	-.20 (-.44)	-1.11** (-2.74)	12.03 (.08)	.20 (.68)
Misc. Manufac-turing	.07 (.30)	.26 (1.30)	.44** (1.97)	-.37 (-.60)	.31 (.83)	.001 (.00)		.06 (.20)	.33 (.32)	-.54** (-2.66)	-.20 (-.47)	-1.11** (-3.12)	12.03 (.08)	.20 (.84)
Construc-tion	.009 (.03)	.20 (.70)	.38 (1.28)	-.43 (-.67)	.25 (.59)	-.06 (-.17)	-.06 (-.20)		.27 (.26)	-.58** (-2.03)	-.26 (-.55)	-1.17** (-2.87)	11.96 (.08)	.14 (.46)
Wholesale Trade	-.26 (-.26)	-.08 (-.07)	.11 (.11)	-.70 (-.60)	.02 (.02)	-.33 (-.32)	-.33 (-.32)	-.27 (-.26)		-.95 (-.94)	-.53 (-.47)	-1.44 (-1.36)	11.69 (.07)	-.13 (-.12)
Retail Trade	.62** (3.89)	.79** (7.39)	.98** (6.39)	.11 (.18)	.88** (2.59)	.54** (2.07)	.54** (2.66)	.58** (2.03)	.95 (.94)		.89* (1.76)	-.44 (-1.07)	13.50 (.01)	.81** (3.31)
Hotel, RestaurantsBars	.27 (.66)	.46 (1.17)	.64 (1.57)	-.17 (-.24)	.51 (1.00)	.20 (.44)	.20 (.47)	.26 (.55)	.53 (.49)	-.34 (-.90)		-1.33** (-2.08)	12.62 (.01)	-.04 (-.08)
Trans-portation	1.18** (3.29)	1.37** (4.02)	1.55** (4.35)	.75 (1.10)	1.42** (3.06)	1.11** (2.74)	1.11** (3.12)	1.17** (2.87)	1.44 (1.36)	.52 (1.52)	1.33** (2.08)		13.94 (.01)	1.28** (3.10)
Real Estate	-11.96 (-.08)	-11.77 (-.08)	-11.58 (-.07)	-12.39 (-.08)	-11.72 (-.08)	-12.03 (-.08)	-12.03 (-.08)	-11.96 (-.08)	-11.69 (-.07)	-12.56 (-.08)	-12.62 (-.01)	-13.94 (-.01)		-12.66 (-.01)
Services	-.13 (-.60)	.05 (.27)	.24 (1.14)	-.57 (-.93)	.10 (.29)	-.20 (-.68)	-.20 (-.84)	-.14 (-.46)	.13 (.12)	-.74** (-3.76)	.04 (.08)	-1.28** (-3.10)	12.66 (.01)	

APPENDIX TABLE B

The Influence of Sector on Hazard: Zimbabwe and Swaziland Combined (Sector at the One-Digit ISIC Level)	
Regressor	**Coefficient and T-statistic**
Firm Growth Rate	-.049 ** (-16.68)
Firm Size	.028 ** (2.445)
SECTORAL DUMMIES	
Manufacturing	-.768 ** (-7.748)
Construction	-.596 ** (-2.101)
BASE CATEGORY: Trade	•
Transportation	.472 (1.394)
Real Estate	-12.598 (-.080)
Services	-.726 ** (-3.710)
LOCATIONAL DUMMIES	
Market Locations	-.945 ** (-11.496)
Roadside Locations	-.625 ** (-3.739)
BASE CATEGORY: Home-Based Enterprises	•
Mobile MSEs	.065 (.851)
Urban Locations	-.221 ** (-4.041)
Dummy for Swazi MSEs	-.030 (-.505)
LINKAGE DUMMIES	
Makes or Gathers Own Inputs	-.433 ** (-3.318)
Buys Unprocessed Inputs	.108 (.522)
Buys Semi-Processed Inputs	-.240 ** (-2.398)
BASE CATEGORY: Buys Finished Products for Resale	•

The Influence of Sector on Hazard: Zimbabwe and Swaziland Combined (Sector at the One-Digit ISIC Level)	
Regressor	**Coefficient and T-statistic**
Has Other Input Arrangements	-.438 ** (-2.682)
Sells Directly to Final Consumer	-.059 (-.430)
PROPRIETOR CHARACTERISTIC DUMMIES	
Female Proprietor	.074 (.784)
Mixed Gender Joint Proprietorship	.569 ** (2.266)
BASE CATEGORY: Male Proprietorship	*
Proprietor in Majority Ethnic Group	-.053 (-.277)
OTHER ENTERPRISE CHARACTERISTICS	
Access to Formal Credit Sources	.001 (.007)
Access to Informal Credit Sources	.183 * (.079)
REGRESSION STATISTICS	
Sample Size	8,517

APPENDIX TABLE C

Sectoral Coefficients: Growth Model With Alternative Sectoral Bases (Pooled Data)

Variable	Alternative Bases													
	Food, etc.	Textile Prod.	Wood Proc.	Chem., etc.	Min-erals	Metals	Misc. Mfg.	Const.	Whole. Trade	Retail Trade	Hotel, etc.	Trans.	Real Estate	Serv.
Food, Beverage Processing		.31 (.12)	3.69 (1.45)	-2.26 (-.59)	-13.13 (-1.2)	-.71 (-.06)	3.83 (.80)	-19.14* (-1.65)	3.01 (.45)	2.13 (.90)	2.07 (.52)	-4.16 (-.55)	10.25** (3.38)	-9.53 (1.5)
Textile Production	-.31 (-.12)		3.38 (1.26)	-2.57 (-.75)	-13.44 (-1.22)	-1.02 (-.09)	3.52 (.68)	-19.45 (-1.61)	2.69 (.37)	1.82 (.56)	1.76 (.36)	-4.47 (-.56)	9.94** (2.75)	-9.85 (-1.3)
Wood Processing	-3.69 (-1.45)	-3.38 (-1.26)		-5.95* (-1.69)	-16.82 (-1.56)	-4.40 (-.38)	.14 (.03)	-22.84* (-1.92)	-.69 (-.10)	-1.56 (-.60)	-1.62 (-.39)	-7.85 (-1.05)	6.56** (1.99)	-13.2* (-1.9)
Chemicals, Plastics	2.26 (.59)	2.57 (.75)	5.95* (1.69)		-10.87 (-1.01)	1.55 (.13)	6.09 (1.22)	-16.88 (-1.40)	5.26 (.71)	4.39 (1.21)	4.33 (.85)	-1.90 (-.24)	12.5** (2.93)	-7.28 (-.93)
Mineral Processing	13.13 (1.2)	13.44 (1.22)	16.82 (1.56)	10.87 (1.01)		12.42 (.81)	16.96 (1.51)	-6.01 (-.39)	16.13 (1.42)	15.3 (1.36)	15.2 (1.41)	8.97 (.70)	23.4** (2.03)	3.59 (.30)
Metal Fabrication	.71 (.06)	1.02 (.09)	4.40 (.38)	-1.55 (-.13)	-12.42 (-.81)		4.54 (.39)	-18.44 (-1.16)	3.71 (.32)	2.84 (.24)	2.78 (.24)	-3.45 (-.27)	10.96 (.95)	-8.83 (-.69)
Misc. Manufac-turing	-3.83 (-.80)	-3.52 (-.68)	-.14 (-.03)	-6.09 (-1.22)	-16.96 (-1.51)	-4.54 (-.39)		-22.98* (-1.90)	-.83 (-.11)	-1.70 (-.38)	-1.76 (-.36)	-7.99 (-1.03)	6.41 (1.35)	-13.4* (1.8)
Construc-tion	19.14* (1.65)	19.45 (1.61)	22.84* (1.92)	16.88 (1.40)	6.01 (.39)	18.44 (1.16)	22.98* (1.90)		22.14* (1.71)	21.3* (1.79)	21.22* (1.76)	14.99 (1.12)	29.4** (2.48)	9.61 (.75)
Wholesale Trade	-3.01 (-.45)	-2.69 (-.37)	.69 (.10)	-5.26 (-.71)	-16.13 (-1.42)	-3.71 (-.32)	.83 (.11)	-22.15* (-1.71)		-.87 (-.14)	-.93 (-.14)	-7.16 (-.78)	7.24 (1.07)	-12.54 (-1.5)
Retail Trade	-2.13 (-.90)	-1.82 (-.56)	1.56 (.60)	-4.39 (-1.21)	-15.3 (-1.36)	-2.84 (-.24)	1.7 (.38)	-21.3* (-1.79)	.87 (.14)		-.06 (-.02)	-6.29 (-.86)	8.12** (2.87)	-11.7* (-1.8)
Hotel, RestaurantsBars	-2.07 (-.52)	-1.76 (-.36)	1.62 (.39)	-4.33 (-.85)	-15.2 (-1.41)	-2.78 (-.24)	1.76 (.36)	-21.22* (-1.76)	.93 (.14)	.06 (.02)		-6.23 (-.83)	8.18* (1.86)	-11.6* (-1.7)
Trans-portation	4.16 (.55)	4.47 (.56)	7.85 (1.05)	1.90 (.24)	-8.97 (-.70)	3.45 (.27)	7.99 (1.03)	-14.99 (-1.12)	7.16 (.78)	6.29 (.86)	6.23 (.83)		14.41* (1.86)	-5.38 (-.60)
Real Estate	-10.25** (-3.38)	-9.94** (-2.75)	-6.56** (-1.99)	-12.5** (-2.93)	-23.4** (-2.03)	-10.96 (-.95)	-6.41 (-1.35)	-29.4** (-2.48)	-7.24 (-1.07)	-8.12** (2.87)	-8.18* (-1.86)	-14.41* (-1.86)		-19.8** (-2.92)
Services	9.53 (1.46)	9.85 (1.30)	13.2* (1.9)	7.28 (.93)	-3.59 (-.30)	8.83 (.69)	13.4* (1.8)	-9.61 (-.75)	12.54 (1.51)	11.7* (1.81)	11.6* (1.73)	5.38 (.60)	19.8** (2.92)	

APPENDIX TABLE D

The Influence of Sector on Growth	
Variable	**Coefficient and T-Statistic**
CONSTANT	36.931 ** (5.716)
FIRM AGE AND SIZE	
Firm Age	-1.734 ** (-3.524)
Size	-4.274 * (-1.742)
(Firm Age)(Size)	.122 (.366)
$(\text{Firm Age})^2$	.028 ** (2.341)
$(\text{Size})^2$	.123 (1.384)
$(\text{Firm Age})^2(\text{Size})$	-.003 (-.329)
$(\text{Firm Age})(\text{Size})^2$	-.010 (-.764)
$(\text{Firm Age})^2(\text{Size})^2$	.0003 (.756)
SECTORAL DUMMIES	
Manufacturing	1.667 (.695)
Construction	21.160 * (1.794)
BASE CATEGORY: Trade	*
Transportation	6.332 (.884)
Real Estate	-8.285 ** (-2.916)
Services	11.822 * (1.854)
LOCATIONAL DUMMIES	
Commercial District	13.236 ** (4.830)
Traditional Market	9.316 ** (3.133)
Non-Fixed Locations	3.561 (1.415)

The Influence of Sector on Growth	
Variable	**Coefficient and T-Statistic**
BASE CATEGORY: Home-Based Enterprises	•
Other Locations	33.848 ** (2.989)
Dummy for MSEs in Swaziland	-15.889 ** (-4.461)
BASE CATEGORY: MSEs in South Africa	•
Dummy for MSEs in Lesotho	-18.192 ** (-4.712)
Dummy for MSEs in Botswana	-12.034 ** (-2.865)
Dummy for MSEs in Zimbabwe	-14.518 ** (-3.345)
Urban Areas	6.595 ** (2.905)
HUMAN CAPITAL VARIABLES	
Dummy for Ownership of Multiple MSEs	.899 (.396)
Dummy for Training	8.841 ** (2.927)
SOCIO-ECONOMIC VARIABLES	
Dummy for Female Proprietorship	-9.876 ** (-4.421)
REGRESSION STATISTICS	
Sample Size	1814
R-Square	.118
F-Statistic	9.57

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