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THE ROLE OF GRANTS IN HELPING EMERGING SOUTH AFRICAN FARMERS TO ACCESS AGRICULTURAL MARKETS

by

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A minor dissertation submitted in partial fulfilment for the Degree of
Master of Commerce in
Development Economics

at the
College of Business and Economics
UNIVERSITY OF JOHANNESBURG

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2018
DECLARATION

I certify that the minor dissertation submitted by me for the degree Master of Commerce in Development Economics at the University of Johannesburg is my independent work and has not been submitted by me for a degree at another university.

NATALIA KOPYLOVA
The base of the minor dissertation named “The role of grants in helping emerging South African farmers to access agricultural markets” is a National Income Dynamics Survey of South Africa. This research paper has been written to fulfil the graduation requirements of the Development Economics Masters Programme at the University of Johannesburg. I have worked on this mini-dissertation from January 2015 to May 2018.

The idea of investigating emerging farmers came from my undergraduate studies undertaken at the State Agrarian University of North Transurals in Russia. I was curious to explore the agricultural sector and the government’s assistance towards emerging farmers in South Africa. The research was difficult due to the lack of available information on this group of farmers and my lack of knowledge about South Africa in general. I started doing my masters when I had just moved to South Africa, so the coursework and extensive investigation on the thesis topic helped me beyond academic activities.

I am very grateful for all the help that Prof Greyling and Dr Amusa provided me by answering my queries and supplying me with detailed comments and suggestions. Their experience in the field and professionalism is something I admire and look up to. I would like to thank both of my supervisors for their support and guidance throughout these three years.

My parents and my husband deserve a special word: without you I would not have finished this journey. Thank you for always keeping me motivated. This thesis is dedicated to you, Tatiana and Alexander Kopylov and Michail Michaelides.
ABSTRACT
The aim of this minor dissertation is to explore the nature of the relationship between social grants and the commercialisation of emerging farmers in South Africa. The use of social grants is not subject to any conditions, though they are intended to support the basic needs of the recipients. These basic needs include food security, which is a function of agricultural production. Therefore, social grants can be utilised to meet both the basic needs of households and assist emerging farmers to increase their production and market access. There are more than 17 million — approximately one third of the population — of vulnerable people in South Africa who receive social grants, which makes it the type of cash transfer that is ideal for investigating the unintended benefits.

The literature on the proposed topic is extremely sparse, especially in South Africa. The only other study found, analysed a single province in South Africa and made use of cross-sectional data, with a questionable dependent variable (the proportion of cultivated land area as a proxy for market commercialisation). Other studies investigated the relationship between other cash transfers or access to credit and market commercialisation or the welfare of farmers. The estimation methods are mostly limited to Probit, Logit or Tobit models and rarely used the double-hurdle models. These gaps are addressed in the current study. The double-hurdle model
was estimated on the 3-wave panel data\(^1\) covering the period from 2011 to 2015, taken from the “National Income Dynamics Study” survey for the whole of South Africa. The post-estimation analysis included the computation of the average partial effects to determine the magnitude of these effects. It was found that social grants have a positive, but not significant, effect on the commercialisation of emerging farmers. Social grants, although addressing the basic needs of the vulnerable, do not necessarily increase market commercialisation and might be a disincentive for emerging farmers to become commercialised. Therefore, to address poverty and food insecurity related to emerging farmers, there is a need for cash transfer, support and skills development to directly address the shortfalls. Other factors found to significantly affect the market commercialisation of emerging farmers are: education, marriage, farm size, land ownership and cell phone and vehicle ownership and should be considered in any future policy development. It is recommended that the government creates incentives for the youth to remain on their farmland and contribute to food production in order to address the food insecurity by promoting agricultural qualifications. Furthermore, courses or workshops could be organised to train these farmers and supply them with knowledge, enabling them to farm more efficiently.

\textit{JEL Classifications: C23, C24, H81, Q12, Q13}

\textit{Key words: Double-hurdle model, Commercialisation, Emerging farmers}

\(^1\) The 3 waves cover the period of 2010 – 2014. We excluded wave 1 (2008) because the independent variable “Farm size” does not have observations in the 1\(^{st}\) wave and is important from an economic perspective.
# TABLE OF CONTENTS

DECLARATION ............................................................................................................. ii
PREFACE and ACKNOWLEDGEMENTS ..................................................................... iii
ABSTRACT .................................................................................................................... iv
LIST OF TABLES .......................................................................................................... viii
LIST OF FIGURES ....................................................................................................... ix
LIST OF ACRONYMS / ABBREVIATIONS ................................................................. x

CHAPTER 1 .................................................................................................................. 1
1.1. Background to the research ................................................................................. 1
1.2. Research problem and research question ......................................................... 3
1.3. Contribution ........................................................................................................ 4
1.4. Significance of the study ..................................................................................... 5
1.5. Organisation of the dissertation ......................................................................... 6

CHAPTER 2 .................................................................................................................. 7
2.1. Introduction .......................................................................................................... 7
2.2. Approaches, definitions and statistics on South African emerging farmers ....... 7
   2.2.1. Approaches used to define emerging farmers ........................................... 7
   2.2.2. Terminology and definitions .................................................................... 8
   2.2.3. Statistics on emerging farmers ................................................................. 9
2.3. Agricultural commercialisation and its determinants ....................................... 10
   2.3.1. Definition .................................................................................................. 10
   2.3.2. The need for market participation ............................................................ 11
   2.3.3. Factors affecting market participation ..................................................... 13
       Physical constraints ......................................................................................... 14
       Human resources ............................................................................................. 15
       Financial resources ........................................................................................ 16
       Other barriers .................................................................................................. 17
2.4. Programmes supporting emerging farmers ....................................................... 18
   2.4.1. A brief historical overview of government support towards the agricultural sector .................................................. 19
   2.4.2. Non-financial support programmes towards emerging farmers .......... 19
   2.4.3. Financial support programmes ................................................................. 21
2.5. South African social assistance ......................................................................... 23
   2.5.1. Cash transfers ........................................................................................... 23
       Social grants .................................................................................................... 24
2.6. Conclusion .......................................................................................................... 26

CHAPTER 3 .................................................................................................................. 27
3.1. Introduction ........................................................................................................ 27
CHAPTER 4

4.1. Introduction..................................................................................................................35
4.2. Data and selection of variables ....................................................................................35
4.3. Model specification and estimation techniques ..........................................................40
   4.3.1. Model specification ...............................................................................................40
   4.3.2. Estimation techniques ..........................................................................................41
   4.3.3. Diagnostic tests ......................................................................................................45
      Test for sample selection bias ....................................................................................45
      Test for endogeneity ....................................................................................................45
      Test for heteroscedasticity .........................................................................................46
      Test for serial autocorrelation ...................................................................................46
      Model specification test ............................................................................................46
4.4. Conclusion ...................................................................................................................46

CHAPTER 5 ............................................................................................................................48

5.1. Introduction ...................................................................................................................48
5.2. Diagnostic tests ..........................................................................................................48
   Choice between the Tobit and double-hurdle models ....................................................48
   The selection bias problem .........................................................................................48
   Test for endogeneity ......................................................................................................49
   Test for heteroscedasticity ............................................................................................49
   Test for serial autocorrelation ....................................................................................49
   Test for multicollinearity ..............................................................................................50
   Model specification test .............................................................................................51
5.3. Descriptive statistics ..................................................................................................51
5.4. Estimation results .......................................................................................................53
5.5. Conclusion ...................................................................................................................61

CHAPTER 6 ............................................................................................................................62

References ...........................................................................................................................66

APPENDIX A ........................................................................................................................74
LIST OF TABLES

2.1. Factors affecting agricultural commercialisation........................................ 14

2.2. Agriculture, rural development and land reform, 2015/16-2018/19............... 23

2.3. Number of social grants by social type (in thousands) .............................. 26

4.1. Description of the variables used in the regression model......................... 37

5.1. The likelihood ratio test of independent equations......................................... 50

5.2. White’s general test for heteroscedasticity.................................................. 50

5.3. Wooldridge test for serial autocorrelation.................................................. 51

5.4. VIF test for multicollinearity...................................................................... 51

5.5. Model specification test.............................................................................. 52

5.6. Descriptive statistics................................................................................. 53

5.7. Double-hurdle regression results............................................................... 55

5.8. Probability of commercialisation decision and commercialisation intensity..... 56

5.9. Average partial effects of the double-hurdle model..................................... 57
LIST OF FIGURES

2.1. Government expenditure on extension and farmer support………………………… 21

3.1. Household demand after the introduction of cash transfers………………………… 30

3.2. Economic model of the farm household………………………………………………… 31
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>APE</td>
<td>Average partial effects</td>
</tr>
<tr>
<td>CASP</td>
<td>Comprehensive Agricultural Support Programme</td>
</tr>
<tr>
<td>CCI</td>
<td>Household Crop Commercialisation Index</td>
</tr>
<tr>
<td>COCI</td>
<td>Household Crop-Output Commercialisation Index</td>
</tr>
<tr>
<td>DAFF</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
</tr>
<tr>
<td>HCI</td>
<td>Household Commercialisation index</td>
</tr>
<tr>
<td>IMR</td>
<td>Inverse Mill’s Ratio</td>
</tr>
<tr>
<td>LRAD</td>
<td>Land Redistribution for Agricultural Development</td>
</tr>
<tr>
<td>NIDS</td>
<td>National Income Dynamics Study</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RSA</td>
<td>Republic of South Africa</td>
</tr>
<tr>
<td>SASSA</td>
<td>South African Social Security Agency</td>
</tr>
<tr>
<td>StatsSA</td>
<td>Statistics South Africa</td>
</tr>
<tr>
<td>VIF test</td>
<td>Variance Inflation Factor test</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1. Background to the research

Food security and poverty alleviation are high on the agenda of the South African development policies and programmes. Sulla and Zikhali (2018) claim that, since 2006, there were notable gains in poverty reduction from over 50% in 2006 to 40% in 2015 considering the lower bound poverty line. Although the statistics show a decrease in the poverty levels and improvements in the food security, the problem is still pertinent. The number of vulnerable people who do not meet the minimum sufficient caloric intake\(^2\) for good health has decreased from 2002 to 2012, reaching 13.1% of the population. However, since then, the number has increased again to 13.4% in 2016 (Statistics South Africa, 2011; StatsSA, 2017a; StatsSA, 2017b). The average amount of undernourished people for the period of 2014-2016 was 2.5 million (Food and Agriculture Organization of the United Nations, 2017). This lack of food has severe consequences for health and the development for especially children, but also adults (StatsSA, 2016).

Many people in South Africa fulfil their food needs with subsistence farming. These farmers are described as *subsistence or emerging* farmers\(^3\) (there is no standard definition or classification of the term; see a detailed discussion in Chapter 2, section 2.2). Moreover, they focus on home agricultural production to gain extra income. A number of these emerging farmers receive cash transfers\(^4\) in support of their production, for instance: (i) the Ilima/Letsema project’s grant spent R491.4 million in 2016-2017 to support 145,000 subsistence and smallholder farmers (National Treasury, 2016b), (ii) the Comprehensive Agricultural Support Programme (CASP) spent approximately R20 million in 2016-2017 (National Treasury, 2016b), and (iii) there are targeted initiatives by the Department of Agriculture, Forestry and Fisheries, South Africa. Apart from these support strategies, many of the farmers and farming households also receive social grants. South Africa has one of the

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\(^2\) The minimum sufficient caloric intake is 2,100 kilocalories per person per day (National Treasury, 2007).

\(^3\) In this minor dissertation we accept the following definition of an emerging farmer: an emerging farmer is a previously disadvantaged African farmer that may have been involved in full-time or part-time agricultural production, the farmer might lack various resources and is limited in market participation (Gumede, 2000; Department of Trade and Industry, 1996; Kirsten & van Zyl, 1998; Snijman, Van Rensburg & Van Rensburg, 2009; Department of Agriculture, Forestry and Fisheries, 2013; Ramdeen, 2014).

\(^4\) Cash transfers are direct payments, usually provided by the government, that help poor households raise their incomes (Arnold, Conway & Greenslade, 2011).
largest social grant schemes in the world (Lewis, McCosh & Nxele, 2011) with an estimated 17 million of the total population of 55.9 million receiving social grants (Kelly, 2017). These social grants complement the programmes mentioned above to increase the income of emerging farmers.

Even though the social protection support is not directly intended to support farmers’ commercialisation (Prifti, Davis, Handa & Seidenfeld, 2016), it is an unconditional cash transfer, implying that it can be used in any way to meet the basic needs of the household, including supporting higher levels of production by emerging farmers and increasing emerging farmers’ market participation (Von Fintel & Pienaar, 2015).

In theory, a higher income – social grants inflow – will increase a household’s consumption and savings. Social grants supplement the farm with off-farm income which has an indirect effect on the farm production (Moloi, 2008). Social grants also act as a buffer against shocks and risks by increasing the farm’s liquidity (Prifti et al., 2016). The extra income may be used to diminish transaction costs as well as entry barriers to the market, e.g. transport costs, purchasing of inputs and a reduction of a financial deficit, among others. Since social grants contribute significantly to the farmers’ incomes, reducing the financial barrier, it is important to investigate whether these grants influence the farmers’ decision to sell their goods on the market.

The literature on the relationship between social grants and commercialisation is sparse. To the best of our knowledge there are only two papers, one in Zambia (Prifti et al., 2016) and the other in South Africa with the focus on KwaZulu-Natal (Sinyolo, 2016). Prifti et al. (2016) found that social grants positively contribute to the market participation decision but Sinyolo (2016) found the opposite outcome – those farmers who received social grants sold less maize.

Other research papers mainly focused on the relationship between cash transfers and agricultural activities and not specifically on market participation. In the studies of Tshuma (2014) and Kane-Berman (2016), both concluded that when a household receives social grants, their agricultural activities decline. Contrary to this, Lewis et al. (2011), Yi, Lu and Zhou (2016) and Handa, Angeles, Abdoulayi, Mvula and Tsoka (2016) showed that cash transfers positively affect the agricultural activities of emerging farmers by increasing income, asset accumulation, reducing transaction costs and making the household generally more commerce-orientated.
Another strand of studies investigated how credit can impact commercialisation. In general, it was found that access to credit positively affects market access (Manafi, Bagheri & Sharghi, 2011; Bolarinwa & Fakoya, 2011; Mmbengwa, Gundidza, Groenewald & Van Schalkwyk, 2009; Thamaga-Chitja & Hendriks, 2008; Ramabulana, 2011; Martey, Al-Hassan & Kuwornu, 2012; Muricho, 2015).

An additional limitation of many of the studies was that they only focused on crop-specific estimations and not on farmers’ entire produce. For instance, Sinyolo (2016) and Martey et al. (2012) focused on maize; Justus, Knerr, Owuor and Ouma (2015) concentrated on banana and legumes producers; Chapoto, Haggblade, Hichaambwa, Kabwe, Longabaugh, Sitko and Tschirley (2013) focused on maize, cotton and horticulture.

In addressing the research questions, a number of studies used qualitative approaches (Tshuma, 2014; Kane-Berman, 2016; Bezu & Holden, 2008; Louw, Jordaan, Ndanga & Kirsten, 2008), which might be hindered by subjectivism, thus not depicting accurate results. Those that did use quantitative analysis often used cross-sectional data, which limits the robustness of such as Sinyolo (2016); Osmani and Hossain (2015); Kabiti, Raidimi, Pfumayaramba and Chauke (2016) and Martey et al. (2012). There were only a few studies that were pursuing panel data (Prifti et al., 2016; Muricho, 2015).

The above-mentioned papers mostly used estimation techniques other than the double-hurdle model, which is the most appropriate in the estimation of farmers’ decisions to commercialise, such as Logit, Tobit, Probit with Maximum Likelihood Estimation (MLE), fixed-effects or random-effects approaches (Randela, Alemu & Groenewald, 2008; Gebremedhin & Jaleta, 2010; Martey et al., 2012; Osmani & Hossain, 2015; Justus et al., 2015). Sinyolo (2016), Prifti et al. (2016), Martey et al. (2012), on the other hand used methods more applicable to address the research question at hand, such as the Heckman sample selection models and double-hurdle models.

1.2. Research problem and research question

Due to the lack of food security in South Africa and emerging farmers’ vulnerable financial situation, it is clear that commercialisation can help in the reduction of poverty and food insecurity. Ahmed (2017) found a positive relationship between commercialisation and household welfare, while Justus et al. (2015) showed a positive relationship to diet diversity.
Muricho (2015) concluded that agricultural commercialisation may work as a method to reduce rural poverty among smallholder farmers.

As was stated above, social grants play a vital role in improving peoples’ lives. Therefore, if a social welfare payment has the unintended benefit of encouraging the market commercialisation of emerging farmers it implies; (i) that farmers can develop from being subsistence farmers to commercialised farmers and (ii) it relieves the government from introducing additional support.

The research question that follows is: do social grants contribute to the commercialisation of emerging farmers in South Africa?

The main objective of this study is to provide a more complete understanding of the nature and possibility of the contribution of social grants towards the commercialisation of emerging farmers in South Africa. To achieve this, the study specifically focuses on the following:

- To develop an understanding of the market participation constraints.
- To find critical factors that influence emerging farmers’ commercialisation.
- To determine the relationship between market access and social grants.

To address these objectives, we use the panel dataset from the National Income Dynamics Study (NIDS) – national survey on South Africa. To analyse the data, we use a double-hurdle model which includes two steps that were run simultaneously. The post-estimation analysis of the double-hurdle model includes: a calculation of the probability of the emerging farmer participating or not participating in the market, and the computation of the average partial effects (APE) to determine the magnitude of these effects.

1.3. Contribution

Considering the reviewed literature and the gaps identified in these studies, the contribution of this minor dissertation is as follows.

Firstly, it investigates the relationship between market commercialisation and social grants. The only other two studies that have investigated this relationship was one in Zambia (Prifti et al., 2016) and the other in South Africa, which only focused on one province (Sinyolo, 2016).

Secondly, other studies did investigate the relationship between credit (Mathenge, Place, Olwande & Mithoefer, 2010; Muricho, 2015; Randela et al., 2008; Amrouk, Poole, Mudungwe & Muzvondiwa, 2013) or specific cash transfers and market activities or market
commercialisation (Von Fintel & Pienaar, 2015; Sadoulet, De Janvry & Davis, 2001), but did not specifically investigate the relationship between social grants and market allocation.

Thirdly, a number of studies use qualitative approaches (Tshuma, 2014; Kane-Berman, 2016; Bezu & Holden, 2008; Louw et al., 2008) and those that do use quantitative analysis make use of Probit (Osmani & Hossain, 2015; Justus et al., 2015), Logit (Randela et al., 2008) and Tobit (Gebremedhin & Jaleta, 2010) models, whereas the most efficient model to estimate market participation is the double-hurdle model used in this minor dissertation.

Fourthly, we focus on all the crop and livestock produce instead of only a single crop (Sinyolo, 2016; Martey et al., 2012; Justus et al., 2015; Chapoto et al., 2013).

Lastly, this minor dissertation will be using 3-year panel data and other mostly used cross-sectional data (Sinyolo, 2016; Osmani & Hossain, 2015; Kabiti et al., 2016; Martey et al., 2012). The main advantage of using the panel data is that it controls for unobserved heterogeneity (Gujarati & Porter, 2009).

1.4. Significance of the study
The findings of this study will contribute to society and the economy of South Africa in general, considering that agriculture plays an important role in food security and the reduction of poverty. Currently, emerging farmers still live below the poverty line and face difficulties that influence market participation. Also, it can change the way the government and financial institutions provide and formulate their financing to emerging farmers.

Social grants can have a significant positive impact on farmers’ commercialisation. A finding of this nature will indicate that social grants can also have additional beneficial consequences by contributing towards the commercialisation of emerging farmers. Furthermore, due to the vast amount of social grants recipients, it can imply that a considerable number of emerging farmers, who are not covered by the agricultural support network (only 145,000 subsistence and smallholder farmers receive agricultural grants per year) will benefit from these social grants.

These social grants can increase the ability to access the market. The increase in the number of emerging farmers that take part in the market will increase the demand for goods and also increase the competition in the agricultural sector, which could result in lower prices and may even improve exports (Meijerink & Roza, 2007). Thus, this indirect contribution of social grants can significantly influence the current agricultural market situation.
Contrary to this, social grants can have a significant or not significant negative impact on farmers’ commercialisation. This means that there is a negative or non-existent relationship between the two variables. In this case, if market access is one of the aims of the government, social grants will not be a contributing factor. One of the solutions could be to increase the number of agricultural grants.

Increased attention on emerging farmers can improve their standard of living, which will lead to food security and a reduction of poverty in the rural areas. Furthermore, if emerging farms can grow in size, their profits will also increase, eventually resulting in these farmers paying more taxes. The emerging farmer will have more money, which they could invest locally by hiring more locals, thus increasing the employment rate (Meijerink & Roza, 2007).

1.5. Organisation of the dissertation

The structure of this minor dissertation is as follows: Chapter 2 provides background information on emerging farmers, commercialisation and social grants in South Africa. Chapter 3 provides the theoretical framework and empirical reviews on emerging farmers, social grants and commercialisation. Chapter 4 provides the methodology used in this minor dissertation and the data description. Chapter 5 presents the empirical findings of this minor dissertation. Chapter 6 concludes the study, summarising the key findings and providing some policy implications.
CHAPTER 2

BACKGROUND

2.1. Introduction

In this chapter we outline the different approaches used to define emerging farmers and the terminology used, while referring to the uncertainties around the statistics on emerging farmers. Furthermore, we define agricultural commercialisation and discuss its measurements. The importance of commercialisation and its effects on poverty and inequality receive attention, as well as the reasons for emerging farmers experiencing difficulties to commercialise. Finally, we describe the support received by emerging farmers, including a discussion on social grants.

2.2. Approaches, definitions and statistics on South African emerging farmers

In this section we explore a theoretical background of emerging farmers. Emerging farmers are a new group that is not well-researched, leaving room for various definitions and characteristics. This section lists all of the concepts that authors have used in their work.

2.2.1. Approaches used to define emerging farmers

The approaches to define the concept “emerging farmers” have been diverse – authors have based the definitions on various characteristics related to emerging farmers, such as land size, turnover, the number of employees and the kind of production.

Historically, the regulations that were implemented in South Africa divided the agricultural sector into two groups: white commercial farmers on the one hand and African farmers based in the homeland areas on the other (Kirsten & van Zyl, 1998; Williams, Mayson, De Satgé, Epstein & Semwayo, 2008). This historical separation laid the foundation to split farmers between commercialised and subsistence-orientated farmers.

Another method followed, attempting to distinguish between groups of farmers, and was based on the number of people they employed: medium (the maximum number of employees is 100), small (not more than 50 employees), very small (not more than 10 employees) and micro (fewer than 5 employees) (Department of Trade and Industry, 1996).

Some researchers define small-scale farmers in terms of their agricultural production: field crops, horticulture and livestock (Liebenberg, 2015). Moreover, the production goods vary depending on the kind of crop or animal produce.
Some researchers use capital assets as a reference category and other researchers use the size of the farm as the reference category for the definition. Tshuma (2014) questioned the classification of farmers by their land size, because different crops or animals need land areas of various sizes for production. The general definition is that emerging farmers cultivate one hectare of land, whereas Sitko and Jayne (2012) describe emerging farmers as farmers with 10 to 200 hectares of land. Webster (2002) states that a smallholder farmer is an African farmer who has between 0.05 and 5 hectares of land and sells his agricultural produce for less than 10% of his household income.

In this minor dissertation, seeing that there is no standard approach to determine who emerging farmers are, we assume the following: emerging farmers are farmers in the subsistence-orientated category with no limitations on the land size or the kinds of agricultural produce.

2.2.2. Terminology and definitions

The terminology used to refer to emerging farmers varies from author to author: some use the term “smallholder farmers” (Magingxla & Kamara, 2003; Hagos & Geta, 2016; Arias, Hallam, Krivosnos & Morrison, 2013; Chapoto et al., 2013; Ncube, 2014; Barham & Chetimi, 2009; Osmani & Hossain, 2015; Barrett, 2008), others “small-scale farmers” (Tshuma, 2014; Louw et al., 2008; Randela et al., 2008; Afolabi, 2010; Hooper, 2004; Webster, 2002), others “subsistence farmers” (Aliber & Hart, 2010; Saqib, Kuwornu, Ahmad & Panezai, 2018; Baiphethi & Jacobs, 2009) and yet others “emerging farmers” (Senyolo, 2007; Khapayi & Celliers, 2016; Sitko & Jayne, 2012; Denison, Field, van Averbeke, Mayson, Mutamba, Masika & Wotshela, 2009; Senyolo, Chaminuka, Makhura & Belete, 2009).

The differentiation between “smallholder” and “emerging” farmers is challenging. Most of the authors use the above-mentioned terminology interchangeably. For example, Chikazunga and Paradza (2012) state that the terms “smallholder farmers”, “communal farmers” and “emerging farmers” are synonymous. Kane-Berman (2016) uses the terms “smallholder” and “small-scale” farmers. Hagos and Geta (2016) found that the term “small-scale” farmers is used as a synonym for “smallholder”, “subsistence”, “resource-poor” or “low-input” farmers. Some authors use the terms “emerging farmer” and “emerging agribusiness” interchangeably with the term “African farmer”. Mabaya, Tihanyi, Karaan and van Rooyen (2011) stated that some African farmers prefer to be called “developing African farmers”.

According to Lebone (2012), emerging farmers are those that benefit from Agricultural Broad-Based Black Economic Empowerment (AgriBEE), the Land Redistribution for Agricultural
Development (LRAD) and CASP, meaning that the farmers are called “emerging” only because they are sponsored by the government. Whitbread (2010) on the other hand, defined the term “emerging” as moving from subsistence to commercial farming. Senyolo (2007) combined the last two to “emerging farmer” being a farmer who wants to successfully produce and sell goods (agricultural market participant) and needs an external supporter to battle socio-economic constraints.

Crosby, Armour and Boshoff (2017) stated that there is no exact description of who fits into the “smallholder” or “small-scale” farmer bracket. The term “small-scale” usually refers to the total number of farmers or households engaged in any agricultural production. Von Fintel and Pienaar (2015) stated that a “small-scale” farmer is a poor African farmer who does not own the land, but farms in the very small communal area. Chikazunga and Paradza (2012) focused their definition on the fact that a “smallholder farmer” is a disadvantaged farmer who lacked attention due to the racial lines during the Apartheid era as well as the current market forces.

Crosby et al. (2017) said that small-scale farmers can be divided into two categories: “emerging” farmers who sell their produce and “smallholder” farmers who produce for their own consumption. Similarly, Hagos and Geta (2016) gave gradation to the term “small-scale” farmers: non-commercial (subsistence) farmers (farmers who produce mainly for self-consumption, but may also sell their goods. Thus, farming is not their main source of income) and commercialised farmers who (better integrated with the market) specialise in high value cash crops.

In this minor dissertation we assume that there is very little difference between all of these terms. Thus, we can summarise the definition of an emerging farmer as a previously disadvantaged African farmer who may have been involved in full-time or part-time agricultural production, might lack various resources and is limited in market participation (Gumede, 2000; Department of Trade and Industry, 1996; Kirsten & van Zyl, 1998; Snijman et al., 2009; DAFF, 2013; Ramdeen, 2014; Senyolo et al., 2009).

### 2.2.3. Statistics on emerging farmers

The statistics regarding emerging farmers vary because there is no strict definition given by the government. The number of subsistence farmers vary between 1.3 and 2.8 million. Kane-Berman (2016) investigated different sources and found that the National Development Plan (NDP) states that there were 440,000 households in 2012; the University of the Western Cape showed 200,000 smallholders; Agri SA indicated 120,000 emerging farmers in 2010; Standard
Bank presented a figure of 50,000 developing farmers and a confidential Agricultural Policy Plan disclosed 164,000 smallholder farmers.

Variations in numbers could be due to some farmers being assigned to the incorrect category. For instance, some African emerging farmers with an annual turnover of R1.5 million should be considered as commercial, but were declared to be “emerging”. Furthermore, many smallholders produce agricultural goods for their own consumption, meaning that they do not consider themselves to be farmers. Since some of them do not produce for the marketplace, there is a lack of statistical records about the volume and value of the production, resulting in a deficiency of information in the literature (Williams et al., 2008).

Unfortunately, there are no (available) nationally based surveys on emerging farmers (Mahadea & Pillay, 2008) and there are hardly any records in both Statistics South Africa and the Department of Agriculture, Forestry and Fisheries (DAFF) reports about emerging or smallholder agriculture (Khapayi & Celliers, 2016).

2.3. Agricultural commercialisation and its determinants

In this section we discuss the definition of commercialisation, its measurements and its indexes. Then we look at why commercialisation is crucial for emerging farmers; and lastly, the reasons for emerging farmers not becoming commercialised.

2.3.1. Definition

There is a need to define the term “commercialisation” and discover its measurements. Some researchers measure commercialisation as the volume of production marketed by a farm (Okezie, Sulaiman & Nwosu, 2012; Olanrewaju, 2015; Osmani & Hossain, 2015). Others see it as a transition from self-orientated towards profit-orientated farming (Gebremedhin & Jaleta, 2010; Tirkaso, 2013; Khapayi & Celliers, 2016). Randela et al. (2008) stated that there is a two-step decision process for farmers to enter the market; firstly, the decision to join the market and secondly, deciding how much to sell. Commercialisation is the result of a farmer’s conscious decision to produce and market agricultural goods (Martey et al., 2012).

Hagos and Geta (2016) indicated three levels of market orientation: subsistence, semi-commercial and commercial. Commercialisation can be measured from zero subsistence-oriented production to 100% fully commercialised production (Hagos & Geta, 2016).

Different approaches are used to measure commercialisation:
Commercialisation of agriculture (output side) = \frac{\text{Value of agricultural sales in markets}}{\text{Agricultural production value}} \tag{2.3.1.}

Commercialisation of agriculture (input side) = \frac{\text{Value of inputs acquired from market}}{\text{Agricultural production value}} \tag{2.3.2.}

Commercialisation of rural economy = \frac{\text{Value of goods and services acquired through market transactions}}{\text{Total income}} \tag{2.3.3.}

Degree of integration into the cash economy = \frac{\text{Value of goods and services acquired by cash transactions}}{\text{Total income}} \tag{2.3.4.}

The most common measurement is through the output side of commercialisation. Each type has appropriate indices (Muricho, 2015):

- Household Commercialisation Index (HCI) – the proportion of the value of agricultural output sold in the market and purchased inputs to the total value of the agricultural production;
- Household Crop Commercialisation Index (CCI) – the ratio of gross value of all crop sales over gross value of all crop production multiplied by one hundred (Hagos & Geta, 2016).

In this minor dissertation we use the Household Commercialisation Index. The core element of all the measurements of commercialisation is sales; this generates extra income for the household. In the section 2.3.2., we are going to investigate how market participation with extra income affects a household’s welfare.

2.3.2. The need for market participation

One of the advantages of commercialisation is the development of linkages between the input and output of agricultural markets (Gebremedhin & Jaleta, 2010). The need for fertilisers and other chemicals for the production of agricultural goods create a backward linkage. The supply of raw materials to the manufacturers creates a forward linkage.

Chirwa and Mitita (2012) state that, due to the poor level of market access, households’ selling prices are limited and their input prices remain higher than optimal. Welfare gains occur, since farmers can increase their production of those goods that they are better at producing (comparative advantage) and exchange them at the market, leading to a technological change and the exchange of information from trade-based interactions – total factor productivity growth; Romer model (Barrett, 2008).
From the production side, Strasberg, Jayne, Yamano, Nyoro, Karanja and Strauss (1999) found that agricultural commercialisation had a positive and significant effect on the productivity of food crops and the use of fertilizer. On the other hand, the results of Rios, Masters and Shively (2008) showed that better market access did not significantly affect a farm’s productivity. They stated that highly productive households participate in the market regardless of constraining factors. Cadot, Dutoit and Olarreaga (2006) analysed the sample of 5,951 agricultural households in Madagascar (449 subsistence and 5,505 commercialised households) by using the Probit model. It was found that subsistence farmers had 30% lower profits than market farmers. Ceteris paribus, the shift from subsistence to commercialised farming could increase income by 36%.

Farmers’ welfare was investigated by Ahmed (2017). The Ordinary least squares (OLS) method was used to analyse 100 smallholder farmers in Bangladesh. The results showed that commercialisation has a significant and positive effect (with a 16.9% variance) on household welfare. Mitiku (2014) and Mathenge et al. (2010) came to the same conclusion by analysing 280 farmers in Ethiopia and 1,275 households in Kenya, respectively.

Kennedy and Cogill (1987) showed that the effects of commercialisation on the nutritional outcomes (calorie intake) did not show significant differences. In contrast, Justus et al. (2015) showed a positive and robust effect of commercialisation on food security with commercially orientated farmers having more diverse diets (the index ranged from 24.22 to 32.58 in terms of increasing the dietary diversity).

Participation in the agricultural markets is crucial for pro-poor growth (Van der Heijden & Vink, 2013). Olanrewaju (2015) examined the current level of commercialisation and its impact on food security of 373 farmers in Nigeria by using the Logit model. The HCI estimation indicated that 6.43% of the farmers were at a low level of commercialisation, 9.65% operated on a medium scale and 83.91% of the farmers were at a prominent level of commercialisation. In general, it was found that the higher levels of commercialisation tend to lead to a higher probability of being food secure. Chirwa and Matita (2012) found reverse causality - more food-secure households were, on average, 0.09 points more commercialised than less food-secure households.

Muricho (2015) found that the probability of a household to be food secure was about 62% for commercialised and 32% for non-commercialised households. The food security of non-commercialised households is more dependent on physical and financial assets while the food
security of commercialised households depends on social capital and transaction costs. It was, therefore, concluded that agricultural commercialisation may work as a method to reduce rural poverty among smallholder farmers.

The reviewed literature showed a positive relationship between the influence of commercialisation on poverty and food security among emerging farmers. The process of commercialisation is affected by many internal and external factors that are linked with farming (Tirkaso, 2013). The market access is not uniform, because emerging farmers have different barriers (e.g. transaction costs) with regard to commercialisation (Barrett, 2008). These factors will be discussed in section 2.3.3.

2.3.3. Factors affecting market participation

The interaction between farmers and formal or informal institutions create the environment in which farmers operate. This environment includes both “rules” and socioeconomic relationships that set a certain behavioural pattern. Mahadea and Pillay (2008) divided these factors into two categories: external environment and internal resource conditions. External constraints are infrastructure, taxes and laws and market shocks, whereas internal constraints include all farmers’ socio-economic characteristics, as well as the farm’s characteristics such as land size, availability of water and fertilisers, among others.

The factors which affect emerging farmers include: infrastructure (roads, power, electricity), structure of the market, physical access to markets (distances, costs), lack of access to capital and credit, organisational structures, absence of innovative production, lack of skills and property rights, among others (Crosby et al., 2017; Khapayi & Celliers, 2016; Louw et al., 2008; Magingxa & Kamara, 2003; Ramdeen, 2014; Denison et al., 2009; Van der Heijden & Vink, 2013; Vink & Kirsten, 2000; Abor & Quartey, 2010; Tshuma, 2014; Freeman & Silim, 2002; Saravia-Matus, Gomez-y-Paloma & Mary, 2012). In Table 2.1., we combine all these factors into groups.

It is crucial to understand the specific factors that prevent emerging farmers from becoming commercialised (Khapayi & Celliers, 2016). The above-mentioned factors may limit their economic contribution to agriculture (Webster, 2002). For instance, South African Ex-President Zuma said that from approximately 11,000 new smallholders that were created in 2009, only 5,381 were still involved in agricultural production. Only 35% of the total number of farmers had market access. It is crucial to identify the main issues stopping emerging farmers from participating in trade.
Table 2.1. Factors affecting agricultural commercialisation

<table>
<thead>
<tr>
<th>Physical</th>
<th>Financial</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure (roads)</td>
<td>Lack of capital</td>
<td>Working capital</td>
</tr>
<tr>
<td>Distance to markets</td>
<td>Transaction costs (price of goods, transport costs, market taxes)</td>
<td>Lack of education (formal, extension services, training)</td>
</tr>
<tr>
<td>Geography (location)</td>
<td>Credit</td>
<td></td>
</tr>
<tr>
<td>Land (farm size)</td>
<td>Cash-flow deficit</td>
<td></td>
</tr>
<tr>
<td>Weather (temperatures, rainfall)</td>
<td>Off-farm income</td>
<td></td>
</tr>
<tr>
<td>Water access (irrigation)</td>
<td>Price volatility</td>
<td></td>
</tr>
<tr>
<td>Soil fertility (access to pesticides)</td>
<td>Insurance</td>
<td></td>
</tr>
<tr>
<td>Transport ownership</td>
<td>Unreliable agricultural inputs</td>
<td></td>
</tr>
<tr>
<td>Mobile technologies (mobile phones, internet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>Technological</td>
<td>Product</td>
</tr>
<tr>
<td>Legal constrains</td>
<td>Labour productivity</td>
<td>Volume</td>
</tr>
<tr>
<td>Business relationships with buyers</td>
<td>Land productivity</td>
<td>Product quality</td>
</tr>
<tr>
<td>No reliable market</td>
<td>Technical efficiency</td>
<td>Seasonality of production</td>
</tr>
<tr>
<td>Union membership</td>
<td>Know-how</td>
<td>Failure to deliver</td>
</tr>
<tr>
<td>Crime</td>
<td>No market information</td>
<td>Staple crops cultivation needs</td>
</tr>
<tr>
<td>Inconsistent policies</td>
<td>Government support services</td>
<td></td>
</tr>
<tr>
<td>Culture and traditions</td>
<td>Veterinarian services</td>
<td></td>
</tr>
</tbody>
</table>

Source: Combined from Arias et al. (2013); Ferris, Robbins, Best, Seville, Buxton, Shriver and Wei (2014), Barham and Chitemi (2009)

**Physical constraints**

South Africa has 122 million ha of total land surface area but only 14 - 16 million ha is suitable for crop production. Kotze and Rose (2015) stated that only 3% of the country’s soil is truly fertile. Some regions of South Africa are only suitable for extensive livestock production (OECD 2006). The land’s condition limits the variety of agricultural goods that can be produced.

Soil degradation in South Africa was reported to be the most severe in the areas where small-scale farmers are dominant (Musvoto, Nortje, de Wet, Mahumani & Nahman, 2015). It is because smaller farmers often do not have enough financial resources to use the best quality soil fertilisers and machinery, resulting in the slow destruction of the land. If farmers do not
manage their land properly, it can damage their long-term productivity (National Treasury, 2016a).

Extreme weather conditions also influence the farmers’ success. North West, KwaZulu-Natal, Free State, Limpopo and Mpumalanga are the provinces that were most affected by the drought in 2015. The South African Weather Service data shows that 2015 and 2016 were the warmest years in the history of the country (2016 sets a new record as the hottest year globally, 2017). Due to the natural disasters, annual food inflation increased to 7% in January 2016. Higher inflation negatively affected food prices, especially crops (National Treasury, 2016a).

Drought and hail resulted in irrigation problems. Most small-scale farmers are not insured against natural disasters and the negative impacts that they carry (National Treasury, 2016b). 57% of the emerging farmers (out of 50 farmers in Eastern Cape Province, South Africa) failed to irrigate their land and did not have the appropriate equipment - hosepipes and watering cans were used to water the crops (Khapayi & Celliers, 2016).

Distance to the market appears to be another restriction. Some markets are located further from the farm, being inconvenient for emerging farmers, where this is not an issue for large agribusinesses (Khapayi & Celliers, 2016). Govere and Jayne (2003) found that a difference of 10km distance to the nearest market is associated with a 6.8% decline in the CCI. Justus et al. (2015) used a Probit model to predict the probability of the commercialisation status of 480 banana and legume farmers in the Great Lakes Region of Central Africa. They found that a decrease in distance to the market by 1 unit will improve market orientation by 1%.

Land constraints is another factor which prevents farmers’ success. Muricho (2015) found that a 1 hectare increase in farm size raises the probability of commercialising by 93% (he analysed 457 households in Kenya; two-year - 2011, 2013 - panel data; using the Probit model). Similarly, Martey et al. (2012) concluded that every additional hectare added under cultivation increases maize and cassava commercialisation by 10% (utilising the Tobit model for 250 smallholder farmers in Ghana).

**Human resources**

Recent studies show that agriculture became a non-popular discipline for young people, leading to a shortage of skilled labour. Agriculture as a subject was removed from the study programmes of most schools, or it is poorly delivered (Williams et al., 2008). A career in agriculture has a negative image in the eyes of the youth. Many people see it as the work of the poor and not something that will be profitable. It is seen as a path for older people who live in
a village with a lack of entertainment. There are people who are willing to farm passionately but, according to research, these are 40-46 years olds (Kane-Berman, 2016).

Emerging farmers are often uneducated (Mahadea & Pillay, 2008). Khapayi and Celliers (2016) used a questionnaire to perform their research by examining 50 emerging farmers in South Africa. 12% of the farmers had an education level less than 8th grade in high school and only 4% of the respondents had completed matric (none of the farmers completed tertiary education). This means that 62% of the farmers had less than a 10th grade education level. Also, 53% of the respondents did not have adequate knowledge of fertilisers.

Govereh and Jayne (2003) found that a difference of 5 years of education is associated with roughly a 9% difference in the predicted CCI (480 rural households were investigated in Zimbabwe in 1996). Justus’ et al. (2015) results showed that every additional year of education increases the possibility of commercialisation by 5% (investigated 480 bananas and legumes producers in the Great Lakes Region of Central Africa with the Probit model).

Muricho (2015) used a sample of 457 households in Kenya (two-year - 2011, 2013 - panel data) to run the Probit model which showed that a one-year increase in formal education improves the farm’s probability to be commercialised by 1%. Furthermore, Kabiti et al. (2016) used the Tobit model to estimate the data of 102 randomly selected smallholder farmers in Zimbabwe. A 1 year increase in formal education resulted in a 0.024 unit increase in the level of the crop output commercialisation index and a 1 year increase in the farming experience was found to improve the probability of output commercialisation by 0.0297 units.

Access to market information is another constraint to participation in the agricultural markets. More than 55% of the emerging farmers were uninformed about what happens within the agricultural markets – prices, products in demand or supply. Those that had information, received it from potentially unreliable sources such as their relatives, other farmers, or through self-research. This incorrect information may mislead farmers. Martey et al. (2012) attained a contradictory result: the sales of cassava were found to be less likely to be increased (8% less sales) when smallholder farmers increased their knowledge of market information (the Tobit model on 250 maize and cassava smallholder farmers in Ghana).

**Financial resources**

Since 2005 the nominal cost of intermediary agricultural inputs such as fertilisers, diesel and seeds increased by 247% (ABSA, 2015). Fuel prices highly influence the business of farming, because most of the farmers transport their goods by road (Kotze & Rose, 2015). The emerging
farmers of South Africa (the survey data of 50 farmers) spent between R3,000 to R5,000 per annum on transport costs (Khapayi & Celliers, 2016). Furthermore, most emerging farmers cannot buy chemical fertilisers because they are too expensive (Khapayi & Celliers, 2016).

Some farmers find it difficult to attain loans from banks (Mpandeli & Maponya, 2014; Oyedele & Akintola, 2012). Senyolo (2007) stated that most of the farmers do not have access to credit – only 16% of all farmers received financial support services (analysed 500 emerging farmers in South Africa). Mahadea and Pillay (2008) found that 48.1% of the 495 South African small-scale farmers lack finances. Sebopetji and Belete (2009) found that only 11.7% of 73 small-scale farmers in South Africa (Letaba Local Municipality) borrowed money, the rest of the sample lacked finances. The same problem appears in Uganda: Mpuga (2004) found that only about 5% of all households in the country receive micro-credits.

Emerging farmers are considered to be high-risk ventures, implying high administrative costs in relation to the size of the loans they receive. Akram, Sial and Ijaz (2008) by using the Logit model, found that high interest rates and the need for collateral are key factors that stop farmers from accessing credit. Some of the farmers struggle to get the required documentation (Kane-Berman, 2016).

Other barriers
The majority of the players in the agricultural markets are large commercial producers making the agricultural market an oligopoly (Denison et al., 2009). 80% of the formal retail chain is supplied by South African farmers. These suppliers include 95% of commercial agricultural companies and 5% of emerging farmers. Chikazunga (2012) believes that emerging farmers as a group are highly misrepresented in the formal market, emphasising the importance of government support towards this minority (National Treasury, 2016a).

Bigger agricultural companies squeeze smaller farmers out of the market without giving them a chance to join (Kane-Berman, 2016) – in South Africa there were cases of price fixing of basic foods such as bread and milk (Mncube, 2015). This leads to the problem of high barriers to entry. Cadot et al. (2006) analysed 5,951 agricultural households in Madagascar (449 subsistence and 5,505 commercialised households) by using the Probit model to determine that entering costs to the markets were 124-153% of subsistence farmers’ annual production.

Big firms can dictate the terms, conditions and requirements for the products that they sell (Chikazunga & Paradza, 2012). These requirements include volumes, quality, food safety systems, consistency and year-round supply (Louw et al., 2008), requirements in terms of the
usage of chemicals or restricted production by quotas that the government releases (Teka Tsegay, Rusare & Mistry, 2014). Mahadea and Pillay (2008) added that 69% of the respondents agreed that taxation was a major constraint on their business; another 71% stated that regulations and laws are a constraint (495 emerging farmers in South Africa were investigated). The inability to attain the appropriate certification and requirements stops farmers from selling their production on the formal markets; thus, driving them toward the informal markets (e.g. roadsides and farm gates) (Chikazunga & Paradza, 2012).

For example, Ncube (2014) conducted a case study on the three broiler smallholder farmers in South Africa (this study cannot be generalised, nor can it be applied to the wider population; however, it is important because it is a part of what was done on the topic in South Africa). When farmers tried to join the market, they met the following requirements: a minimum production of 90,000 birds per cycle; enormous land size; electric fencing; advanced equipment for keeping birds; bio-security and sanitary measures. These requirements were reached while experiencing a lack of finance and managerial skills. It was found that most of the farmers were selling their production to informal markets. Furthermore, only 10% of all broiler production in Gauteng is being sold in the formal markets and only 4% of these producers were smallholder farmers.

Small-scale farms do not have enough capacity to give discounts. So, larger firms enjoy their superiority by giving special offers to their customers – growing their customer base and luring both current and potential customers away from the emerging farmers. Crime is another problem that limits farmers’ success. An entrepreneur must spend a great deal of money and time to protect his business or replace and fix possessions that were stolen. Robberies and corruption add a transaction cost to the company (Teka Tsegay et al., 2014). Crime, in general, slows down the activity of the company and makes it harder to survive in the market (Mahadea & Pillay, 2008).

2.4. Programmes supporting emerging farmers
In this section we give a brief overview of the history of government support for the South African agricultural sector. Then we discuss non-financial and financial support programmes implemented to enhance market participation among emerging farmers in South Africa. Lastly, we zoom in on social grants as one of the assistance methods.
2.4.1. A brief historical overview of government support towards the agricultural sector

In the 1990s, farmer support was mainly orientated towards the white farmer, while the post-apartheid era in agriculture can be characterised as the era of reforms and new agricultural policies focused on the previously disadvantaged groups of farmers (Williams et al., 2008). Since 1994, the biggest impact on agriculture was the deregulation of the marketing of agricultural products; the abolition of certain tax concessions favouring the sector; reductions in budgetary expenditure in the sector; land reform (restitution, redistribution and tenure reform); trade reform, including the tariffication of farm commodities; and the broadening/introduction of new labour legislation (OECD, 2006).

The main result of these reforms was the elimination of the State’s control over the agricultural sector. The OECD (2006) calculated the Producer Support Estimate (PSE) for South Africa for the period 1994-2003. South Africa’s tariff levels decreased from 28% to 7.1% from 1980-2004. Since 2010, the aggregate percentage of gross farm receipts was 5% (OECD, 2016). This indicates that South Africa is one of the world’s dominant agricultural players along with Brazil, China, Russia and Australia (OECD, 2006).

As some developed countries still maintain elevated levels of support for their farmers (the European Union and United States increased their agricultural subsidies to 15%), South African farmers are often unable to compete in the domestic and foreign markets (Williams et al, 2008; Theron, Godfrey & Visser, 2007). Subsidised agricultural imports from the EU and USA are available in South Africa at a lower cost than our own produce, causing the reduction of South African farmers in the market (OECD, 2006). This competition is supposed to lead to a more efficient allocation of resources, causing inefficient firms to quit the South African market. However, the question is how emerging farmers are expected to compete in a global market, when bigger South African commercial farmers struggle to do so (Theron et al., 2007). To answer this question, we investigate policies that promote emerging farmers’ commercialisation.

2.4.2. Non-financial support programmes towards emerging farmers

There are government structures and approximately 40 non-governmental organisations focused on agriculture and rural development. Also, there are a few associations (AgriSA, the Transvaal Agricultural Union, The National African Farmers Union, the African Farmers Association of South Africa) that focus on financial and social support for African smallholder farmers at the national level.
Over the years there were several initiatives to strengthen the smallholder agricultural sector. For instance, the extension and advisory services sponsored by the DAFF increased the budget to reach 9,000 extension workers (Liebenberg, 2015). The recommended extension-to-farmer ratios are 1:400 in crop farming, 1:500 in livestock and 1:500 in mixed farming. The increase in spending in the National Extension Support Services programme (namely the Extension Recovery Plan part of CASP) showed a rise from R797.9 million in 2008-2009 to R1.3 billion in 2011-2012.

From the figure 2.1, “Government expenditure on extension and farmer support” we can see that the Land Reform expenditure is roughly the same as the expenditure on extension services by the DAFF collective, with provincial departments spending.

![Graph showing government expenditure on extension and farmer support]

Figure 2.1. Government expenditure on extension and farmer support

*Source: Liebenberg, 2015*

Another non-financial support programme is the National Small Business Act that aims to promote entrepreneurship through the creation of more flexible regulations; ease the access to finance and markets; improve infrastructure; business support and skills training (Department of Trade and Industry, 1996). Skills training is one of the main aims of the Small Enterprise Development Agency (SEDA), which is a development support programme that encourages emerging farmers to start and build successful businesses (SEDA, 2010).

The Trade Promotion and the Market Access Programme aim to increase market access to the processing of agricultural products by improving the certification process, providing training, co-ordination with international relations and trade by 2019/2020 (National Treasury, 2016b).
Furthermore, the Perishable Products Export Control Board, that was mandated by the government, ensures that perishable export is done according to the standards planned to provide training and assistance to smallholder farmers (15 workshops with a budget of R22.1 million over the medium term). The aim is to ensure greater market access and improve the profitability (sustainability as agri-businesses) of smallholder farmers (National Treasury, 2016b).

2.4.3. Financial support programmes
There is also financial assistance from both government-owned and non-government credit finance institutions (Iderawumi & Ademola, 2015). The six main sources of credit are banks (56%), the Land and Agricultural Bank (30%) (further referred to as the Land Bank), agricultural co-operatives and agribusinesses (9%), private creditors (3%) and other creditors and financial institutions (2%) (DAFF, 2015). Commercial banks are a major source of financial support to farmers.

The Land Bank (2016) implemented the Retail Emerging Markets (REM) programme, which allocated a total amount of R841 million of funding during the 2016 fiscal year (358 farmers with 254,909 hectares farmed). This programme aims to support 10,000 African farmers with low interest loans through special funding called Commercial Development Banking (CBD). Land Bank’s funding includes assistance with technical, managerial and financial skills development; support with agricultural market access; and advising on how to build an asset base or business plans (approximately 3,400 farmers got assistance in 2016). As an agricultural business develops and it progresses to its full potential, within a period of five to seven years a regime of progressive interest rate increases is applied. It is done to make it easier for the farmers to be comfortable with the interest rates of commercial banks after they transition into commercial farmers. The Department of Rural Development transfers money to subsidise interest rates payable by the Land Bank and appointed intermediaries (LandBank, 2016). The goal is to increase agricultural production and to help farmers grow. It aims to help them shift their production from being low to being on a commercial scale (National Treasury, 2016b).

The Land Bank (2016) stated that their policy increased the turnover of farms by R224 million, along with an increase in asset value of R146 million. Funding had a direct impact on employment – 2,400 jobs were created. 13 farmers implemented automated irrigation systems, solar energy systems and high yield cultivation.
According to Kane-Berman (2016), the Land Bank offers assistance to farmers who do not have good credit or a good collateral history. The requirements that the Land Bank has are water and land access, a satisfactory credit record and membership of one of the co-operatives, unions or other non-profit organisations. Most of the emerging farmers who get assistance are on communal land or land leased from the government.

Government assistance does not stop at subsidising the interest rates. Table 2.2. indicates that the National Development Plan will be increasing spending on agriculture, rural development and land reform by R29.1 billion in 2018/19 (National Treasury, 2016b).

Table 2.2. Agriculture, rural development and land reform, 2015/16-2018/19

<table>
<thead>
<tr>
<th>R million</th>
<th>2015/16 Revised estimate</th>
<th>2016/17 Medium-term estimates</th>
<th>2017/18</th>
<th>2018/19</th>
<th>Percentage of total MTEF allocation by function</th>
<th>Average annual MTEF growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, rural development and land reform</td>
<td>25 249</td>
<td>26 417</td>
<td>27 744</td>
<td>29 147</td>
<td>100.0%</td>
<td>4.9%</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land reform</td>
<td>1 177</td>
<td>1 241</td>
<td>1 397</td>
<td>1 472</td>
<td>4.9%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Agricultural land holding account</td>
<td>1 342</td>
<td>1 502</td>
<td>1 488</td>
<td>1 580</td>
<td>5.5%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Restitution</td>
<td>2 603</td>
<td>3 168</td>
<td>3 346</td>
<td>3 545</td>
<td>12.1%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Farmer support and development</td>
<td>3 420</td>
<td>3 634</td>
<td>3 875</td>
<td>4 065</td>
<td>13.9%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Total</td>
<td>25 249</td>
<td>26 417</td>
<td>27 744</td>
<td>29 147</td>
<td>100.0%</td>
<td>4.9%</td>
</tr>
</tbody>
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<th>Percentage of total MTEF allocation by function</th>
<th>Average annual MTEF growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation of employees</td>
<td>10 408</td>
<td>11 448</td>
<td>12 176</td>
<td>12 951</td>
<td>43.9%</td>
<td>7.6%</td>
</tr>
<tr>
<td>Goods and services</td>
<td>6 244</td>
<td>6 195</td>
<td>6 488</td>
<td>6 742</td>
<td>23.3%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Transfers and subsidies</td>
<td>6 325</td>
<td>6 774</td>
<td>7 449</td>
<td>7 741</td>
<td>26.4%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Buildings and other fixed structures</td>
<td>946</td>
<td>621</td>
<td>608</td>
<td>588</td>
<td>2.2%</td>
<td>-14.7%</td>
</tr>
<tr>
<td>Machinery and equipment</td>
<td>614</td>
<td>465</td>
<td>491</td>
<td>515</td>
<td>1.8%</td>
<td>-3.7%</td>
</tr>
</tbody>
</table>

Source: National Treasury, 2016b

OECD (2016) data shows that most of the budget is related to the implementation of the land reforms, general services and support of the emerging farmers. The Department of Rural Development and Land Reform will also spend R4.6 billion to acquire 1.1 million hectares of land and create 1,107 farms. Financial support and services (farming advice) are being provided to smallholder farmers by the department through conditional grants (R1.1 billion) to increase production.

The Land Redistribution for Agricultural Development (LRAD) programme aimed to help disadvantaged citizens buy land for agricultural purposes. This programme provides grants and can be served only as a contribution to the amount that the farmer already has (DAFF, 2001). Previously only poor beneficiaries could apply for the LRAD programme. However, this has
changed, the main concern being the commitment to use the land for agricultural purposes. The minimum grant of R20,000 would be given to applicants with a contribution of R5,000. Depending on the applicant’s contribution (cash or labour), grants of up to R100,000 could be arranged (Denison et al., 2009).

In 2005, CASP started supporting family farmers with grant allocations at a national level (OECD, 2006). The Micro-Agricultural Finance Scheme of South Africa (MAFISA) provided micro- and retail financial services in the rural areas. These short-term loans are managed at the provincial level and are funded by CASP.

The Comprehensive Rural Development Programme (CRDP), launched in 2009, has two sub-programmes: The Rural Infrastructure Development (RID) and The Rural Enterprise and Industrial Development (REID). Both programmes aim to provide support in the rural areas by providing funding in social rural infrastructure (sanitation, irrigation and roads) and aid in the organisation and development of rural farmers’ production (OECD, 2006). In 2016, the government budgeted R475 million for the Department of Small Business Development to support and encourage the development and growth of small businesses (National Treasury, 2016b).

In 2015, South Africa experienced the worst drought in the last two decades. The Department of Agriculture, Forestry and Fisheries allocated a fund (R1.1 billion) to support farmers in such disastrous times. The fund’s aim is to benefit smallholder farmers by transforming about 120,000 hectares of land into productive use (National Treasury, 2016b). Drought relief in 2015/2016 involved procedures such as: drilling boreholes; moving cattle herds to state farms; transporting safe drinking water to the most affected areas and the distribution of animal feed (National Treasury, 2016a).

2.5. South African social assistance

In this section we investigate social assistance provided to emerging farmers. We provide the link between cash transfers and commercialisation and we include the types and statistics of social grants in South Africa.

2.5.1. Cash transfers

Marginalised and vulnerable people can receive assistance from the government by means of a social security system (Republic of South Africa, 1997). This social protection supports the
poor through public or private initiatives. It involves targeted transfers with the goal of fulfilling their basic needs.

The most vulnerable often focus on home agricultural production to fulfil their needs for food and gain extra income. As per section 2.3.2., commercialisation also plays a dominant role in reducing poverty and food insecurity. Along with selling agricultural goods, these emerging farmers often receive cash transfers\(^5\) that aim at reducing poverty and food insecurity. Even though cash transfers are not directly intended to support farmers (Prifti et al., 2016), unconditional cash transfers do not place any limitations upon the receivers’ actions. Thus, they can be effective in increasing emerging farmers’ market participation (Von Fintel & Pienaar, 2015). A more thorough discussion of the link between cash transfers and commercialisation can be found in Chapter 3, section 3.2., “Theoretical framework”.

The three forms of social protection are: informal insurance, social insurance and social grants (Van der Berg, Siebrits & Lekezwa, 2010). Informal insurance usually refers to monetary assistance from family and friends. Social insurance on the other hand, is distributed by the state and is funded by both employees and employers.

There are two pillars within the South African social security system: 1) state funded or non-contributory - social grants; and 2) contributory social insurance, which benefits only the formally employed (Plagerson & Ulriksen, 2016). In this minor dissertation we focus on the state-funded social grants.

**Social grants**

A social grant is an income transfer sponsored by government (SASSA, 2015). Social grants are funded by the tax payers and are a targeted intervention for households with incomes less than a certain threshold. The national government agency called the South African Social Security Agency (SASSA) administers and implements social grants (RSA, 2004). It is monitored by the national Department for Social Development. The main objectives of social grants are to reduce poverty and to improve the long-term health and food security of the most vulnerable (RSA, 1997). Some studies state that social grants no longer cover their original goals. They are expected to enhance economic activity by reducing financial constraints; this allows households to spend social grant money as they choose.

In South Africa there are seven grants supporting various groups (RSA, 2004):

---

\(^5\) Cash transfers are direct payments that are usually provided by the government that help poor households raise their incomes (Arnold et al., 2011).
1. The Old Age Grant (OAG) supports people that are older than 60;
2. Child Support Grant (CSG) aids households with children under 18;
3. Disability Grant (DG) assists adults with disabilities;
4. War Veterans’ Grant (WVG) supports veterans of the Second World War or the Korean War who are older than 60;
5. Foster Care Grant (FCG) helps households with foster children;
6. Care Dependency Grant (CDG) endorses households with disabled children under 18;
7. Grant-in-Aid (GIA) is for those that have physical or mental disability.

The households receive these social grants monthly and can be eligible to qualify for more than one. Each social grant has a specific monetary amount issued per month. In Table 2.3., we combined the total amounts paid by grant type.

### Table 2.3. Number of social grants by social type (in thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OAG</td>
<td>2,679</td>
<td>2,751</td>
<td>2,873</td>
<td>2,970</td>
<td>3,087</td>
<td>3,194</td>
<td>3,302</td>
</tr>
<tr>
<td>WVG</td>
<td>0.958</td>
<td>0.753</td>
<td>0.587</td>
<td>0.429</td>
<td>0.326</td>
<td>0.245</td>
<td>0.176</td>
</tr>
<tr>
<td>DG</td>
<td>1.201</td>
<td>1.198</td>
<td>1.164</td>
<td>1.120</td>
<td>1.113</td>
<td>1.086</td>
<td>1.067</td>
</tr>
<tr>
<td>GIA</td>
<td>58</td>
<td>66</td>
<td>74</td>
<td>83</td>
<td>113</td>
<td>138</td>
<td>164</td>
</tr>
<tr>
<td>CDG</td>
<td>112</td>
<td>115</td>
<td>120</td>
<td>121</td>
<td>127</td>
<td>131</td>
<td>145</td>
</tr>
<tr>
<td>FCG</td>
<td>513</td>
<td>537</td>
<td>532</td>
<td>512</td>
<td>500</td>
<td>470</td>
<td>440</td>
</tr>
<tr>
<td>CSG</td>
<td>10,372</td>
<td>10,928</td>
<td>11,342</td>
<td>11,126</td>
<td>11,703</td>
<td>11,973</td>
<td>12,081</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14,936</strong></td>
<td><strong>15,596</strong></td>
<td><strong>16,106</strong></td>
<td><strong>15,932</strong></td>
<td><strong>16,643</strong></td>
<td><strong>16,992</strong></td>
<td><strong>17,201</strong></td>
</tr>
</tbody>
</table>

*Source: SASSA (2017)*

Table 2.3. shows that the Child Support Grant was the largest through the years. The second largest was the Old Age Grant. According to Lewis et al. (2011) South Africa has one of the largest social grant schemes in the world - an estimated 17 million of the total population of 55.9 million receive social grants (Kelly, 2017).

In this minor dissertation we investigate the relationship between social grants and the commercialisation of emerging farmers. We chose social grants because they are unconditional cash transfers that do not have conditions placed on the way emerging farmers are allowed to spend them. Therefore, we assume that this cash inflow could be used to improve market participation.
2.6. Conclusion

This chapter provided background information on emerging farmers, commercialisation and social grants. Definitions, measurements and statistical information were provided where possible. South Africa has a dualistic agricultural economy with an unknown number of emerging farmers. The statistical information in this segment is limited. Thus, a larger contribution should be made towards this area. Market access constraints were investigated. From the above-mentioned it became apparent that in South Africa there are a number of emerging farmers that are struggling to access agricultural markets, with limited support from government to encourage commercialisation. However, there is the likelihood that these farmers receive government assistance such as social grants. Therefore, there is a need to investigate if a connection exists between social grants and commercialisation.
CHAPTER 3

LITERATURE REVIEW

3.1. Introduction

In this section we first discuss the theory of the relationship between cash transfers and the commercialisation of emerging farmers, which is applicable to the current study. Next, we review the empirical literature, specific to the topic at hand. However, the literature on the association between commercialisation and social grants is very sparse. Thus, we also review literature closely related to the topic, namely the relationship between any assistance provided to farmers and commercialisation.

3.2. Theoretical framework

The economic well-being of emerging farmers depends on the resources, production and the ability of a household’s income to cover its needs. A typical farm in a developing country produces agricultural goods \((i)\) by the quantity \((q_i)\) for either its own consumption \((c_i)\) or for sale \((s_i)\) (Muricho, 2015; Prifti et al., 2016). The same goods can be bought from the market as an input \((k_i)\). Therefore, the farm constantly takes part in the input and output markets, meaning that the farmer needs to decide on whether to sell the production and for how much \((m_i - \text{market price})\). Theoretically, if there are no market failures, the farmer will maximize his profits and use generated income to maximise his utility (Muricho, 2015):

\[
\max_{q_i,c_i,k_i,m_i} U(c_i,z^c) \tag{3.2.1.}
\]

which is subject to:

\[
A + \sum_{i=1}^{n} p_i^m s_i \geq \sum_{i=1}^{n} p_i^m b_i \tag{3.2.2.}
\]

The income constraint indicates that cash transfers \((A)\) and the total value of sales should be greater than, or equal to all household purchases \((b_i)\).

\[
q_i + e_i + b_i \geq k_i + c_i + s_i \tag{3.2.3.}
\]

The resource constraint implies that agricultural goods that were produced \((q_i)\) and sold, including the total endowment of goods \((e_i)\), cannot be more than production, endowment and the purchased quantity of each of the goods.

\[
G(q_i,k_i,z^g) \tag{3.2.4.}
\]
The production technology constraint represents a production function on all inputs and outputs:

Non-negativity constraint:

\[ c_i, q_i, s_i, b_i, k_i \geq 0 \]  \hspace{1cm} (3.2.5.)

where:

\( z^c = \) Household characteristics;

\( z^q = \) Production technology characteristics.

However, in real life transaction costs must be considered. The above assumptions do not hold. Therefore, the following income constraint equation will take form (Muricho, 2015):

\[
\sum_{i=1}^{n} \left[ s_i \left( p_i^m - \delta_i \tau_i^s \right) - \delta_i \tau_i^s \right] \geq \sum_{i=1}^{n} \left[ b_i \left( p_i^m - \gamma_i \tau_i^b \right) - \gamma_i \tau_i^b \right] \]  \hspace{1cm} (2.2.6.)

where:

\( \delta_i = 1 \) if household is a seller and 0 of otherwise;

\( \gamma_i = 1 \) if household is a buyer and 0 of otherwise;

\( \tau_i^f = \) Fixed transaction costs;

\( \tau_i^p = \) Proportional transaction costs.

Cash transfers (A) have an effect both on the quantity of the marketed surplus and the decision to participate in the market (Prifti et al., 2016). An increase in income from transfers (in our case these are social grants) can have both a demand and a supply effect. Firstly, looking at the demand effect: the demand for goods will increase, shifting the demand curve to the right which can be seen in the Figure 3.1.

Secondly, looking at the supply side, the households can allocate their increased income from cash transfers to savings and/or consumption. Savings may be used to either develop the farm (business development) or for non-farm activities. Government transfers supplement the farm with off-farm income, which has an indirect effect on farm production and the well-being of the household (Moloi, 2008).
Also, cash transfers give a measure of protection from shocks and risks by increasing the liquidity (Prifti et al., 2016). The above-mentioned increases the amount of goods produced, thus the supply effect, shifting the supply curve to the right. The multiplier effect explains the increase in the supply further.

Initially, poor households that have very low levels of income might consume the extra supply. However, once the necessities are met, cash transfers can increase further consumption or lead to higher levels of investment in productive activities (Handa et al., 2016). Furthermore, the additional income might also be used to diminish transaction costs as well as entry barriers to the market, e.g. transport costs, the purchasing of inputs and the reduction of financial deficits, among others. The production may become more efficient, thus increasing the output and inspiring the households to produce more products and sell the excess in the market, leading to an increase in market involvement and access (see Figure 3.2. below). The effect of cash transfers on a household’s behaviour can vary depending on the conditions in the community and the starting point of the household.
There is a strong positive correlation between a farmer’s income and his farm’s commercialisation level – the higher a farmers’ income the more likely he is to commercialise. Higher income received from market participation leads to higher expenditures – Engel’s law – meaning that market participation affects farmers’ well-being (Tirkaso, 2013).

3.3. Empirical literature

As mentioned in the introduction (section 3.1), this section discusses the relevant empirical literature related to emerging farmers, cash transfers and access to the market. Starting off with literature specific to social grants (the focus of the study) as well as literature related to other support given to farmers.

3.3.1. Social grants and commercialisation

The literature on the relationship between social grants and commercialisation is limited. To the best of our knowledge there are only two papers, one in Zambia (Prifti et al., 2016) and the other in South Africa (Sinyolo, 2016). The South African study only covers one province, namely KwaZulu-Natal, and is therefore not representative of South Africa. In the current study we address this gap by analysing a sample representative of the whole country.
In the paper of Prifti et al. (2016) (Zambia), they empirically measured the role of the Child Grant Support Programme in reducing the transaction costs to join the market. Thus, they did not use all the social grants available for the vulnerable population. In their study, Prifti et al. (2016) made use of two waves of panel data and used the Heckman model in the estimation of the model. They observed several outcomes of the effect of social grants on commercialisation. Firstly, they found that farmers who receive grants have a 12.7% higher likelihood to sell part of their agricultural production than to keep everything for their own consumption. Secondly, the likelihood of market participation increased by 8.3% after the introduction of the Child Grant. Thirdly, those farmers who became grant beneficiaries after they had already taken part in market transactions, increased their amount sold by 202k Kwacha (a 67.3% increase in the average volume sold).

In the South African study, Sinyolo (2016) estimated a double-hurdle model on the cross-sectional data of 2014 to analyse the relationship between social grants and market participation. The results showed that farmers who received social grants sold 6.14 tonnes less maize on the market compared to those who did not receive social grants, implying that grants decrease the incentive to be market-oriented. They used the proportion of cultivated land area to proxy commercialisation. This choice of dependent variable is questionable, because the increase in the proportion of cultivated land could have happened through obtaining the land as a gift or via a discovery of available unused communal land and does not necessarily reflect commercialisation.

3.3.2. Cash transfers and agricultural activities

Another strand of studies investigates the relationship between (i) cash transfers (these might include any type of grant), and (ii) agricultural activities that are not necessarily market commercialisation, the focus of the study. Some of these studies are qualitative and might be relatively subjective. Thus, they might not depict accurate results.

In the studies of Tshuma (2014) and Kane-Berman (2016) they both concluded that, when a household receives social grants, their agricultural activities decline. Lewis et al. (2011) and Hornby (2014), on the other hand, stated that some farmers use social grants as extra finances to accumulate agricultural capital, buy machinery and cattle or pay the casual labourers. Lewis et al. (2011) also showed that social grants transform the orientation of farming activities from subsistence to commercially-orientated farming. Bezu and Holden (2008) stated that social grants have a positive effect on agricultural production by reducing transaction costs and
increasing the use of fertilisers. To test these theories, a few studies performed quantitative analysis (Von Fintel & Pienaar, 2015; Yi et al., 2016; Handa et al., 2016).

For instance, Von Fintel and Pienaar (2015) performed an analysis on whether the Old Age Pension Grant enables small-scale farming activities in South Africa. This study used a fuzzy regression discontinuity design. They found that when the social grant is introduced or increased in its amount, farmers tend to increase their production of agricultural goods by almost 2% and its diversity by 1%.

This study is in line with the results gained by Yi, Lu and Zhou (2016) who studied the multiplier effect of the grain subsidies in China. Every Yuan of subsidy was shown to create 1.6 Yuan of agricultural income. Grain subsidy reduces liquidity constraints and allows farmers to use extra cash to purchase assets and invest (Sadoulet et al, 2001). Handa et al. (2016) further proved that farmers in Malawi turn each Kwacha received through the Social Cash Transfer Programme into an additional 0.69 Kwacha profit by accumulating assets, fertiliser and livestock.

The outcomes of the qualitative and quantitative studies mentioned above are valuable. However, they only investigated the relationship between cash transfers and farmers’ agricultural activities and not the relationship between cash transfers and market commercialisation, which is the focus of this study.

3.3.3. Credit and commercialisation

In this section we investigate studies on the relationship between credit access and commercialisation. The main aim of most of these papers is to investigate factors that influence market commercialisation; but our focus is on those studies that included credit as one of the variables of interest. We include the analysis on credit in our literature because it is a financial inflow and a common form of financial funding, along with social grants. Even though it has a different repayment process, it is important to see which financing options influence market commercialisation.

For example, Mathenge et al. (2010) investigated households in Kenya. In this case, credit access showed a positive and significant influence on market access across a variety of marginal groups: firstly, credit access increased market participation intensity6 by 12% for

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6 Commercialisation intensity or market participation intensity measures the amount of goods sold as a proportion of the total amount of goods produced (Muricho, 2015).
female-headed households; secondly, credit access improved market participation intensity by 11% for income-poor households; thirdly, credit access increased market participation intensity by 14% for land-poor households; and lastly, credit access raised market participation intensity by 8% for households that are situated in the poor potential areas.

Muricho (2015) agreed with the above-mentioned results. By using the double-hurdle model, he showed that a household in Kenya that had access to credit had a 17% higher chance to commercialise, compared to one that did not. Farmers who received credit for agricultural inputs were more likely to increase commercialisation intensity by 5%. The study in South Africa performed by Randela et al. (2008) found a positive and significant impact by estimating the Logit model: if a small-scale farmer gains access to loans, it increases the probability to commercialise from 55% (before loan access) to 71% (after loan access) which is 16%. Amrouk et al. (2013) found that credit access showed an increase in the probability of an improvement in market access by 57% (from 35% to 92%).

Contrary to the previous results, Martey et al. (2012) found access to credit in Ghana being negative and not significant for the commercialisation for both maize and cassava crops, using the Tobit model. The same results appeared in the study by Kabiti et al. (2016) for Zimbabwe, when estimating the Tobit model. Access to credit also showed a negative but not significant influence on input, and a positive but not significant influence on output commercialisation. Justus et al. (2015) confirmed the not significant effect of access to credit in Central Africa by estimating the Probit model. A sample of smallholder farmers in Bangladesh and Ethiopia showed the same negative and not significant results for Osmani and Hossain (2015) in the Probit model and Gebremedhin and Jaleta (2010) in the Tobit model, respectively.

There are also studies that investigated the determinants of commercialisation, but these studies did not necessarily include social grants as one of these determinants. However, we review these studies to establish which variables have been found to be significant in most of the studies on the relationship between social grants, cash transfers or credit access and commercialisation.\footnote{In chapter 2, the “Background” section 2.3.3., we summarised all the factors that influence market participation but, in this section, we specify which ones are the most relevant according to the literature.}
In the reviewed literature we found that age, gender, level of education, access to credit, land size and ownership of a vehicle have shown to be significantly related to commercialisation (see Martey et al., 2012; Osmani & Hossain, 2015; Justus et al., 2015). Furthermore, Kabiti et al. (2016) and Von Fintel and Pienaar (2015) found household off-farm income and irrigation availability to be significant in explaining market commercialisation. Other factors found to be significant were the dependency ratio (Muricho, 2015; Prifti et al., 2016) and market transaction costs (Sinyolo, 2016).

In conclusion, from the literature review it is apparent that the literature on the relationship between social grants and market commercialisation is extremely sparse and that only one other study, except the current study, focused specifically on this relationship in South Africa. However, that study only investigated a single province and made use of cross-sectional data. Furthermore, the dependent variable used in that study, namely the proportion of cultivated land area as a proxy for market commercialisation, is questionable. Other studies did not explicitly investigate the relationship between social grants and market commercialisation, but rather investigated the relationship between other cash transfers or access to credit and market commercialisation or the welfare of farmers. The data used in these studies are often cross-sectional and the estimation methods are mostly limited to Probit, Logit or Tobit models, rarely using the double-hurdle models, which are the most applicable in the estimation of the market commercialisation of farmers. Therefore, these gaps are addressed in the current study.
CHAPTER 4

RESEARCH METHODOLOGY

4.1. Introduction
This chapter describes the data sources and definitions of the dependent and independent variables used to distinguish the relationship between social grants and the commercialisation of emerging farmers in South Africa. Then, the model specification followed by a detailed explanation of the estimation techniques will be provided. We specify diagnostic tests to screen for various issues which may have an impact on the conducting of this study.

4.2. Data and selection of variables
This paper uses secondary data of the National Income Dynamics Study (NIDS) – a national survey of South Africa collected by the Southern Africa Labour and Development Research Unit (SALDRU) based at the University of Cape Town (Chinhema, Brophy, Brown, Leibbrandt, Mlatsheni & Woolard, 2016). The information was collected using a structured household and individual level questionnaire. The questionnaire captured data on aspects including the socio-economic profiles of households; sources of income including grants; information on farm activities such as crop and livestock production; and farm ownership, among others. It is a panel dataset containing four waves with a two-year gap in between each wave (2008, 2010, 2012 and 2014). Originally, it included 28,226 observations in 2008, but in 2014 the number of observations increased to 42,337 (Chinhema, et al., 2016).

This study uses three out of the four waves of the NIDS dataset. The first wave (2008) was excluded from the study because the independent variable “Farm size” does not have observations in the first wave and this variable is important from an economic perspective.

Based on the discussion of the definition of emerging farmers in Chapter 2 section 2.2., when generating the sample, we used only African farmers producing agricultural goods regardless of their farm size and profits. Thus, a total sample of 4,110 observations across all waves of balanced panel data was used. However, after the estimation, 1,172 observations were left out, due to missing data in some variables. All the data was imputed by the NIDS dataset creators and we used proxy variables (“best gender”, “best education”, among others).

---

8 Missing data does not bias the results because the missing data is a random group of the subsample.
Table 4.1. Description of the variables used in the regression model.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Variable definition</th>
<th>Variable measurement</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market participation</td>
<td>Decision to commercialise</td>
<td>Dummy variable (1- Participating 0- Otherwise)</td>
<td></td>
</tr>
<tr>
<td>Market participation intensity</td>
<td>Proportion of the value of goods sold to the value of goods produced on the farm</td>
<td>Continuous variable (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Grants</td>
<td>Total monthly amount of grants received by the household</td>
<td>Continuous variable (Rand)</td>
<td>+</td>
</tr>
<tr>
<td>Age</td>
<td>Household head age</td>
<td>Continuous variable (Years)</td>
<td>+/-</td>
</tr>
<tr>
<td>Age squared</td>
<td>Household head age squared</td>
<td>Continuous variable (Years)</td>
<td>+</td>
</tr>
<tr>
<td>Gender</td>
<td>Household head gender</td>
<td>Dummy variable (Male=1; Female=0)</td>
<td>+</td>
</tr>
<tr>
<td>Education</td>
<td>Household head education level</td>
<td>Categorical variable (1. Illiterate 2. Primary Education 3. Secondary Education 4. University/College)</td>
<td>+</td>
</tr>
<tr>
<td>Marriage</td>
<td>Marital status</td>
<td>Dummy variable (Married=1; Single=0)</td>
<td>+</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>Number of people in the household divided by the number of dependants</td>
<td>Continuous variable (ratio &gt;= 0)</td>
<td>-</td>
</tr>
<tr>
<td>Credit</td>
<td>Access to credit</td>
<td>Dummy variable (1-No; 0-Yes)</td>
<td>-</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>Total monthly income from non-agricultural activities</td>
<td>Continuous variable (Rand)</td>
<td>+</td>
</tr>
<tr>
<td>Water source</td>
<td>Proxy for infrastructure</td>
<td>Dummy variable (1-External source; 0-Piped)</td>
<td>-</td>
</tr>
<tr>
<td>Farm size</td>
<td>Area used for farming</td>
<td>Continuous variable (1. 0-0.5 ha; 2. 0.5-1 ha; 3. 1-5 ha; 4. 5-10 ha; 5. 10-20 ha; 6. more than 20ha)</td>
<td>+</td>
</tr>
<tr>
<td>Land ownership</td>
<td>Household owns land</td>
<td>Dummy variable (Yes=1; No=0)</td>
<td>+</td>
</tr>
<tr>
<td>Cell phone</td>
<td>Household owns cell phone</td>
<td>Dummy variable (Yes=1; No=0)</td>
<td>+</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Household owns vehicle</td>
<td>Dummy variable (No=1; Yes=0)</td>
<td>-</td>
</tr>
<tr>
<td>Distance to the police station</td>
<td>Proxy for distance to the market</td>
<td>Continuous variable (km)</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Chinhema, et al. (2016) and author’s computations
Based on theory and previous research papers, variables that were mentioned in Chapter 2 section 2.3.3 (demographic characteristics, physical and financial assets, social capital, transaction costs) and those available in the dataset were selected to be included in the model (Table 4.1.).

The dependent variables named “market participation” and “market participation intensity” are computed for all available information on sales and consumption of produced goods by emerging farmers, instead of focusing on a single sold or consumed crop or animal. To generate these variables, we created variables “total sales” and “total consumption” from the information given by the NIDS dataset on the value of the produced agricultural goods that were sold and consumed over the month. Then, the variable “market participation intensity” was constructed as “total sales” divided by the sum of “total sales” and “total consumption” and multiplied by 100 to realise a percentage. The “market participation intensity” is specified as a dependent variable with the lower and upper limits ranging from 0 (subsistence-oriented household) to 100 (commercialised household). To generate a “market participation” variable we coded 1 if a household sold any of its produce and 0 if a household did not sell anything, meaning that it consumed all its produce (Kabiti et al., 2016).

The independent variables include demographic characteristics of the household head, farm characteristics and infrastructure related variables. The household head was identified with the question “Who is the head of the household?” obtained from the NIDS dataset.

The variable of interest is the total monthly amount of social grants received by the household. To generate this variable, all social grants received by the household were summed to get the total amount. The social grants that households received include: Child Support Grant, Foster Care Grant, Care Dependency Grant, Disability Grant, Grant-in-Aid, State Old Age Pension and War Veterans Pension. Theoretically, it is expected that social grants have a positive relationship to commercialisation (Prifti et al., 2016). We include all of the social grants received by the household because the more grants the household receives the more money it

---

9 Muricho (2015) investigated the theoretical assumption about the inclusion of the same explanatory variables in both steps of the estimation in the double-hurdle model. According to Newman, Henchion and Matthews (2003) the double-hurdle model has an assumption that the first hurdle should include variables that have non-economic effects on the market participation decision, because if the set of regressors is the same, then it can be difficult to identify the parameters of the model. Therefore, he suggests excluding variables connected to income. Muricho (2015) and Burke (2009) used the same set of explanatory variables in both steps of the estimation. This dissertation follows that approach.
has to invest in the agricultural production. The objective is to confirm this theory by using the NIDS dataset.

The variable “age” is a continuous variable that was obtained from the NIDS dataset. It includes all household heads not younger than 18 years old. This variable is a proxy for a measure of farming experience (Martey et al., 2012). The relationship between age of the household head and market participation as well as market intensity can either be negative or positive. Older household heads tend to make better decisions and have more contact with other farmers or markets leading to greater trading and production opportunities. However, younger farmers can adopt innovative technology more easily, meaning that having a younger household head can reduce costs and improve the production process.

The “age squared” variable is a continuous variable that we calculate as a square of the “age” variable. The relationships between “age squared” and “market participation” and “market participation intensity” are expected to be positive. If the sign is positive, then it means that the middle-aged household head will have a higher chance of becoming commercialised. If the sign is negative, then younger and older emerging farmers will have a higher chance of commercialising.

Regarding “gender”, we expect males to have a higher propensity to participate in the market than females (Martey et al., 2012). We composed this variable from the NIDS dataset. The missing data on the individual was filled in with the value if it was presented in one of the waves, for example, if a household head stated that he is a male in the third and fourth waves but there is a missing value in the second – we fill in the information with the value from the other two waves.

The “education” variable indicates the levels of completed education by the head of the household (Prifti et al., 2016). To generate four groups, we combine: 1) for “illiterate”- those that are illiterate or did not go to school; 2) “primary education” includes those who completed grades 1-6; 3) “secondary education” includes those that have finished grades 7-12; 4) “university/college” category includes any degree, honours, masters or doctorate qualifications. We expect a positive relationship between education and “market participation” and “market participation intensity”.

The variable “marriage” is coded with 1 indicating “married” and 0 indicating “single”. Those household heads that are married or living with a partner are considered to be “married”, whereas those that are widowed, divorced or have never been married are depicted as “single”.
We expect a positive relationship of the variable “marriage” to “market participation” and “market participation intensity” (Olanrewaju, 2015; Muricho, 2015).

The “dependency ratio” is calculated as the number of people in the household divided by the number of dependants (children and pensioners). It is expected that a higher dependency ratio has a negative relationship to commercialisation. This variable represents the degree of labour constraints in the household (Prifti et al., 2016).

The variable “credit” was coded as 1 for a household that does not have access to credit, and 0 – a household that has access to credit. We say that the household has access to credit if it receives one of the following loans: loan from an employer, study loan with institution other than a bank, study loan with a bank, loan from a family member, a personal loan from a micro-lender, loan from friends, loan with a Mashonisa, a home loan/bond or a personal loan from the bank. We expect that those households that do not have access to loans, have a negative influence on commercialisation (Martey et al., 2012).

The variable “off-farm income” is a variable that shows the amount of income that the household attains per month (salary from the main employment or dividends, among others) excluding income from agricultural activities and social grants. The NIDS dataset included social grants and income from agricultural activities in the variable called “household monthly income” (Chinhema, et al., 2016). Thus, to avoid multicollinearity we subtract “social grants” and the variable “farm income” (these variables were already present in the dataset) from “household monthly income”. We expect that off-farm income will have a positive relationship to the “market participation” decision and “market participation intensity”.

Farm characteristics such as “farm size”, “land ownership” and “water source” are included in the model (Senyolo, 2007). The variable “water source” is a proxy for access to infrastructure with 0 coded as “piped” water source and 1 coded as “external” water source. It is known that farmers in the rural areas have less access to infrastructure and it influences their agricultural production. A household that has an external water source is expected to have a negative relationship to the decision to commercialise and the amount to sell.

Farm size was included as physical asset endowments. The more land a farmer has, the higher his probability of participating in the market. If a farmer owns the land, a positive relationship to “market participation” decision and “market participation intensity” is expected. Both variables are captured from the NIDS dataset.
The variables “cell phone” and “vehicle” represent household assets. Access to a cell phone increases a farmer’s access to information along with his likelihood of participating in the market (Amrouk et al, 2013). This dummy variable is used as a proxy to market information (Prifti et al., 2016). Household ownership of a “cell phone” is coded as 1 if a household has a cell phone and 0 if it has no cell phone. This variable is expected to have a positive sign.

Ownership of a vehicle helps emerging farmers have access to the input and output markets. We coded the variable “vehicle” as 1 if a household does not have a vehicle and 0 if the household owns a motor vehicle. We coded 0 if a household owns one of these motor vehicles: motor vehicle in running condition, commercial motor vehicle, motorcycle or scooter and if a household owns a tractor (these separate variables were obtained from the NIDS dataset). If a household does not have a vehicle then a negative relationship to “market participation” and “market participation intensity” is expected.

The variable “distance to the police station” is a proxy for the distance to the market as the location of the police station may indicate the location of the shops or other institutes nearby. Thus, if the police station is located further from the farm, then the relationship to commercialisation should become negative.

4.3. Model specification and estimation techniques

In this section we first give the model specification and thereafter discuss the likely estimation techniques and appropriate diagnostic tests.

4.3.1. Model specification

The primary objective of this study is to determine the relationship between social grants and the level of commercialisation among emerging farmers. To estimate the relationship, we distinguish between two steps in the process: the first is the decision of the farmer to participate in the market (formula 4.2.1) – thus, to sell products in the market, the second, which is dependent on the outcome of the first, is the quantity of products to be sold in the market (formula 4.2.2) (Muricho, 2015).

\[
\text{Market participation}_{it} = X_{1it}\beta_{1it} + \varepsilon_{1it} \quad (4.3.1)
\]

\[
\text{Market participation intensity}_{it} = X_{2it}\beta_{2it} + \varepsilon_{2it} \quad (4.3.2)
\]

The dependent variable in the first model (4.3.1), market participation, represents the choice of the \(i^{th}\) farmer in time \(t\) to partake in the market or not. In the second model (4.3.2) the dependent variable is “market participation intensity”, which represents the intensity of the market
participation of farmer $i$ in time $t$. $X_{1it}$ and $X_{2it}$ are matrices of exogenous explanatory variables, including the variable of interest “social grants”, $\beta_{1it}$ and $\beta_{2it}$ are estimated parameters and $\epsilon_{1it}$ and $\epsilon_{2it}$ are error terms (Muricho, 2015).

4.3.2. Estimation techniques

In the econometric modelling of the determinants of market participation, the issue arises when some farmers do not wish to participate in the market, meaning that a number of the variables of the decision to participate in the market is equal to zero (Muricho, 2015). Zero market participation ($y=0$) might be due to: 1) the household not taking part in the market for economic reasons (e.g. prices); 2) the household not participating in the market because of non-economic reasons (e.g. individual characteristics); and 3) a sporadic decision (Newman et al., 2003). Thus, there is a “self-selected” sample of farmers, who are those emerging farmers who decided to sell their products on the market. However, those who decided not to take part in the market, should also be considered in the estimations of the models to limit sample selection bias in the estimations.

Using a POLS method of estimation, disregarding the self-selection of farmers, is not appropriate, because it does not take into consideration the fact that many of the observations are zero, which would result in the estimation of biased parameters (Tobin, 1958; Eakins, 2016). To correct for this self-selection problem, a number of econometric models have been developed that can be applied to panel data namely: the Heckman sample selection model, the Tobit model and the double-hurdle model.

The Heckman sample selection model has a two-step approach. The first step is to estimate a Probit model and then compute the Inverse Mill’s Ratio (IMR) from the estimated regression. The second step uses the IMR and other explanatory variables to explain the variation in the outcome variable (Heckman, 1979). However, a quandary arises when analysing market sales which are equal to zero. Zeros are treated as unobserved values implying that the participation volume decision includes only non-zero observations. This is not the case in this study because we have many farm households with zero sales values (Sinyolo, 2016). Therefore, the double-hurdle model is more appropriate than the Heckman selection model.

A corner-solution model may also be estimated by the Tobit model (Tobin, 1958). It contains a censored dependent variable (non-negative) and a set of independent explanatory variables (Wooldridge, 2010). A corner solution applies to a dependent variable, where data is saturated at a given value and is continuous otherwise (Burke, 2009). This model has weaknesses and
limitations namely: 1) the Tobit model takes the same set of variables, explaining the participation decision and the decision of how much to sell, and assumes that the partial effect of a given explanatory variable gives the same sign as that of the market participation decision or market participation intensity; 2) the Tobit model assumes that the dependent variable is censored from the left or right side so it can potentially underestimate the intercept and overestimate the slope (Muricho, 2015, Newman et al, 2003). The Tobit model is more restrictive than the double-hurdle model as the Tobit model accepts that the decision to participate and the level of participation are made jointly, whereas the double-hurdle model allows us the possibility to estimate these decisions separately (Burke, 2009).

We found the double-hurdle model to be the most appropriate model to estimate, due to the above-mentioned limitations of the Heckman sample selection model and the Tobit model.

However, we used the log-likelihood test to validate our decision to use the double-hurdle model instead of the Tobit model. A separate estimation of the Probit, Truncated regression and the Tobit model is done to obtain the likelihood ratio statistics ($\nu$):

$$\nu = 2[LL_{probit} + LL_{truncated} - LL_{tobit}]$$

(4.3.3)

where $LL_{probit}$, $LL_{truncated}$ and $LL_{tobit}$ are the likelihood values from the Probit, Truncated regression and Tobit models. The test statistic has a $\chi^2$ distribution with the number of independent variables including the intercept as a value of the degrees of freedom (df) (Eakins, 2016). The null hypothesis is that the Tobit model is more appropriate to use than the double-hurdle model. The null hypothesis gets rejected when $\nu$ exceeds the $\chi^2$ critical value (Burke, 2009; Eakins, 2016). In this minor disseration we found the $\nu$ value exceeded the $\chi^2$ critical value, and therefore we rejected the null hypothesis, which confirmed our decision to use the double-hurdle model in all estimations.

The double-hurdle model can be specified as follows (Muricho, 2015):

First stage:

$$H_{it}^* = X_{1it}\beta_1 + \varepsilon_{1it} ; \quad \varepsilon_{1it} \sim N(0, \sigma^2)$$

(4.3.4)

$$H_{it} = \begin{cases} 1 & \text{if } H_{it}^* > 0 \\ 0 & \text{if } H_{it}^* \leq 0 \end{cases}$$

(4.3.5)

Second stage:

$$Y_{it}^* = X_{2it}\beta_2 + \varepsilon_{2it} ; \quad \varepsilon_{2it} \sim N(0, \sigma^2)$$

(4.3.6)
\[ Y_{it} = \begin{cases} 1 & \text{if } H_{it}^* > 0 \\ 0 & \text{if } H_{it}^* \leq 0 \end{cases} \quad (4.3.7) \]

where:

- \( H_{it}^* \) = Unobservable discrete decision of whether or not to participate in the market;
- \( H_{it} \) = Observable discrete decision of whether or not to participate in the market;
- \( Y_{it}^* \) = Unobservable variable of market participation intensity status;
- \( Y_{it} \) = Observed market participation intensity;
- \( \beta_1, \beta_2 \) = Parameters to estimate;
- \( \varepsilon_{1it}, \varepsilon_{2it} \) = Error terms;
- \( X_{1it}, X_{2it} \) = Vectors of exogenous explanatory variables;
- \( i_t - i^{th} \) = Household during period \( t \).

The double-hurdle model will take the form below, since \( Y_{it} \) can be zero (Muricho, 2015):

\[
Y_{it} = \begin{cases} X_{1it} \beta_1 + \varepsilon_{1it} \text{ if } \min(X_{1it} \beta_1 + \varepsilon_{1it}; X_{2it} \beta_2 + \varepsilon_{2it}) > 0 \\ 0 \text{ otherwise} \end{cases} \
(4.3.8)
\]

\[
\begin{pmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \end{pmatrix} \sim N(o, \Sigma), \Sigma = \begin{pmatrix} 1 & \sigma_{12} \\ \sigma_{12} & \sigma \end{pmatrix} \quad (4.3.9)
\]

The log-likelihood function for the double-hurdle model letting \( \psi(X, Y, \rho) \) define the cumulative distribution function (CDF) of a bivariate normal correlation \( \rho \) (Garc’ia, 2013):

\[
\log L = \sum_{Y_{it}=0} \left[ \log \left( 1 - \phi \left( X_{2it} \beta_2, \frac{X_{1it} \beta_1}{\sigma}, \rho \right) \right) \right] + \sum_{Y_{it}>0} \left[ \log \left( \phi \left( \frac{X_{2it} \beta_2 + \rho (Y_{it} - X_{1it} \beta_1)}{\sqrt{1 - \rho^2}} \right) \right) - \log(\sigma) \right]_{\text{otherwise}} \quad (4.3.10)
\]

By setting \( X_{2it} \beta_2 = 0 \) and \( X_{2it} \beta_2 \to \infty \) this equation (the double-hurdle model) can be reduced to the Tobit model.

Following Burke (2009) we generate probabilities and expected values regarding market participation and market participation intensity.
The probabilities on whether \( H_{it}^* \) is positive are (Burke, 2009):

\[
P(H_{it}^* = 0|X_{1it}) = 1 - \phi(X_{1it}\beta_1)
\]

\[
P(H_{it}^* > 0|X_{1it}) = 1 - \phi(X_{1it}\beta_1)
\]

The expected value of \( Y_{it}^* \) assuming \( H_{it}^* \) id higher than zero is:

\[
E(Y_{it}^*|H_{it}^* > 0, X_{2it}) = X_{2it}\beta_2 + \sigma \lambda(X_{2it}\beta_2/\sigma)
\]

where \( \lambda \) is the inverse Mills ratio (IMR).

The unconditional expected value of \( Y_{it}^* \) means that the household will sell in the agricultural market despite the decision to be market-orientated:

\[
E(X_{1it}, X_{2it}) = \phi(X_{1it}\beta_1)(X_{2it}\beta_2 + \sigma \lambda(X_{2it}\beta_2/\sigma))
\]

The Data Analysis and Statistical Software (STATA 14.1) for Windows was used to analyse the data (StataCorp, 2015). The double-hurdle model includes two steps that were estimated simultaneously to reduce the complications of interpreting the results if estimated separately. The estimated coefficients of the double-hurdle model indicate the direction and the significance of the relationship, but not the magnitude. The average partial effects (APE) of each independent variable were computed to represent the marginal effects (Muricho, 2015). The marginal effects allow us to interpret the magnitude of the estimated coefficients. The estimation of the partial effects is performed as a separate estimation.

The partial effect of an independent variable around the probability that \( H_{it}^* > 0 \) is (Burke, 2009):

\[
\frac{\partial P(H^* > 0|X_{1})}{\partial X_j} = \beta_j \phi(X_{1}\beta_1)
\]

where \( X_j \) and \( \beta_j \) represent the specific independent variable with corresponding coefficient.

The partial effect of an independent variable on the “conditional” expected value of \( Y_{it}^* \) assuming \( H_{it}^* > 0 \) is (Burke, 2009):

\[
\frac{\partial E(Y^*|H^* > 0, X_{2})}{\partial X_j} = \beta_j [1 - \lambda \left(\frac{X_{2}\beta_2}{\sigma}\right) \left\{ \frac{X_{2}\beta_2}{\sigma} + \lambda \left(\frac{X_{2}\beta_2}{\sigma}\right) \right\}]
\]

The partial effect of an independent variable on the “unconditional” expected value of \( Y_{it}^* \) assuming that \( X_j \) is the vector of both \( X_1 \) and \( X_2 \) is (Burke, 2009):

\[
\frac{\partial E(Y^*|X_{1}, X_{2})}{\partial X_j} = \beta_j \phi(X_{1}\beta_1)(X_{2}\beta_2 + \sigma \lambda(X_{2}\beta_2/\sigma))
\]
\[
\frac{\partial E(Y^* | X_1, X_2)}{\partial x_j} = \beta_j \phi(X_1 \beta_1) * \left\{ x_2 \beta_2 + \sigma \left( \frac{x_2 \beta_2}{\sigma} \right) \right\} + \phi(X_1 \beta_1) + \beta_j \left[ 1 - \lambda \left( \frac{x_2 \beta_2}{\sigma} \right) \left( \frac{x_2 \beta_2}{\sigma} + \lambda \left( \frac{x_2 \beta_2}{\sigma} \right) \right) \right] \]

The results of this estimation can be found in the next chapter.

### 4.3.3. Diagnostic tests

We conducted the tests for selection bias, endogeneity, heteroscedasticity, serial autocorrelation, model specification and multicollinearity to find any underlying problems in the model that would potentially require correction.

**Test for sample selection bias**

The selection bias was tested in the model because social grants are a targeted intervention – the government allocates money to individuals with certain characteristics (Eakins, 2016). The Heckman selection model was estimated with social grants as the selection variable. The likelihood ratio test of independent equations was done to find if there is evidence of selection bias. The truncated regression with IMR was also tested to ensure that there is no selection bias.

**Test for endogeneity**

We use the Hausman test for potential endogeneity (Gujarati & Porter, 2009). This is done to examine for the possibility of inverse causality that might flow from commercialisation to social grants because increased market access results in increased farm income. The increased farm income can influence the possibility of not receiving grants (Woldeyohanes, 2013). The increased off-farm income can influence the possibility of not receiving grants. The regression is estimated with social grants as a dependent variable on the set of exogenous variables as follows:

\[
Social\ Grants_{it} = \kappa_{it} \gamma + w_{it}
\]

where: \( \kappa_{it} \) is the vector of exogenous variables, \( \gamma \) is the estimated coefficients and \( w_{it} \) is residuals. The second step estimates the equation 4.4.2. including the residuals from the previous step. The significance of the residuals indicates whether or not endogeneity is present: significant residuals indicate endogeneity while not significant residuals indicate that there is no evidence of endogeneity.
**Test for heteroscedasticity**

According to Gujarati and Porter (2009), heteroscedasticity occurs when the error term differs across observations. If heteroscedasticity is present and is left untreated then all the conclusions that are drawn from the results can be misleading because heteroscedasticity produces non-constant error terms. One of the ways to test for heteroscedasticity is graphically (by seeing how the error term moves when compared to the independent variable; if the error term increases with the independent variable, heteroscedasticity is present). Another way of testing for heteroscedasticity is by performing White’s general test as a special case of the Breusch-Pegan test. Following the steps from Gujarati and Porter (2009), we estimate the POLS residuals, then we regress the squared residuals on the original set of variables and afterwards we regress the squared residuals on the squared predicted value of market participation intensity. We reject the null hypothesis of homoscedasticity if the p-value is less than 0.05. If heteroscedasticity is present, then the estimates will be computed with robust standard errors.

**Test for serial autocorrelation**

According to Gujarati and Porter (2009), autocorrelation is the correlation of a time series with its past values. Drukker (2003) stated that the presence of serial autocorrelation causes the results to be less efficient, with biased standard errors. The Wooldridge test for autocorrelation is more robust, because it has fewer assumptions while using the residuals from a first-difference regression.

**Test for multicollinearity**

The test for multicollinearity is performed by using the Variance Inflation Factor (VIF) test and pair-wise correlations among regressors. The rule of thumb is: if the VIF of the variable exceeds 10 then that variable is collinear (Gujarati & Porter, 2009).

**Model specification test**

The model specification error can happen when there are omitted variables, or some irrelevant variables were included in the model, or there is a wrong functional form (Gujarati & Porter, 2009). If the model is not specified correctly then the consequences are an overfitted model or underfitted model. To examine for a model specification error, we use the Ramsey RESET test with the null hypothesis that the model has no omitted variables.

4.4. Conclusion

The econometric framework outlined in this section made it possible to analyse the contribution of social grants towards emerging farmers’ commercialisation. We use the panel data on 3
waves (2010, 2012 and 2014) as sourced from the NIDS dataset. The data on all explanatory variables, including the variable of interest “social grants”, was sourced from this dataset.

The methodology provided information about the chosen model and the strategy for estimation. The model was chosen according to the relevant theory – the farmer makes a two-step decision (first, whether to commercialise and second, how much to sell); thus, the choice of the double-hurdle model.

The diagnostic statistics to test for the sample selection bias, endogeneity, heteroscedasticity, autocorrelation and multicollinearity were provided to detect issues in the model that would potentially require correction.
CHAPTER 5

RESULTS OF ANALYSIS

5.1. Introduction
This section presents the estimation results of the research question as set out in Chapter 1. Firstly, we report on the diagnostics tests used to identify problems that are present in the model. We test if the following are present: sample selection bias, endogeneity, heteroscedasticity, autocorrelation and multicollinearity, to correct for these in the following estimations. Next, we present the descriptive statistics on the variables included in the model. Lastly, we report the estimation results on the double-hurdle model.

5.2. Diagnostic tests
In this section we provide the diagnostic tests to identify the problems present in the model. We examine underlying issues to generate the “best” model, so that all estimated coefficients have the “correct” signs and are statistically significant on the basis of the t and F statistics (Gujarati & Porter, 2009). When performing diagnostic tests, we assume that our model is correctly specified and then we use standard statistics to test restrictions on the parameters. In other words, these tests help determine the strengths and weaknesses of our model.

Choice between the Tobit and double-hurdle models
There is a need to evaluate whether the double-hurdle model is more appropriate than the Tobit model. Based on Chapter 4 section 4.3.3., we perform the log-likelihood test. From the equation 4.3.3 we find that, with the likelihood ratio (LR) of -478.394 at 16 df (p<0.01), the Tobit model gets rejected in favour of the double-hurdle model which is shown to be more suitable.

The selection bias problem
The Heckman selection model is estimated with social grants as the selection variable. The likelihood ratio test of independent equations is done to find if there is evidence of selection bias. Table 5.1. summarises the results. At the 10% significance level, the test shows that there is no evidence of selection bias.
Table 5.1. The likelihood ratio test of independent equations

<table>
<thead>
<tr>
<th>$H_0$: Equations are independent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>chi2(1) = 0.01</td>
<td></td>
</tr>
<tr>
<td>Prob &gt; chi2 = 0.9296</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s computations

We also estimate the truncated regression with IMR to further ensure that there is no selection bias (results can be found in Appendix A). The IMR is found to be not significant, meaning that there is no selection bias problem.

**Test for endogeneity**

The Hausman test for potential endogeneity is performed on equation 4.3.18. and shows that there is no evidence of endogeneity (results can be found in Appendix A). This means that changes in social grants have a direct influence on commercialisation and there is no possibility of inverse causality. We only test the connection between social grants and market participation and do not test if other variables cause an endogeneity problem.

**Test for heteroscedasticity**

Following the steps discussed in the section 4.3.3. of Chapter 4, Table 5.2. summarises the results of the heteroscedasticity validation.

Table 5.2. White’s general test for heteroscedasticity

<table>
<thead>
<tr>
<th>$H_0$: Constant variance/ homoscedasticity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>chi2(127) = 249.04</td>
<td></td>
</tr>
<tr>
<td>Prob &gt; chi2 = 0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s computations

We reject the null hypothesis of homoscedasticity at the 5% significance level, meaning that heteroscedasticity is present in the model. To correct for it, estimates are computed with robust standard errors.

**Test for serial autocorrelation**

The Wooldridge test for serial autocorrelation is performed and the results are presented in Table 5.3. below.
Table 5.3. Wooldridge test for serial autocorrelation

<table>
<thead>
<tr>
<th></th>
<th>F (1, 29)</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_0$: No first order autocorrelation</td>
<td>1.017</td>
<td>0.3216</td>
</tr>
</tbody>
</table>

Source: Author’s computations

We fail to reject the null hypothesis, because the p-value is higher than 5% significance level. This means that there is no serial autocorrelation present in the model.

**Test for multicollinearity**

We performed the VIF test to investigate if multicollinearity is present. The steps were discussed in the Chapter 4, section 4.3.3.

Table 5.4. VIF test for multicollinearity

<table>
<thead>
<tr>
<th>Variable label</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social grants</td>
<td>1.14</td>
<td>0.88</td>
</tr>
<tr>
<td>Age</td>
<td>46.51</td>
<td>0.02</td>
</tr>
<tr>
<td>Age squared</td>
<td>47.65</td>
<td>0.02</td>
</tr>
<tr>
<td>Gender</td>
<td>1.21</td>
<td>0.83</td>
</tr>
<tr>
<td>Education</td>
<td>1.42</td>
<td>0.70</td>
</tr>
<tr>
<td>Marriage</td>
<td>1.32</td>
<td>0.76</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>1.40</td>
<td>0.71</td>
</tr>
<tr>
<td>Credit</td>
<td>1.03</td>
<td>0.97</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>1.08</td>
<td>0.92</td>
</tr>
<tr>
<td>Water source</td>
<td>1.11</td>
<td>0.90</td>
</tr>
<tr>
<td>Farm size</td>
<td>1.04</td>
<td>0.96</td>
</tr>
<tr>
<td>Land ownership</td>
<td>1.02</td>
<td>0.98</td>
</tr>
<tr>
<td>Cell phone</td>
<td>1.11</td>
<td>0.90</td>
</tr>
<tr>
<td>Vehicle</td>
<td>1.09</td>
<td>0.92</td>
</tr>
<tr>
<td>Distance to the police station</td>
<td>1.08</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Source: Author’s computations

From Table 5.4. we can observe that most variables show a degree less than 10, meaning that there is no multicollinearity present in the model. However, variables “Age” and “Age squared”
exhibit a degree of 46.51 and 47.65 meaning that they are collinear, which is expected since “Age squared” is calculated by using the “Age” variable.

**Model specification test**

Following the steps discussed in the section 4.3.3. from Chapter 4, Table 5.5. “Model specification test” summarises the results of the test.

Table 5.5. Model specification test

<table>
<thead>
<tr>
<th>$H_0$: Model has no omitted variables</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F (3, 1010) = 0.50</td>
<td></td>
</tr>
<tr>
<td>Prob &gt; F = 0.6847</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Author’s computations*

The null hypothesis that the model is well specified is not rejected because the p-value is higher than the 5% level of significance, suggesting that this set of variables specifies the household market participation intensity correctly.

To conclude, heteroscedasticity is found in the model, so the robust option is used to account for it. Other tests do not indicate problems; no serial correlation or endogeneity are found in the model. The empirical analysis and its results are presented in the next chapter.

**5.3. Descriptive statistics**

This section gives the descriptive statistics on the key variables included in the model, which are summarised in Table 5.6.

The descriptive statistics of the dependent variable “Market participation” show that only 22% of the sample decided to take part in the market. The “Market participation intensity” variable indicates that approximately 79% of the surveyed households were non-commercialised, meaning that they did not sell any of the output they produced to the market. This means that only about a fourth of the sample engaged in agricultural markets.

The average amount for social grants received is R1,331 per household per month. Almost all the households in the sample received grants except for 622 households (excluding missing observations), as is derived from the total number of households 4,110 minus the number of observations of the social grants variable (3,591). Thus, 85% of all emerging farmers in the sample receive some type of social grant. This enforces the point that social grants can likely be a supplement to income, which can be used to address financial barriers to enter the market.
The demographic characteristics of the household heads are found to vary significantly across farmers. From Table 5.6, it is found that the average age of household heads is 54 years old with a maximum of 96 years and minimum of 20 years. On average, the education level of the household heads is primary school level. The maximum educational level of the farmers is found to be university or college education (only 2% of the sample). Approximately 40% finished secondary school, 26% of the sample have primary school education and 31% have no schooling. Thus, more than half of the sample has primary or less schooling, which implies that the level of education of emerging farmers is relatively low on average. More educated heads are expected to show better levels of commercialisation. Only 44% of the sample are married. The household dependency ratio is shown to be 33% on average. Approximately 68% of the households in the sample are female-headed. While causality cannot be drawn from these
descriptive statistics, these gender differences might result in a lack of households being commercialised, because it is shown from theory that male-headed households have better market access.

Off-farm income of a household on average was R3,184 per month. There are significant differences in the incomes of the households – the maximum amount that a household receives is R143,100 per month, which is extremely high compared to the average. We find that approximately 90% of the sample do not have access to credit.

The descriptive statistics of farm assets are as follows: 77% of the sample indicated that they own the land, with the majority of the sample (79%) being concentrated on land of 0-0.5 ha. Only 3.5% of the sample have more than 5 ha of land. This illustrates a lack of land availability, a major challenge for South African emerging farmers. On average, about half of the sample have a piped source of water. Vehicle ownership is extremely poor – only 10% of the sample have some form of transport (motorcycle, tractor, car). Distance to the police station (as a proxy to the distance to the market) is on average 5-10 km. The combination of the lack of transportation and the long distance to likely “markets” can indicate the reasoning behind the small number of commercialised households. The majority of households (74%) have access to a cell phone, which is a medium to access the relevant market information.

Theoretically and empirically it is shown that households have difficulty commercialising if the transaction costs are high. The results from the descriptive statistics (Table 5.6.) indicate possible barriers to entry to markets experienced by the farmers. Following this descriptive breakdown, a detailed regression analysis will be more conclusive.

5.4. Estimation results

This section presents overall probabilities of the household being commercialised and at what intensity. Furthermore, we present the results of the households’ market participation decision and market participation intensity (these terms were explained in Chapter 4 section 4.3.1). We compute the APE to obtain the magnitudes of the market participation decision and conditional and unconditional market participation (these terms were explained in Chapter 4 at the end of the section 4.3.2).

The double-hurdle estimation is presented in Table 5.7. and has the following structure: the first column shows the variable names; the second column represents the estimation results of
tier 1\(^{10}\) of the double-hurdle model and the third column – the estimation results of tier 2. Each tier includes coefficients and standard errors.

Table 5.7. Double-hurdle regression results

<table>
<thead>
<tr>
<th>Variable label</th>
<th>Tier 1: Market participation decision</th>
<th>Tier 2: Market participation intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>Std. err.</td>
</tr>
<tr>
<td>Social grants</td>
<td>0.00002</td>
<td>0.00</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0143</td>
<td>0.02</td>
</tr>
<tr>
<td>Age squared</td>
<td>0.0001</td>
<td>0.00</td>
</tr>
<tr>
<td>Gender</td>
<td>0.0173</td>
<td>0.09</td>
</tr>
<tr>
<td>Education</td>
<td>0.0193</td>
<td>0.05</td>
</tr>
<tr>
<td>Marriage</td>
<td>-0.0663</td>
<td>0.08</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>-0.1334</td>
<td>0.14</td>
</tr>
<tr>
<td>Credit</td>
<td>0.1309</td>
<td>0.12</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>7.39e-06</td>
<td>0.00</td>
</tr>
<tr>
<td>Water source</td>
<td>-0.0071</td>
<td>0.08</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.2044**</td>
<td>0.04</td>
</tr>
<tr>
<td>Land ownership</td>
<td>-0.1612*</td>
<td>0.09</td>
</tr>
<tr>
<td>Cell phone</td>
<td>0.2023**</td>
<td>0.09</td>
</tr>
<tr>
<td>Vehicle</td>
<td>0.2001</td>
<td>0.19</td>
</tr>
<tr>
<td>Distance to the police station</td>
<td>0.0559</td>
<td>0.04</td>
</tr>
<tr>
<td>sigma_constant</td>
<td>23.6717***</td>
<td></td>
</tr>
</tbody>
</table>

Model description:

Number of obs =1172

Wald chi2(15)=38.23 Prob>chi2=0.0008 Log-pseudolikelihood= -3478.394

Significance level: *p<0.10; **p<0.05; *** p<0.01;

Source: Author’s computations

From Table 5.7, it can be observed that the log-pseudolikelihood ratio statistics, as indicated by chi-square statistics, are highly significant (p<0.001), suggesting that the estimated model has strong explanatory power. The correlation coefficient between \( \epsilon_{1t} \) in equation 4.3.4. and \( \epsilon_{2t} \) in equation 4.3.6., as measured by the sigma constant, is relatively high (23.67) and

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\(^{10}\) Two tiers (see Chapter 4, section 4.3.2.): tier 1 represents the first stage of the double-hurdle estimation (equation 4.3.5); and tier 2 represents the second stage (equation 4.3.7.).
statistically significant at the 1% significance level (see Table 5.7.). It is an indication of the strong dependence between the 2 tiers, further proving that the double-hurdle model is preferable to the Tobit model (Muricho, 2015). Table 5.7. also indicates that the estimated coefficients of the double-hurdle model show that the explanatory variables — education, marriage, farm size, land ownership, cell phone and ownership of the vehicle — are found to be significant.

From the estimation of the double-hurdle model (equations 4.3.5 and equation 4.3.7.) we can also compute (i) the probabilities of a household decision to participate in the market (equations 4.3.11 and 4.3.12), as well as (ii) the conditional and unconditional expected intensity of market participation (equations 4.3.13 and 4.3.14). We do this to compare the predicted values with the actual values of the dependent variables observed in the model.

Table 5.8. Probability of commercialisation decision and commercialisation intensity

<table>
<thead>
<tr>
<th>Variable label</th>
<th>Mean</th>
<th>Std. dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of market participation</td>
<td>0.4999</td>
<td>0.0899</td>
</tr>
<tr>
<td>Probability of no market participation</td>
<td>0.5001</td>
<td>0.0899</td>
</tr>
<tr>
<td>Conditional market participation intensity</td>
<td>0.9264</td>
<td>0.0371</td>
</tr>
<tr>
<td>Unconditional market participation intensity</td>
<td>0.4637</td>
<td>0.0875</td>
</tr>
</tbody>
</table>

*Source: Author’s computations*

The results presented in Table 5.8 (these terms were explained in Chapter 4, section 4.3.2) show that, in the chosen sample, the probability of a household to participate in the market is approximately 50%. The conditional market participation intensity exhibits 92%, meaning that the proportion of agricultural goods produced and then sold by a household is high (the households that are market-orientated sell almost all their production). This probability implies that our model predicts market commercialisation precisely. An unconditional market participation intensity of 46% shows that, despite the decision to be market-oriented, the proportion of goods that a household sold was 46%.

The results of the Table 5.7. show the direction and significance of the relationship to the market participation decision and not the size, or with how much an independent variable is related to the dependent variable (marginal effects). Thus, as we explained in Chapter 4, in section 4.3.2, there is a need to perform a post estimation analysis to compute the APE. Yet Burke (2009) mentioned that the standard deviations computed from the predicted partial
effects cannot be used for the APE conclusions, thus, standard errors for the APE are calculated for each variable by performing bootstrapping which generates the new APE on a random subsample chosen from the data. The alternative method would be the delta method which approximates the variance of the transformation of the variable (Burke, 2009). We choose the bootstrapping methodology because it does not require any apriori assumptions. The results are found in Table 5.9.

Table 5.9. Average partial effects of the double-hurdle model

<table>
<thead>
<tr>
<th>Variable label</th>
<th>Tier 1: Market participation decision</th>
<th>Tier 2a: Conditional market participation intensity</th>
<th>Tier 2b: Unconditional market participation intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social grants</td>
<td>9.24e-06</td>
<td>0.00</td>
<td>0.0004</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0055</td>
<td>0.01</td>
<td>-0.4108</td>
</tr>
<tr>
<td>Age squared</td>
<td>0.0001</td>
<td>0.00</td>
<td>0.00334</td>
</tr>
<tr>
<td>Gender</td>
<td>0.0067</td>
<td>0.03</td>
<td>0.1225</td>
</tr>
<tr>
<td>Education</td>
<td>0.0075</td>
<td>0.02</td>
<td>-2.0554*</td>
</tr>
<tr>
<td>Marriage</td>
<td>-0.0258</td>
<td>0.03</td>
<td>3.6093</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>-0.0518</td>
<td>0.06</td>
<td>2.3147</td>
</tr>
<tr>
<td>Credit</td>
<td>0.0509</td>
<td>0.05</td>
<td>2.1198</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>2.87e-06</td>
<td>0.00</td>
<td>0.0001</td>
</tr>
<tr>
<td>Water source</td>
<td>-0.0028</td>
<td>0.03</td>
<td>1.0452</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.0794***</td>
<td>0.02</td>
<td>-1.0353</td>
</tr>
<tr>
<td>Land ownership</td>
<td>-0.0627*</td>
<td>0.03</td>
<td>-0.0493</td>
</tr>
<tr>
<td>Cell phone</td>
<td>0.0786**</td>
<td>0.04</td>
<td>0.6211</td>
</tr>
<tr>
<td>Vehicle</td>
<td>0.0777</td>
<td>0.06</td>
<td>-6.6956**</td>
</tr>
<tr>
<td>Distance to the police station</td>
<td>0.0217</td>
<td>0.01</td>
<td>1.5282</td>
</tr>
</tbody>
</table>

Significance level: *p<0.10; **p<0.05; *** p<0.01;
Source: Author’s computations

The variable of interest is social grants. It shows a positive relationship to the market participation decision and market participation intensity but is not statistically significant. This implies that there is no relationship between social grants and market commercialisation. We obtain the expected positive sign. The same result was obtained by Prifti et al. (2016), who
found that the Child Grant was positive, but not significant, to the decision to take part in the market. It is plausible for grants to be not significant in the estimation of market commercialisation, since social grants are considered to be a source of income (Lewis et al., 2011) that is used to finance basic needs in South Africa. Thus, there is no incentive for the recipients to farm and sell their produce in the market, as their basic needs are met by the income received from the grants.

The results show that the age of a household head indicate a negative, but not significant, relationship to the household’s market participation decision and market participation intensity (Table 5.7.). This implies that there is no relationship between the age of a household head and market commercialisation. It indicates an expected negative sign - older farmers can be less receptive to innovative ideas and might find it too risky to join the market. Other studies also reported similar results (Amrouk et al., 2013; Osmani & Hossain, 2015; Tirkaso, 2013).

Age squared reflects an expected positive relationship to the market participation decision and the market participation intensity, but it is not statistically significant. This suggests that there is no relationship between the age squared and market commercialisation, meaning that there is no non-linear relationship between age and a households’ commercialisation. This result was also found by Justus et al. (2015).

The results show that the gender of a household head has a positive, but not significant, relationship to the market participation decision and market participation intensity (Table 5.7.). The positive sign is consistent with theory and our expectations; a male-headed household is shown to have a positive influence on market commercialisation. Studies by Martey et al. (2012) and Chirwa and Matita (2012) also obtained this result.

The household head’s education level shows a positive and not significant relationship to the market participation decision but indicates a negative and significant effect on the market participation intensity (Table 5.7.). A household head who has an elevated level of education (higher than illiterate) has a 2% lower chance to be conditionally commercialised (Table 5.9.). This result is not in line with the theory but was also found in papers by Chirwa and Matita (2012) and Osmani and Hossain (2015). As indicated by Osmani and Hossain (2015) it can be explained by higher educated individuals rather seeking employment in which they can earn higher levels of income and not preferring to perform agricultural activities.

Marriage shows a negative and not significant effect on the decision to take part in the market, but in the case of market participation intensity, if a household head was married it played a
positive and significant role (Table 5.7.). It means that there is no relationship between marriage and the market participation decision, but there is a positive and significant relationship to market participation intensity. A household head who is married has a 3.6% higher probability to be commercialised, meaning that married individuals tend to sell more in the market – this result is consistent with the theory and a research paper by Kabiti et al. (2016).

The dependency ratio produces negative and not significant results on the relationship to the market participation decision and positive and not significant results on market participation intensity. It shows a theoretically negative sign, meaning that more dependents negatively affect the decision to take part in the market. This result implies that, if the household increases in size, there is a higher demand for food, meaning that the households’ agricultural production will cover these needs instead of being sold. Thus, the increased number of dependents will not incentivise the household to take part in the market. The same result was obtained by Muricho (2015), Chirwa and Matita (2012), Justus et al. (2015) and Prifti et al. (2016). However, the positive sign on market participation intensity could mean that, when the decision to take part in the market is made, the household needs more labour. Thus, more people in the household can contribute to the production process.

Credit exhibited positive and not significant results on the relationship to the market participation decision and market participation intensity (Table 5.7.). This result infers that there is no relationship between credit and market commercialisation. This result is unexpected. A positive relationship is inconsistent with the expectation, because the dummy variable was constructed as 1 representing a household that does not have access to credit and, theoretically, if a household has credit then it increases the decision to take part in the market (Muricho, 2015). A few research papers found a negative relationship between access to credit and commercialisation, namely Justus et al. (2015), Kabiti et al. (2016), Osmani and Hossain (2015). The result of non-significance might reveal a unique pattern of the South African credit market – South Africans spend approximately 78% of their disposable income on covering their debt (South Africa's Credit Market Analysis, 2018), thus, indicating that it is quite risky to access credit and to try convert subsistence farming into a commercialised activity.

The variable off-farm income is found to have a positive sign to the farmers’ decision to take part in the market and market participation intensity, but it is not statistically significant (Table 5.7.). This positive sign is expected. Some studies also report this positive connection between off-farm income and commercialisation, namely Kabiti et al. (2016), Okezie et al. (2012),
Justus et al. (2015) and Martey et al. (2012). This implies that off-farm income has a tendency to improve market access.

The infrastructure proxy – water source — was found to be not significant. If a household has an external water source (public tap, communal borehole, public tap) then it displays a negative relationship to the decision to take part in the market. When looking at the market participation intensity, the external water source presents a positive sign. The change of sign could be due to the earlier stages of production when the household could spend more time accessing water (going to the public tap or asking their neighbour). Thus, a negative relationship in the later stages, when the production is ready to be consumed or sold, will not affect the amounts that should be sold; hence a positive sign. The study by Kabiti et al. (2016) found that access to a water source has a negative relationship to the level of market participation intensity. They explained it as an increase in expenses for the installation and maintenance of irrigation systems, where a farmer could have spent these finances on production.

Farm size shows a negative and significant relationship to the market participation decision but has a negative and not significant relationship to market participation intensity (Table 5.7.). An increase in the land size by 5 ha was likely to decrease the probability to take part in the market by 8% (Table 5.9.). This implies that a larger farm does not contribute to the incentive to take part in the market - this finding contradicts the theory (Martey et al., 2012; Sinyolo, 2016; Justus et al., 2015; Osmani & Hossain, 2015; Prifti et al., 2016). It might need further investigation on whether there is an optimal farm size required to motivate farmers’ decision to take part in the market (Muricho, 2015). Seeing that emerging farmers normally have access to small farming areas, it can be that they cultivate a very small piece of land for the sole reason of generating extra income, but as the land size increases (it might still be small), they depend more on the products produced to provide for their own needs, without taking part in commercialisation. Maybe if the land area increases beyond a certain point, the emerging farmer will then find it to his/her advantage to take part in the market. It could also mean that increases in the farm size accompanied by gains in market access were not substantial enough to cover the costs associated with increased production (Amrouk et al., 2013). Furthermore, this study did not separate farmers that cultivate crops from those who have livestock. Thus, there are diverse requirements in terms of farm size that are needed to produce a certain agricultural good.
Land ownership has a negative and significant relationship to the market participation decision but has a negative and not significant relationship to market participation intensity (Table 5.7.). If a household owns the land on which it produces agricultural goods, this decreases the probability of market participation by 6%. We obtain this unexpected negative sign, but it is also found in the study by Martey et al. (2012). It can be that these emerging farmers recently became owners of land that may be unsuitable for farming – thus delivering a lower produce. Alternatively, these new farmers do not necessarily want to take part in the market. Otherwise, if they do not own the farmland, it might be that they receive assistance from other farmers, making it more likely that their produce could be sold in the market. Martey et al. (2012) stated that farmers who do not own the land, take part in the market because they have obligations to their land owners. Also, emerging farmers who do not own the land are less risk averse and can take the risk of being market-orientated.

Access to a cell phone was found to have a positive and significant effect on the market participation decision while, at the same time, having a positive and not significant relationship to market participation intensity (Table 5.7.). This means that there is a positive relationship between cell phone ownership and market participation decision, but there is no relationship to how many products are sold in the market (market participation intensity). A household that has access to a cell phone tends to have a 7.9% higher probability of taking part in the market (Table 5.9.). This finding is in line with the theory and can be attributed to the fact that a cell phone is used to seek market information. Prifti et al. (2016) and Muricho (2015) found a similar result, stating that gathering market information is a fixed cost effecting the decision to take part in the market, but not regarding market participation intensity.

Another transaction cost variable in this analysis is the ownership of a vehicle. It shows that a household that does not own a vehicle has a positive but not significant relationship to the market participation decision but, at the same time, has a negative and significant effect on the market participation intensity (Table 5.7.). It means that there is no relationship between vehicle ownership and the market participation decision, which is likely as many of the emerging farmers do not own vehicles. However, there is a relationship if a household decides on how much to sell (market participation intensity). The probability of conditional market participation intensity reduces by 6.7% if a household does not have any kind of transport, compared to a household that has a vehicle (Table 5.9.). Thus, when the household produces products to sell in the market and it does not have a vehicle, then the probability to sell in the
market decreases. This supports the findings by Prifti et al. (2016), Kabiti et al. (2016) and Muricho (2015).

The distance to the police station is found to have a positive and not significant relationship to market participation intensity. It means that there is no relationship between the distance to the police station and market commercialisation. The distance to the police station is taken as a proxy for the distance to the market, which might not be the best proxy as police stations are often available in rural areas, and markets only in bigger towns or urban areas. The positive relationship might relate to the fact that most farmers sell in informal markets, meaning that they do not pay taxes. Thus, the further they are from the police stations, the more likely farmers are to sell their produce without interference from the police.

5.5. Conclusion

Heteroscedasticity was found in the model, so the robust option was used to account for it. Other tests revealed no serial correlation or endogeneity. The estimation of the double-hurdle model was found to be more appropriate than the Tobit model. Furthermore, the APE were computed by using the bootstrapping technique.

The descriptive statistics of the dependent variable showed that only 20% of the surveyed households were commercialised. Approximately 68% of the households in the sample were female-headed. Approximately 50% of the sample did not have education higher than primary school. Most of the farmers (more than 90% of the sample) were performing their agricultural activities on land less than 5 ha in size. Access to financial resources is found to be diverse: most of the farmers had no access to credit and had unequal off-farm incomes with a minimum of 0 and maximum of R143,100.

The estimation of the double-hurdle model showed that the variable of interest – social grants – was found to be not significant. Age, gender, dependency ratio, credit, water source and distance to the police station were also found to be not significant in the model meaning that, in this sample, these variables are not related to commercialisation. Education, marriage, farm size, land ownership, cell phone and ownership of a vehicle were significantly related to the market participation decision and market participation intensity bearing out the theoretical underpinnings.
CHAPTER 6

CONCLUSION

The main aim of this minor dissertation was to investigate the relationship between social grants and the emerging farmers’ market commercialisation in South Africa. The emerging farmers in South Africa are a minor group that has not been well researched. The majority of these farmers produce agricultural goods to fulfil their demand for food on land of less than 5 ha. Moreover, they focus on home agricultural production to gain extra income. It was proven by numerous studies that commercialisation positively influences agricultural activities and mainly reduces poverty (Mitiku, 2014; Mathenge et al., 2010). Currently, the South African government promotes commercialisation through financial (cash transfers) and non-financial (extension services) programmes. Social grants are one of the largest targeted interventions that aim to fulfil the basic needs of vulnerable people (SASSA, 2015). The reviewed literature found that social grants could benefit emerging farmers to improve market participation as it leads to an extra cash inflow, which gives them access to assets, reduces their production costs or increases investments in agricultural activities (Moloi, 2008; Muricho, 2015; Prifti et al., 2016). Based on this knowledge, it was our main focus to investigate the relationship between social grants and the market commercialisation of emerging farmers.

To address this aim, we used a panel data set, namely the National Income Dynamics Survey that covers the time period from 2011 to 2015 and applied the double-hurdle estimation technique with APE in the analysis, as it is the most appropriate technique to estimate the market participation of farmers.

Previous literature on the topic is very sparse. Only two other studies analysed the relationship between social grants and market participation. The first was a study in Zambia (Prifti et al., 2016) and the other was a study in South Africa (Sinyolo, 2016) that only focused on a single province namely Kwa Zulu Natal. Other studies did not specifically look at social grants, but looked at other cash transfers and also investigated the relationship between credit and agricultural activities (Lewis et al., 2011; Yi, Lu & Zhou, 2016; Handa et al., 2016; Manafi, Bagheri & Sharghi, 2011; Bolarinwa & Fakoya, 2011; Mmbengwa et al., 2009; Thamaga-Chitja & Hendriks, 2008; Ramabulana, 2011; Martey et al., 2012; Muricho, 2015). In this study we address these gaps in the literature. Our main contributions are as follows: firstly, we performed the study for the whole of South Africa, as the only other paper done in South Africa focused only on one province (Sinyolo, 2016); secondly, we focused on all the crops and
livestock in our calculations and not only on specific crops like maize, banana and legumes or cotton and horticulture (Sinyolo, 2016; Martey et al., 2012; Justus et al., 2015; Chapoto et al., 2013); thirdly, we employed a 3-wave panel dataset that allowed us to obtain more accurate predictions of the double-hurdle model by controlling for unobserved factors (in previous studies Probit, Logit or Tobit models were used by Randela et al., 2008; Gebremedhin & Jaleta, 2010; Martey et al., 2012; Osmani & Hossain, 2015; Justus et al., 2015); and finally, we added to the existing literature on the relationship between social grants and emerging farmers’ market participation.

Our results showed that social grants did not contribute towards emerging farmers’ agricultural commercialisation. Lewis et al. (2011) stated that South Africans have a unique vision of social grants - the recipients consider grants as a “salary”, which discourages any actions to take part in the market. We also investigated the likelihood of reverse causality by performing the Hausman test and found that the direction of causality was from social grants to market commercialisation and not the other way around. While this study does not suggest that social grants should be withdrawn as support for emerging farmers, it is recommended that the government investigates how social grants can be integrated into the promotion of market commercialisation.

Education, marriage, farm size, land ownership, cell phone and ownership of a vehicle were found to be significant while other variables like age, age squared, gender, dependency ratio, credit, off-farm income, water source and distance to the police station did not show any significant relationship to commercialisation. It is suggested that the policies aiming to reduce barriers to the market should be high on the agenda for the development of emerging farmers.

A few unexpected signs were found with some of the results. For instance, it appears that higher education decreases the market commercialisation intensity by 2%. This might be because younger farmers do not feel motivated to perform agricultural activities and are looking into other jobs. This might be because other jobs promise to be more rewarding and offer higher incomes (Osmani & Hossain, 2015). It is recommended that incentives be created for these youths to remain on their farmland and contribute to food production to address the food insecurity. The government should promote agricultural disciplines to inject young and ambitious people into the agricultural sector. Furthermore, the government can take actions to train these farmers and supply them with the knowledge to farm efficiently. Also, courses or workshops could be organised to improve the knowledge of the older generations in the field.
Another result that did not measure up to expectations, was credit. It showed positive and not significant results for the reference category of, “a farmer does not have access to credit”. The result of non-significance might indicate that it is risky to undertake subsistence farming while being obliged to make credit repayments, especially when South Africans spend approximately 78% of their disposable income on covering their debt (South Africa's Credit Market Analysis, 2018).

Farm size showed that an increase in the land size by 1 unit leads to a decrease in the probability to take part in the market by 8% - this finding contradicts the theory. Seeing that emerging farmers normally have access to small farming areas, it could mean that gains in the farm size accompanied by gains to market access were not substantial enough to cover the associated costs of increased production (Amrouk et al., 2013). At the same time land ownership decreases the probability of market participation by 6%. Martey et al. (2012) stated that farmers who do not own the land, take part in the market because they have obligations to their land owners.

Since the majority of the sampled farmers operated on land less than 5 ha in size and the results clearly indicated questionable outcomes, it is clear that policy initiatives are needed to ensure that emerging farmers have considerably more land. The government should review the Land Reform programmes to reach the target of the development of emerging farmers and their integration into the markets.

Interestingly, distance to the police station was found to have a positive and not significant relationship to the market participation intensity. Theory suggests that those farmers located closer to the markets, have higher market participation rates (Justus et al., 2015; Sinyolo, 2016; Martey et al., 2012) In this case it is the opposite. From the background research we found that most farmers sell in informal markets, meaning that they do not pay taxes. Thus, the further they are from the police station the more likely they can sell their produce without interference from the police. Distance to the police station was taken as a proxy for distance to the market, which might not be the best proxy since there are often more police stations available in rural areas, while markets are often only in bigger towns or urban areas.

The results of this minor dissertation add substantially to the literature by showing that emerging farmers are one of the important groups in the agricultural sector of South Africa. It is likely that cash transfers can increase market participation, which could alleviate poverty and increase food security. However, cash transfers such as social grants, which are not specifically directed at the development of agricultural activities and increased market access,
are not the ideal method to address this matter. In this study it was shown that they are not statistically significant and rather act as a disincentive – as emerging farmers who receive social grants will use these grants to fulfil their basic needs, meaning that their dependency on agricultural activities decrease. Thus, to develop the agricultural sector and emerging farmers, a support system tailored to emerging farmers and specific to the development of markets access should be introduced. It is recommended (i) to increase the distribution of targeted agricultural grants; (ii) to investigate how social grants can be integrated into the promotion of market commercialisation; (iii) to raise the priority of reducing the barriers to the market on the development policies agenda; (iv) to create incentives for the youths to remain on their farmland and contribute to food production; (v) to train emerging farmers and supply them with the knowledge to farm efficiently; and (vi) to review the Land Reform programmes to ensure that emerging farmers have considerably more land. These policy interventions will lead to rural development through the decrease of food insecurities and poverty reduction, which is a major problem in rural areas where most of these farms are found.

In future research, different kinds of cash transfers and support systems should be analysed to find the method most appropriate to stimulate growth in these sectors and encourage emerging farmers to participate in the market, which can lead both to addressing food security and decreasing poverty in South Africa.
References


Department of Agriculture, Forestry and Fisheries. (2013). Strategic plan for smallholder support. Pretoria: DAFF.


APPENDIX A

The Stata results for the selection bias and endogeneity problems are presented in this section. The results of these tests can be found below.

Truncated regression with the Inverse Mill's Ratio was estimated to test for the selection bias problem.

Fitting full model:

Iteration 0:  log likelihood = -2653.8918
Iteration 1:  log likelihood = -2653.7719
Iteration 2:  log likelihood = -2653.7718

Truncated regression

<table>
<thead>
<tr>
<th>Limit:  lower</th>
<th>upper</th>
<th>Number of obs</th>
<th>Wald chi2(16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lower = 0</td>
<td>+inf</td>
<td>580</td>
<td>14.33</td>
</tr>
</tbody>
</table>

Log likelihood = -2653.7718

| Coef. | Std. Err. | z     | P>|z|     | [95% Conf. Interval] |
|-------|-----------|-------|--------|---------------------|
| best_age_yrs | -0.4715773 | 0.4334482 | -1.09 | 0.277 | -1.32112 | 0.3779656 |
| AgeSq | 0.0040568 | 0.0038692 | 1.05  | 0.294 | -0.0038267 | 0.0116402 |
| HGender | -0.1588629 | 0.236544 | -0.07 | 0.946 | -0.4790541 | 0.4477315 |
| HHEduc | -1.850379 | 1.371428 | -1.35 | 0.177 | -4.538328 | 0.8375696 |
| HHHaritalSt | 3.168698 | 2.210978 | 1.43  | 0.152 | -1.164739 | 7.502135 |
| ratio | 1.414364 | 3.85972 | 0.37  | 0.714 | -6.150549 | 8.979276 |
| Loan | 3.538726 | 3.276437 | 1.08  | 0.280 | -2.882972 | 9.960423 |
| GrantTotal | 0.0004911 | 0.0008529 | 0.50 | 0.566 | -0.0011805 | 0.0021627 |
| OffFarmIncome | 0.0001177 | 0.0001943 | 0.61 | 0.545 | -0.0002631 | 0.0004904 |
| WaterSource | 1.59166 | 2.134483 | 0.75  | 0.456 | -2.59185 | 5.77517 |
| HHCell | 2.171079 | 2.587346 | 0.84  | 0.401 | -2.900027 | 7.242185 |
| HHVehicle | -0.091416 | 5.113518 | 0.00 | 0.319 | -15.1373 | 4.930894 |
| DistPol | 1.566189 | 1.097767 | 1.55  | 0.120 | -4.408998 | 3.541376 |
| LandSize | -3.646109 | 2.83689 | -1.47 | 0.142 | -8.514051 | 1.221832 |
| LandOWN | -4.158279 | 2.308161 | -1.81 | 0.057 | -14.93974 | 4.618804 |
| lambda | 0.515688 | 0.316453 | 1.63  | 0.103 | -1.045848 | 1.17524 |
| _cons | 104.3929 | 15.44767 | 6.89  | 0.000 | 74.70972 | 134.0761 |

/sigma 23.49881  .6920124    33.96   0.000     22.14249    24.85513

Source: Author’s computations

The IMR (lambda) was found to be not significant, meaning that there is no selection bias problem.
The Hausman test for potential endogeneity included two steps as was discussed in the Chapter 4 section 4.3.3. The second step estimates the equation with the residuals from the previous step. These results are presented below.

### Source: Author’s computations

The residuals (v2hat) are not statistically significant; thus, there is no endogeneity problem. It means that there is no possibility of inverse causality that might flow from commercialisation to social grants.