Article

Exploring the Determinants of the Relationships between the Land-Based Sectors with the Wider Rural Business Base in Scotland: An Empirical Analysis

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Abstract: Over the past two decades, the relative socio-economic importance of land-based sectors has declined in comparison to non-land-based businesses such as tourism, food and beverage activities. However, policy implementation and research have primarily focused on the economic contributions of land-based businesses, leaving businesses outside these sectors and in rural areas, referred to as non-land-based businesses, largely overlooked. Therefore, this study aims to examine the importance of non-land-based businesses and the key determinants of the relationships between non-land-based businesses and land-based (farming, forestry and landed estate) sectors in rural Scotland. Through a survey of 1500 businesses whose primary focus is not agriculture, forestry or landed rural estates in four Scottish regions, the key findings of the logit model reveal that businesses located in rural areas are more likely to have relationships, both direct (supplying or purchasing goods/services) and indirect, with farming, forestry and landed estate sectors than their urban counterparts. Focusing on rural businesses, the results show that business size, sectors, business age, exporting, importing and business constraints related to cash flow, digital connectivity and government financial support significantly influence their relationships with land-based sectors. The results of crosstab analysis also reveal differences in business performance, business challenges related to Brexit and future plans between non-land-based rural businesses having relationships with land-based sectors in different rural classifications: accessible/remote small towns, accessible rural areas and remote rural areas. The paper concludes with policy recommendations to support rural businesses and future land-based and non-land-based sectors in rural Scotland.

Keywords: non-land-based businesses; rural businesses; relationship with land-based industry; empirical analysis; Scotland

1. Introduction

Scotland has a remarkably diverse landscape, which is traditionally divided into two distinct areas, the Highlands and Islands, and Southern Scotland, that were until 2020 represented by two enterprise agencies (Highland and Island Enterprise, and Scottish Enterprise) (Figure 1). Approximately 98% of Scotland's landmass is classified as rural and 80% of rural Scotland's land is used for agriculture, with 12.5% used for forestry [1]. In 2020, 439,500 people were employed in rural areas, with over 20% employed in the agriculture and forestry sectors [2]. Therefore, these land-based sectors, particularly agriculture, are a key contributor to Scotland's rural economy.

Agriculture's role in rural economies in Scotland has shifted over the past two decades, moving away from traditional land-based businesses to non-land-based businesses such as the tourism, food and beverage industries [3]. However, the role of land-based sectors, including farming, forestry and landed estate sectors, remains significant for some local and rural economies. In 2018, the Scottish Government estimated that over 50,000 businesses were registered in rural areas in Scotland, playing a significant role in providing

employment and income generation [3] alongside the public sector. Many of these rural businesses in still rely on the land-based industries to some extent for income and business sustainability. Additionally, long term agricultural support policies (i.e., the Common Agricultural Policy (CAP).) have mainly concentrated on the economic contributions of land-based businesses and their activities. The CAP is a European Union (EU) policy that has played a significant role in supporting sustainable agriculture and other land-based sectors across the EU [4]. Under the CAP, from 2015 to 2020, the Scottish Government provided financial support to farmers based on the area of land farmed and environmental benefits delivered [5]. The government regularly monitors changes in the agriculture and forestry sectors and collects data on farm incomes and the role that the CAP plays in supporting the sector [3]. However, while the CAP has traditionally focused on land-based businesses, many rural businesses with fewer than three hectares of land, particularly small businesses, have been left out of income support schemes [6]. Additionally, after Brexit—the UK's exit from the EU—the Scottish Government introduced the new legislation to ensure that the CAP would continue to support the land-based sectors in the future and to promote rural development and community engagement [7]. However, it is still unclear how the new legislation supports rural development outside the land-based sectors, and if such support flows to 'non-land-based businesses[1]'.
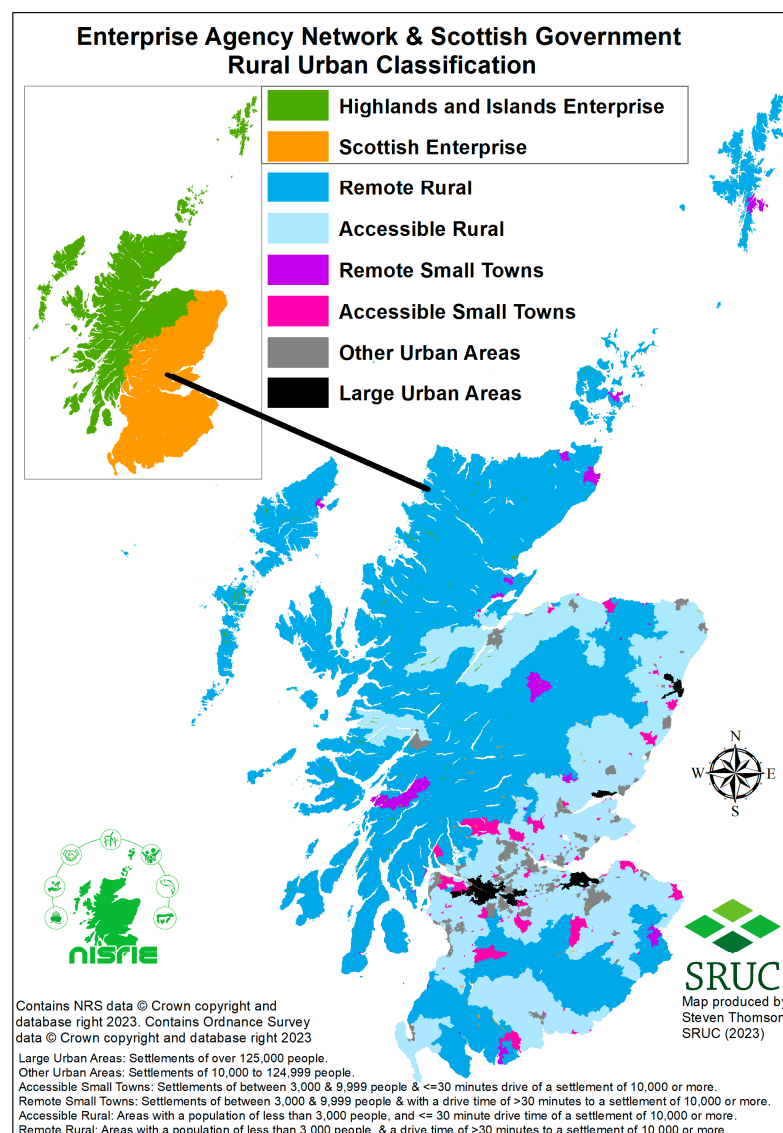
Figure 1. Scottish landscape map. Source: map produced by Steven Thomson.

Since rural areas have diversified economies [8] and are significantly associated with the wider agricultural, forestry and estate supply chains [3], we, therefore, cannot ignore these non-land-based rural businesses. At the same time, farming and agricultural businesses in rural areas often rely on non-land-based businesses for goods, services and processing operations as well as off-farm activities [9]. For example, Haggblade et al. [10] revealed that non-farm income can help stimulate farm investments and improve agricultural productivity in rural areas in sub-Saharan Africa. Hazell and Hojjati [11] pointed out that a combination of agricultural and non-agricultural activities can drive rural economies, since non-farm activities can be an important source of income and employment for farmers in the Zambia. Considering local case studies in England, Short et al. [12] reported that farm diversification that incorporates non-land-based businesses, such as tourism, can create new job opportunities in rural areas. Nonetheless, the key determinants of the relationships between non-land-based businesses and land-based sectors, and how important these non-land-based businesses are as contributors or catalysts to rural businesses in different rural locations in Scotland, are still unclear from the existing evidence. Therefore, the objectives of this study are as follows:

(1) To examine the key determinants of the relationships between non-land-based businesses and land-based sectors (i.e., farming, forestry and landed estate) in rural Scotland.

(2) To explore the differences in business performance, future plans and challenges of non-land-based rural businesses that have relationships with land-based sectors in different rural classifications.

To achieve these objectives, we conducted a survey of 1500 non-land-based businesses in 2020 in four Scottish regions, Aberdeenshire, Dumfries and Galloway, the Scottish Borders and Tayside—areas that were predicted to have been most adversely affected by the 2014 CAP reforms [3]. Given the lack of research and data on non-land-based business in rural areas, this study aimed to investigate the factors that determine the relationships between non-land-based businesses and land-based sectors in rural Scotland. Here, we are interested in whether or not non-land-based businesses have a relationship (supplying, purchasing or both supplying and purchasing) with (1) the farming sector, (2) the forestry sector and (3) the landed estate sector. For data analysis, we empirically applied the logit model to identify the key determinants of relationships between the non-land-based businesses and three types of land-based sectors. In this analysis, non-land-based businesses located in rural areas were reported to be statistically and significantly associated with three types of land-based sectors. Focusing on rural businesses, the results show that differences in business characteristics (e.g., business size, sectors, type of businesses), business activities (e.g., exporting, importing) and business obstacles (e.g., cash flow, digital connectivity, financial support) significantly influence their relationships with these land-based sectors.

Using the 2016 rural–urban classification from the Scottish Government (Figure 1) [13], we conducted a comparative analysis of the business performance, future plans and business challenges of non-land-based rural businesses having relationships with land-based sectors in different rural classifications: accessible/remote small towns, accessible rural areas and remote rural areas. The results reveal the differences in business performance, future plans and business challenges related to Brexit among non-land-based rural businesses having relationships with three land-based sectors in different rural classifications. The results highlight specific business support needs for rural businesses outside land-based sectors in different rural locations. This evidence-based analysis is also beneficial for policymakers, academic researchers and practitioners via informing future agricultural policy, as this is being reshaped across Scotland, and promoting a better understanding of the impacts of policy changes beyond agricultural businesses.

The remainder of the paper is organised as follows: Section 2 discusses the theoretical background. Section 3 reviews key relevant evidence and the national and international literature. Section 4 details data and the econometric models used in this paper. Empirical results are discussed in Section 5, and Section 6 concludes with policy recommendations. Section 7 highlights the limitations of the study and future research directions.

2. Theoretical Perspectives

Rural areas are often characterised by a high degree of dependence on land-based sectors such as agriculture and forestry globally. However, there is growing recognition of the importance of non-land-based businesses in rural economies, particularly in the context of economic diversification and the promotion of sustainable rural development, including in Scotland. The relationships between land-based sectors and non-land-based businesses are complex and multifaceted, being influenced by a range of factors including market demand, access to infrastructure and resources and social networks and relationships [9]. Therefore, to explain these relationships, we firstly follow the 'rural economic development' perspective, which emphasises the importance of economic growth and diversification in rural areas [14]. This theoretical perspective also focuses on enhancing the economic well-being of rural areas through various strategies and activities, such as increasing the range of economic activities, diversifying sources of income and generating new job opportunities, which are closely linked to the performance of different sectors and industries, including both land-based and non-land-based businesses [3]. Lobao and Meyer [15] posit that non-farm businesses such as retail, services and manufacturing provide important sources of employment and income diversification in rural areas in the US. Mahroum et al. [16] also mentions that non-land-based businesses can create higher demand for goods and services produced by farming and agricultural sectors in the UK.

To further explore the relationships between different sectors and industries in rural areas, the notion of 'rural–urban linkages' offers a useful perspective that recognises the flows of goods, people, information, finance and social relations between rural and urban areas [17]. This perspective also goes beyond the traditional urban–rural dichotomy and acknowledges the complementary and interconnected nature of these areas. It also recognises that the functional links between sectors, particularly agriculture, industry and services, are central to structural change in both rural and urban areas [17]. For example, based on data from Africa and Asia, agricultural activities in rural areas can supply food and raw materials to urban areas, while urban areas can provide markets for agricultural products, as well as services and manufactured goods that are important for rural development [18]. Similarly, Mayer et al. [19] discovered that rural businesses, including non-land-based businesses, can supply goods and services to urban consumers, while also relying on urban markets for their own inputs and supplies in Germany. They also report that the rural–urban linkage theory can help to identify the key factors that influence these connections, such as transport infrastructure, communication networks, access to financial services and so on.

'Value chain theory' is another useful conceptual framework for understanding the connections between land-based sectors and non-land-based businesses in rural areas. This perspective emphasises the different stages and actors involved in the production and distribution of goods and services and can help to identify the linkages and dependencies between different parts of the value chain [20]. For example, non-land-based businesses such as food processing companies often rely on inputs from land-based sectors such as agriculture, while also creating value-added products that can support the competitiveness and diversification of land-based sectors [21].

Overall, the relationships between land-based sectors and non-land-based businesses in rural areas can be examined through the lenses of these theoretical perspectives above. The rural economic development perspective emphasises economic growth and diversification through the development of various industries and businesses. The rural–urban linkage recognises the interdependence and linkages between urban and rural areas. Lastly, the value chain theory highlights the importance of understanding the dynamics of value chains and supply chains, including the role of actors and institutions in shaping outcomes for rural businesses. Thus, applying these frameworks to understand the key determinants of these relationships can lead to more effective strategies of promoting rural economic well-being, including income diversification and sustainable development through promoting diversified economic activities in rural areas.

3. Literature Review

Rural areas are an important part of Scotland, accounting for 98% of the country's landmass [3,22]. Rural activities also significantly contribute to the Scottish economy, contributing approximately 30% of Scotland's overall income annually [23]. The agriculture, forestry and fishing sectors are the main economic activities in rural Scotland, employing around 27% of workers in rural areas compared to only 0.5% in the rest of Scotland [2]. However, rural areas are diverse, and these industries are just one component of a more diverse rural economy [24]. The Scottish Government [2] reports that approximately 34% of employees in rural Scotland work in the public sector, followed by financial and other activities[2] (32%), accommodation and food services (24%), wholesale, retail and repair (22%) and manufacturing (18%). In particular, Thomson et al. [3] also report that several fast-growing businesses have been developed in recent years that have a significant presence in rural locations in Scotland, such as the food and drink industry.

Rural businesses play an important role in providing employment and wealth generation, thereby helping to sustain communities in remote rural and accessible rural Scotland [25]. According to the Scottish Government's estimation, 70,000 businesses were reported to be located in rural and small-town areas in 2018, and these generated over GBP 54 billion in turnover and created around 450,000 jobs [3]. According to the Scottish Government Urban Rural Classification 2016, more than 60% of these businesses in remote and accessible rural Scotland are microbusinesses (0–9 employees) [2]. Thomson et al. [3] also report that 44% of rural businesses in Scotland are home-based and 34% employ family members who work full-time in the business. Many of these businesses are vital to local economies, and some rely on direct expenditure from farming, forestry and landed estate activities [3]. In particular, farmers in rural Scotland often receive income support from direct payments under the CAP [26]. The CAP direct payments in the 2015 to 2020 period provided income support to farmers, crofters[3] and landowners in rural areas, which in turn supported the Scottish economy and the stability of the agri-food supply chain in Scotland [27]. Data on direct farm incomes are regularly collected to monitor changes in farming and agriculture sectors and the impacts of these payments on land-based businesses in rural areas. Although many rural businesses rely on direct expenditure from land-based sectors, not all of them are entitled to receive CAP direct payments [6]. To date, there have been limited assessments of how changes in support levels affect different types of rural businesses, particularly non-land-based businesses [3]. Furthermore, information on the key determinants of the interactions between non-land-based rural businesses and land-based sectors in Scotland is still limited.

Previous studies have mainly focused on the interactions between land-based industries and rural businesses and communities [25,28]. Some have identified key factors that influence the connections between land-based sectors and rural firms. For example, Courtney and Errington [29] identified that business sectors, economic activities, technology, business size and age of businesses are key factors that influence the association between land-based sectors and rural areas in England. Shackleton et al. [30] also examined the contribution of land-based activities to rural livelihoods in South Africa. They found that land-based sectors (e.g., agriculture, forestry and other related sectors) play an important role in rural livelihoods both financially and socially and in the diverse range of livelihood strategies adopted by rural households. Through case studies from rural communities in England, Short et al. [28] found that the relationships between rural communities and land-based sectors differ significantly depending on various factors, such as the nature of local land-based industries, local social norms and the association between demand and supply for local products. In addition, Wilmsen [31] examined the effect of land-based resettlement on rural livelihoods in China, and he reports that access to farmland and non-farm jobs are important determinants of household income.

However, the role of non-land-based businesses in rural areas has often been overlooked by research and policy, and evidence on their relationships with land-based sectors is rather scant. Only a few studies have explored the importance of rural non-land-based

rural businesses and the relationships between non-land-based and land-based businesses. For example, Raley and Moxey [9] examined firm characteristics, business support and business performance between agricultural and non-agricultural microbusinesses in rural areas in the northeast of England. They found that agricultural businesses traditionally have low incomes. Thus, to improve their economic performance, more than 50% of farm businesses in this region had diversified into non-farming activities and off-farm employment. This emphasises the strong association between non-land-based and land-based businesses within the rural economy. Farm size, landownership, business age and level of education were reported to be key factors associated with a business's ability to participate in diversification.

Additionally, Thomson et al. [3] explored the importance of non-land-based businesses and their relationships with land-based sectors (farms, estates and forestry sectors) in Scotland. Using data of 1500 rural non-land-based businesses, they found that around 60% of businesses reported some form of business connection with the farming, forestry and estate sectors. Over 50% of businesses said that they had a relationship with the farming sector, with 25% supplying farms, 6% buying from farms, 9% both supplying and purchasing from farms and 15% having a more indirect relationship (e.g., they only have sporadic business dealings). However, this study did not identify the key factors influencing their relationships with land-based industries.

In conclusion, regarding the key literature above, we still know little about the role of non-land–based businesses within rural economies and the specific issues they face as well as their connections with land-based sectors in rural Scotland. Non-land-based businesses are also part of agri-food supply chains in rural areas [9] since rural areas do not solely rely on farming and agricultural sectors [8,24]. Therefore, to produce an evidence-based analysis that can inform policymakers and support non-land-based businesses in rural Scotland, this paper expands on the study of Thomson et al. [3] by identifying the key factors influencing the relationships between rural non-land-based businesses and three types of land-based sectors (agriculture, farming and landed estate sectors). Additionally, this paper is the first to consider these relationships, business performance and business challenges among non-land-based businesses within different rural classifications in Scotland.

4. Data and Methodology

4.1. Data Collection and Descriptive Statistics

In this study, a total of 1500 businesses were interviewed by Pexel Research Services through a telephone survey in 2020 using a quota sampling technique, which is a non-probability sampling method. This technique involves selecting a sample based on pre-specified quotas or proportions for a predetermined number or population units. It allows for a more diverse sample and greater control over the sample selection process. This was particularly useful for our study as there is limited information on business units in some locations. This survey mainly focused on businesses in four Scottish regions, Aberdeenshire, Dumfries and Galloway, the Scottish Borders and Tayside, since these regions were predicted to have been most adversely affected by the CAP reforms [3] and were all contained within the Scottish Enterprise development agencies boundary. Figure 2 illustrates the graphical distribution of businesses included in this survey across the four regions, with the density of businesses represented by different shades of purple. The data were collected from business owners and managers whose primary focus was not agriculture, forestry or landed estate, classified as non-land-based businesses here. In particular, a landed estate is typically a holding of hundreds or thousands of acres of land owned by a family over generations and can host a wide range of businesses activities and assets such as traditional sporting estates (where hunting, shooting and fishing are popular activities), renting of land/building or mixed-enterprise estate that includes a mix of farming, sporting, forestry and other ventures. In Scotland, the landed estate sector has a long history and has played a significant role in shaping the country's landscape and economy [32]. According to a report from BiGGAR Economics [32], many landed estates in

Scotland have significant forestry holdings, such as the Aboyne Estate in Aberdeenshire, which contributes GBP 2.4 billion GVA per year to the Scottish economy. Some landed estates are also involved in tourism and hospitality, offering accommodations and outdoor activities for visitors [33]. In this survey, we also included the ancillary businesses that make up the wider agriculture, estate and forestry supply chains, such as construction companies, renting of land or buildings, animal welfare inspectors, vehicle maintenance, property rental/sale, renewable energy and so on.
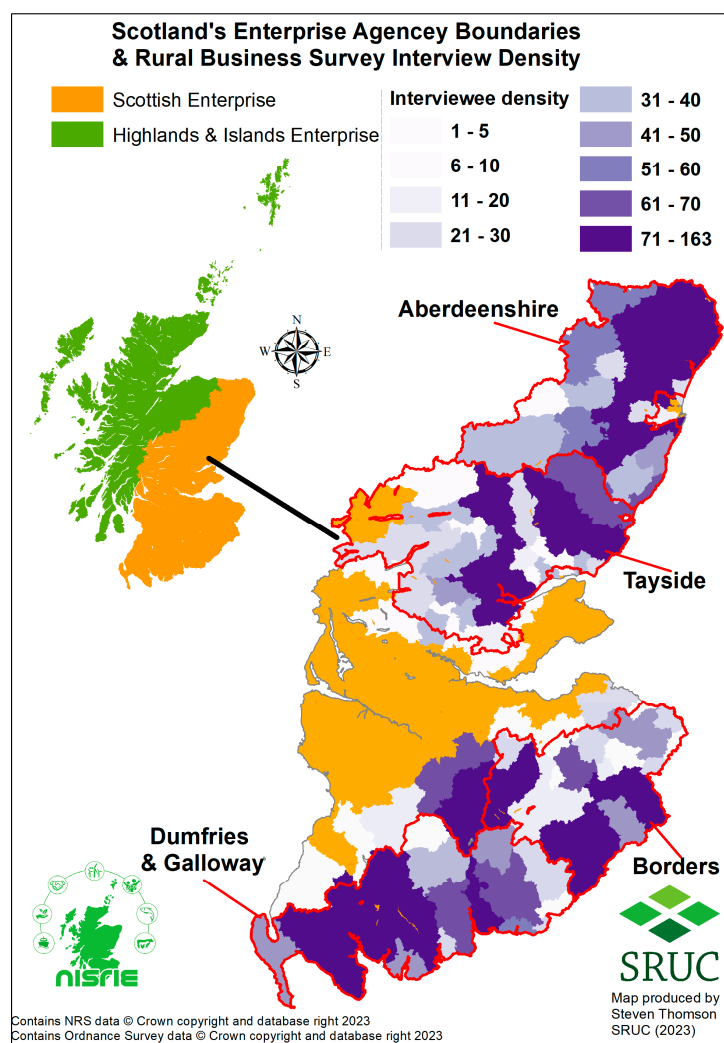
Figure 2. Map of the four Scottish regions included in this study. Source: map produced by Steven Thomson.

In this survey, we asked participants whether their businesses had a relationship with the farming, forestry or landed estate sectors. Non-land-based firms were asked whether they had either a direct relationship (supplying goods/services to the land-based industry and/or buying goods/services from the land-based sectors) or an indirect relationship (e.g., involvement in property rental/sale, animal welfare inspections, vehicle maintenance, accountancy work, property rental/sale, renewable energy and so on) with these sectors. Approximately 57% of non-land-based businesses interviewed in these regions had a relationship with the farming sector, followed by the landed estate (31.2%) and forestry sectors (24.1%).

The survey also included some businesses in towns and urban areas since some businesses in these locations were recognised as having a strong relationship with agricultural supply chains and their locations are despite not being classified as rural, using the 2016 Urban Rural Classification released by the Scottish Government [13], which identifies

urban and rural areas based on settlement size and drive times[4]. Figure 3 demonstrates the distribution of non-land-based businesses in different rural town classifications that were used for the comparative analysis in this study.
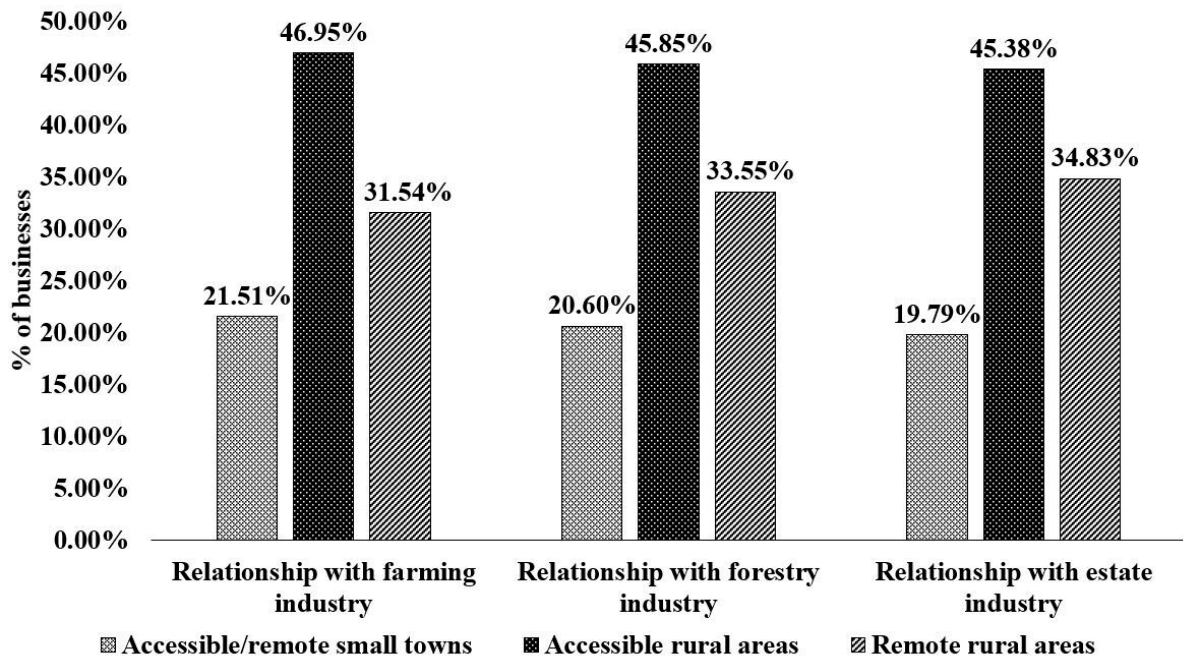

Figure 3. Relationships with land-based industry by rural town classification.

Table 1 details the descriptive statistics of key variables used in the analysis, including both dependent and independent variables. For example, with regard to non-land-based rural businesses, 27.6% of the non-land-based businesses in rural areas were located in Aberdeenshire, followed by the Borders (26.8%) and Dumfries and Galloway (21.9%). Approximately 46% and 35% of these businesses were family businesses and women-led businesses, respectively. Moreover, 40% of the non-land-based rural businesses were older businesses operating for 25 years and over, while only 7.7% were young businesses less than 5 years of age.

Table 1. Descriptive statistics.

Variable	Description	Non-Land-Based Businesses			Non-Land-Based Rural Businesses		
		Obs	Mean	S.D.	Obs	Mean	S.D.
Dependent							
FARM	Whether businesses have a relationship with the farming/agriculture sector (dummy)	1485	0.568	0.496	854	0.632	0.482
FOREST	Whether businesses have a relationship with the forestry sector (dummy)	1486	0.241	0.428	855	0.280	0.449
ESTATE	Whether businesses have a relationship with the landed-estate sector (dummy)	1477	0.312	0.464	848	0.358	0.480
Independent							
RURAL	Whether businesses are located in rural areas (dummy)	1500	0.575	0.494	-	-	-
TOWN	Whether businesses are located in small towns (dummy)	1500	0.195	0.397	-	-	-
FAMILY	Whether businesses are family businesses (dummy)	1500	0.401	0.490	863	0.463	0.499
ABERDEEN	Whether businesses are located in the Aberdeenshire region (dummy)	1500	0.280	0.449	863	0.276	0.447
BORDER	Whether businesses are located in the Borders region (dummy)	1500	0.220	0.414	863	0.268	0.443
DUMGAL	Whether businesses are located in the Dumfries and Galloway region (dummy)	1500	0.220	0.414	863	0.219	0.414

Table 1. *Cont.*

Variable	Description	Non-Land-Based Businesses			Non-Land-Based Rural Businesses		
		Obs	Mean	S.D.	Obs	Mean	S.D.
FEMALE	Whether businesses have female board members (positions) (dummy)	1491	0.364	0.481	858	0.355	0.479
IMPORT	Whether businesses source supplies of goods or services (i.e., inputs) outside Scotland (dummy)	1324	0.242	0.429	763	0.229	0.421
EXPORT	Whether businesses sell goods/services outside Scotland (dummy)	1379	0.163	0.370	788	0.184	0.388
SMALL	Whether businesses are small businesses (dummy)	1489	0.150	0.357	859	0.134	0.341
MED	Whether businesses are medium businesses (dummy)	1489	0.028	0.164	859	0.014	0.117
LARGE	Whether businesses are large businesses (dummy)	1489	0.069	0.253	859	0.035	0.184
ONLINE	Whether online sales are important for businesses (dummy)	1500	0.206	0.405	863	0.217	0.412
SOMEDIA	Whether social media is important for businesses (dummy)	1500	0.304	0.460	863	0.305	0.461
GOVSER	Whether access to government services is important for businesses (dummy)	1500	0.295	0.456	863	0.309	0.463
PRIMARY	Whether businesses operate their businesses in primary industries (dummy)	1497	0.036	0.187	861	0.053	0.225
MANU	Whether businesses operate their businesses in manufacturing (dummy)	1497	0.062	0.241	861	0.070	0.255
CONSTR	Whether businesses operate their businesses in construction (dummy)	1497	0.116	0.320	861	0.125	0.331
WHOLE	Whether businesses operate their businesses in wholesale and retail trade (dummy)	1497	0.270	0.444	861	0.229	0.420
ACCOM	Whether businesses operate their businesses in accommodation and food service activities (dummy)	1497	0.150	0.357	861	0.177	0.381
INFORM	Whether businesses operate their businesses in information and communication (dummy)	1497	0.015	0.120	861	0.017	0.131
FINANCE	Whether businesses operate their businesses in financial and insurance activities (dummy)	1497	0.017	0.128	861	0.006	0.076
PROFESS	Whether businesses operate their businesses in professional, scientific and technical industries (dummy)	1497	0.081	0.273	861	0.060	0.238
ADMIN	Whether businesses operate their businesses in administrative and support services (dummy)	1497	0.075	0.264	861	0.093	0.290
HEALTH	Whether businesses operate their businesses in human health and social work activities (dummy)	1497	0.020	0.140	861	0.013	0.112
ARTS	Whether businesses operate their businesses in arts, entertainment and recreation (dummy)	1497	0.053	0.225	861	0.066	0.249
AGELESS5	Whether the age of the business is between 0 and 5 years (dummy)	1482	0.076	0.264	852	0.077	0.267
AGEOVER25	Whether the age of the business is 25 years and more (dummy)	1482	0.410	0.492	852	0.426	0.495
STAFF	Whether recruiting skilled staff is a major constraint for businesses (dummy)	1436	0.193	0.395	827	0.203	0.403
TRAINING	Whether access to training is a major constraint for businesses (dummy)	1424	0.088	0.284	817	0.083	0.276
CASHFLOW	Whether cash flow is a major constraint for businesses (dummy)	1447	0.345	0.475	830	0.387	0.487
GOVFIN	Whether government financial support is a major constraint for businesses (dummy)	1410	0.232	0.422	815	0.275	0.447
ADVICE	Whether access to business advice is a major constraint for businesses (dummy)	1441	0.083	0.275	830	0.094	0.292
CONNECT	Whether digital connectivity is a major constraint for businesses (dummy)	1432	0.297	0.457	825	0.335	0.472
SUPPLIER	Whether access to appropriate suppliers is a major constraint for businesses (dummy)	1445	0.177	0.382	836	0.159	0.366

Table 1. *Cont.*

Variable	Description	Non-Land-Based Businesses			Non-Land-Based Rural Businesses		
		Obs	**Mean**	**S.D.**	**Obs**	**Mean**	**S.D.**
NEWMARKET	Whether access to new markets is a major constraint for businesses (dummy)	1423	0.134	0.340	823	0.146	0.353
CUSTOMER	Whether finding and retaining customers are major constraints for businesses (dummy)	1454	0.312	0.463	836	0.321	0.467

Note: the total number of observations for each variable is different because not all businesses answered all questions in the survey.

4.2. Empirical Analysis

This study aimed to identify the key determinants of the relationships between land-based sectors and non-land-based businesses in rural areas and to understand the importance of the relationships between land-based sectors and rural businesses in different rural classifications in Scotland. To do this, the analysis was divided into three main steps. Firstly, in the survey, non-land-based businesses were asked whether they have a relationship (either direct or indirect) with land-based sectors (i.e., the farming, forestry and landed estate sectors) or not. The relationships with land-based sectors were used as the dichotomous dependent variables in this analysis. Thus, to examine the relationships between rural businesses and other key factors and their relationships with three land-based sectors, we applied the logit model, which is expressed as

$$\text{Logit}(\mathbf{P}_i) = \beta_0 + \beta_1 \text{RURAL}_i + \beta_2 \text{TOWN}_i + \beta_3 \mathbf{X}_{3i} + \varepsilon_i \tag{1}$$

where $\mathbf{P}_i$ is the probability of ith non-land-based business having a relationship with a land-based industry, RURAL represents businesses located in rural and remote areas, TOWN represents businesses located in small towns (urban areas as a default), $\mathbf{X}_3$ is the vector of covariates such as business size, age of businesses, sector, region, business type, business obstacles and so on (see Table 1), and ε_i is the robust error term.

Secondly, we followed the 1st step analysis. However, this analysis focused solely on non-land-based businesses in rural areas as the analysis explored the key determinants of the relationships of non-land-based rural businesses with land-based sectors. Recall Equation (1); the estimated regression is now rewritten as

$$\text{Logit}(\mathbf{P}_i) = \beta_0 + \beta_1 \mathbf{X}_{1i} + \varepsilon_i, \text{ where ith non-land-based firm} = \text{RURAL} \tag{2}$$

where $\mathbf{P}_i$ is the probability of ith non-land-based rural business having a relationship with a land-based sector, $\mathbf{X}_1$ is the vector of covariates such as business size, age of businesses, sector, region, business type, business obstacles and so on, and ε_i is the robust error term. In Equation (2), rural and small-town areas are omitted in the models because of collinearity.

Since businesses located in different rural classifications experience different business challenges and require specific and unique businesses support and/or advice [34], the final step was aimed to determine the importance of the relationships between land-based sectors and non-land-based businesses located in different rural locations. We applied crosstab analysis to examine the differences in business performance, future plans and challenges of businesses having relationships with the land-based sectors in different rural classifications: accessible/remote small towns, accessible rural areas and remote rural areas. In the crosstab analysis, the chi-square (χ^2) statistic was used to identify the relationship between two variables in a contingency table [35]: the rural town classifications and key observed variables related to business performance, future plans and business challenges. χ^2 helped verify whether the cross-tabulated groups were different, and *p*-values were used to determine whether the previously mentioned difference was statistically significant [36]. The robustness checks and key findings are discussed in Section 5.

4.3. Dependent Variables

In Table 1, based on the theoretical background, non-land-based businesses in rural areas are significantly associated with land-based sectors, since non-land-based businesses can provide important sources of employment and income diversification in rural areas, while creating higher demand for goods and services produced by farming and forestry sectors. This relationship can be influenced by different factors and geographical locations. Therefore, in this analysis, we aimed to explore the key determinants of the relationships between non-land-based businesses and land-based sectors in rural areas. Specifically, we analysed the relationships between wider rural businesses and each land-based sector, including farming, forestry and landed estates, which are binary dependent variables in Equations (1) and (2). The binary variable indicates whether businesses reported having any direct or indirect relationship with land-based sectors in a survey.

For the analysis, we also considered the importance of the relationships with land-based sectors among rural businesses in different rural classifications in Scotland. We analysed the differences in the business performance in terms of annual turnover and turnover changes, which are categorical variables. We also considered the comparative analysis of plans for the next five years among non-land-based businesses that have relationships with land-based sectors in different rural locations. As seen in Table 6, the future plans included investing in land/building, machinery, digital equipment, office equipment and staff recruitment/training. Businesses were asked whether they plan to invest in these plans or not as a binary variable. Finally, we considered the differences in business challenges related to Brexit, such as imports, exports, business regulations, access to seasonal labour and so on, between non-land-based businesses that have relationships with land-based sectors in different rural classifications. Previous studies show that Brexit could potentially add pressure on the UK economy due to labour shortages, UK–EU trade barriers and supply chain disruption [24,37,38]. However, some studies suggest that Brexit could provide opportunities for the UK to expand its global trade and create its own regulatory framework [37]. Thus, businesses that are willing and able to adapt to these changes may find Brexit to be a good opportunity. In the survey, firms were asked whether they see the challenges related to Brexit as a challenge for their businesses, an opportunity or both as a categorical variable.

4.4. Independent Variables

For Equations (1) and (2), the analysis considered three main determinants that can potentially impact the relationships between land-based sectors and non-land-based rural businesses: business characteristics, business challenges and business capability. Firstly, for business characteristics, the analysis controlled for business sectors since non-land-based rural businesses can run their businesses in different sectors, such as manufacturing, wholesale and/or retail and so on. Additionally, business size was controlled for in the analysis, with businesses being classified as small, medium or large based on the number of employees, with microbusinesses being the default in the model. Regions and other geographical locations such as rural areas and small towns were controlled for in the model since they can influence businesses' connection with land-based sectors [3]. In particular, we included information on businesses located in Aberdeenshire, Dumfries and Galloway and the Scottish Borders, with Tayside being the default in the model as a dummy variable, since our survey collected data from four regions. Gender was included in the analysis since women-led businesses are traditionally less likely to engage with land-based sectors than men-led businesses [9]. Business age impacts relationships with land-based sectors [3] since older businesses in rural areas are more likely to operate in agricultural and farming sectors [34]. Therefore, we also controlled for business age in the analysis. Finally, family businesses were controlled for type of businesses in the analysis since rural areas predominantly host family businesses [22].

Furthermore, we considered the impacts of business challenges/constraints on the connection between land-based sectors and non-land-based rural businesses. The key

business constraints considered in this analysis included recruiting skilled staff, access to staff training, access to business advice, government financial support, cash flow, digital connectivity, access to appropriate suppliers, access to new markets and customer engagement, since these variables can potentially influence the relationships between land-based sectors and non-land-based businesses in rural areas [3,9]. Regarding business capacity, digital technology and online platforms are crucial for business development in rural areas in the digital era [39]. Therefore, online sales activities and the use of social media were included in the analysis as these variables can influence the relationships between land-based sectors and non-land-based businesses. Additionally, the analysis controlled for the ability to export and import goods since non-land-based businesses are found to be involved in internationalisation as part of the agri-food supply chain in rural Scotland [3]. Phillipson et al. [34] also demonstrated that businesses in rural England tend to report having goods and/or services that are suitable for exporting.

5. Empirical Results and Discussion

Tables 2 and 3 detail the results of the logistic model concerning the probability of non-land-based businesses and non-land-based rural businesses having relationships with three types of land-based industries. All the models in these tables appear to have performed reasonably well, and the likelihood ratio (LR) was significant, indicating that there is no relationship between the log of odds of having connections with land-based industries and the set of independent variables. We also performed the Wald test, which was statistically significant. This identified that the estimated parameters of the chosen covariates in the propensity score model were suitable. Additionally, the Pearson correlation coefficient was then used to check for multicollinearity in regression analysis, and the highest correlation was 0.36, which was the correlation between GOVFIN and CASHFLOW. We further applied a variance inflation factor (VIF)[5] to test for multicollinearity again. The VIF values of the variables used in the models were less than 5, implying that multicollinearity was not a problem for this analysis [40,41]. The key findings are discussed as follows.

Table 2. The key determinants of the relationships between land-based sectors and non-land-based businesses in Scotland.

	Model I (Farming)	Model II (Forestry)	Model III (Landed Estate)
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
RURAL	0.706 *** (0.169)	0.764 *** (0.206)	0.542 *** (0.185)
TOWN	0.252 (0.197)	0.357 (0.242)	0.086 (0.223)
FAMILY	0.121 (0.136)	0.066 (0.156)	−0.217 (0.145)
ABERDEEN	−0.251 (0.172)	−0.447 ** (0.208)	−0.415 ** (0.193)
BORDERS	0.113 (0.188)	−0.214 (0.214)	0.102 (0.198)
DUMGAL	0.560 *** (0.192)	0.404 * (0.210)	0.152 (0.199)
FEMALE	−0.149 (0.141)	−0.305 * (0.169)	−0.325 ** (0.156)
IMPORT	0.273 * (0.165)	0.332 * (0.184)	0.313 * (0.171)
EXPORT	−0.003 (0.195)	0.331 (0.209)	0.045 (0.251)
SMALL	0.421 ** (0.185)	0.550 *** (0.206)	0.509 ** (0.202)
MED	−0.126 (0.410)	0.160 (0.492)	−0.268 (0.457)
LARGE	0.771 ** (0.307)	0.584 * (0.318)	0.278 (0.300)
ONLINE	0.237 (0.184)	0.262 (0.194)	0.298 (0.196)
SOMEDIA	−0.007 (0.152)	−0.190 (0.179)	−0.004 (0.164)
GOVSER	0.243 (0.151)	0.136 (0.166)	0.385 ** (0.153)
PRIMARY	1.061 *** (0.405)	1.195 *** (0.407)	0.563 (0.401)
MANU	0.274 (0.320)	0.181 (0.368)	−0.122 (0.371)
CONSTR	0.525 * (0.282)	−0.681 (0.362)	0.333 (0.300)
WHOLE	0.633 *** (0.241)	0.150 (0.278)	0.288 (0.258)
ACCOM	0.135 (0.270)	−0.154 (0.314)	−0.226 (0.302)
INFORM	−0.469 (0.619)	−0.712 (0.844)	−1.892 * (0.983)

Table 2. *Cont.*

	Model I (Farming)	Model II (Forestry)	Model III (Landed Estate)
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
FINANCE	0.763 (0.552)	0.969 * (0.582)	0.503 (0.661)
PROFESS	1.103 *** (0.330)	0.501 (0.342)	0.903 *** (0.328)
ADMIN	1.058 *** (0.338)	−0.002 (0.382)	0.458 (0.334)
HEALTH	0.315 (0.540)	−0.209 (0.634)	−0.218 (0.624)
ARTS	0.168 (0.372)	0.218 (0.384)	0.297 (0.381)
AGELESS5	0.328 (0.260)	0.350 (0.288)	0.161 (0.263)
AGEOVER25	0.297 ** (0.140)	0.061 (0.161)	0.088 (0.149)
STAFF	0.204 (0.183)	0.120 (0.207)	0.705 *** (0.184)
TRAINING	0.257 (0.266)	0.204 (0.290)	0.555 ** (0.262)
CASH	0.338 ** (0.161)	0.436 ** (0.180)	0.415 ** (0.165)
GOVFIN	0.287 (0.180)	0.043 (0.192)	−0.160 (0.179)
ADVICE	−0.056 (0.259)	−0.024 (0.297)	−0.025 (0.273)
CONNECT	0.139 (0.156)	0.231 (0.171)	0.330 ** (0.161)
SUPPLIER	−0.476 ** (0.90)	−0.361 (0.222)	−0.317 (0.203)
NEWMARKET	−0.555 ** (0.220)	−0.281 (0.254)	−0.286 (0.230)
CUSTOMER	−0.034 (0.156)	−0.179 (0.186)	−0.330 ** (0.167)
Constant	−1.213 *** (0.296)	−2.079 *** (0.348)	−1.650 *** (0.323)
Observation	**1116**	**1118**	**1116**
Wald chi2(37)	**106.09**	**97.68**	**114.13**
Prob > chi2	**0.000**	**0.000**	**0.000**
Correctly classified (%)	**70.96%**	**76.03%**	**70.25%**

Notes: *, **, *** denote significance at 10%, 5% and 1%; SE represents standard error. The correlation test is available upon request.

Table 3. The key determinants of a connection with land-based industry among non-land-based businesses in rural Scotland.

	Model IV (Farming)	Model V (Forestry)	Model VI (Landed Estate)
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
FAMILY	−0.123 (0.184)	0.051 (0.198)	−0.189 (0.190)
ABERDEEN	−0.371 (0.247)	−0.187 (0.262)	−0.140 (0.253)
BORDERS	−0.120 (0.246)	−0.278 (0.259)	0.088 (0.252)
DUMGAL	0.256 (0.281)	−0.070 (0.283)	0.021 (0.275)
FEMALE	−0.003 (0.196)	−0.285 (0.213)	−0.526 ** (0.207)
IMPORT	0.484 ** (0.236)	0.479 ** (0.234)	0.669 *** (0.232)
EXPORT	0.105 (0.263)	0.581 ** (0.267)	0.304 (0.278)
SMALL	0.890 *** (0.291)	0.391 (0.275)	0.449 (0.274)
MED	−0.520 (0.43)	−0.430 (0.950)	−1.463 (0.865)
LARGE	0.775 (0.640)	0.040 (0.526)	0.179 (0.179)
ONLINE	−0.126 (0.246)	0.073 (0.250)	0.124 (0.271)
SOMEDIA	0.023 (0.209)	−0.055 (0.230)	0.024 (0.225)
GOVSER	0.408 * (0.211)	−0.030 (0.214)	0.356 * (0.225)
PRIMARY	1.485 *** (0.489)	1.128 ** (0.467)	0.553 (0.475)
MANU	0.563 (0.421)	−0.078 (0.471)	−0.491 (482)
CONSTR	1.017 *** (0.371)	−0.736 * (0.443)	0.361 (0.380)
WHOLE	0.831 ** (0.338)	0.202 (0.358)	0.300 (0.337)
ACCOM	0.477 (0.370)	−0.292 (0.394)	−0.216 (0.388)
INFORM	−0.288 (0.767)	−1.480 (1.115)	−1.947 ** (0.989)
FINANCE	0.202 (0.202)	-	0.926 (0.388)
PROFESS	0.775 * (0.457)	0.061 (0.473)	0.003 (0.424)
ADMIN	1.457 *** (0.455)	−0.156 (0.469)	0.304 (0.425)
HEALTH	0.340 (0.807)	−1.277 (0.997)	-
ARTS	0.521 (0.471)	0.347 (0.461)	0.308 (0.490)

Table 3. *Cont.*

	Model IV (Farming)	Model V (Forestry)	Model VI (Landed Estate)
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
AGELESS5	0.238 (0.238)	0.346 (0.341)	0.118 (0.346)
AGEOVER25	0.527 *** (0.191)	0.244 (0.210)	0.181 (0.197)
STAFF	0.107 (0.244)	0.222 (0.252)	0.850 *** (0.245)
TRAINING	0.089 (0.372)	0.134 (0.400)	0.425 (0.380)
CASH	0.366 ** (0.246)	0.525 ** (0.230)	0.630 *** (0.221)
GOVFIN	0.420 * (0.234)	0.105 (0.238)	−0.343 (0.230)
ADVICE	0.437 (0.365)	−0.090 (0.371)	0.336 (0.336)
CONNECT	0.145 (0.204)	0.236 (0.220)	0.428 ** (0.209)
SUPPLIER	−0.392 (0.272)	−0.244 (0.302)	0.133 (0.284)
NEWMARKET	−0.511 * (0.301))	−0.219 (0.327)	−0.496 (0.313)
CUSTOMER	−0.013 (0.216)	−0.229 (0.234)	−0.216 (0.224)
Constant	−0.721 ** (0.377)	−1.311 *** (0.417)	−1.314 ** (0.389)
Observation	**638**	**637**	**630**
Wald chi2(35)	**65.85**	**64.23**	**80.19**
Prob > chi2	**0.001**	**0.001**	**0.000**
Correctly classified (%)	**67.76%**	**73.16%**	**69.62%**

Notes: *, **, *** denote significance at 10%, 5% and 1%. SE represents standard error. The correlation test is available upon request. FINANCE and HEALTH were dropped from Model V and Model VI, respectively, due to insufficient observations.

5.1. The Determinants of the Relationships between Non-Land-Based Businesses and Land-Based Sectors in Scotland

In Table 2 (Model I, Model II and Model III), the results reveal that non-land-based businesses located in rural areas were more likely to have relationships with farming, forestry and landed estate sectors. This suggests that non-land-based businesses in rural areas significantly rely on land-based sectors. Thomson et al. [3] report that Scotland's rural economies have become increasingly diverse as the range of rural businesses has expanded to non-land-based activities in recent decades. However, the primary sector continues to play a vital role in the economies of Scotland's rural areas, particularly in remote locations. Additionally, non-land-based businesses located in Dumfries and Galloway are more likely to have relationships with farming and forestry sectors. Skills Development Scotland [42] reported that almost one-third of all businesses in this region operate their businesses in the agricultural and forestry sectors. Therefore, these land-based sectors still play a strategic role in the process of economic and business development of this region. However, those located in Aberdeenshire are less likely to have relationships with forestry and landed estate sectors. This is because Aberdeenshire is home to a rich diversity of forests and woodlands that provide significant economic, environmental and social benefits for the region [43].

Interestingly, we found that older businesses (over 25 years old) were more likely to have a relationship with the farming sector. Using the data of over 10,000 SMEs in England, Phillipson et al. [34] revealed that businesses that operate in the primary sector, such as farming and forestry, tend to be older firms. In addition, women-led businesses are less likely to have relationships with farming, forestry and landed estate sectors. Typically, agricultural, forestry and land-based sectors are male-dominated businesses [44], and women often constitute a significantly smaller share of owners of agricultural land [45], which provides fewer opportunities for women to interact with these land-based sectors compared to men.

The results also show that non-land-based businesses that have imported goods/services were more likely to have a relationship with all the land-based sectors. This indicates that these businesses tend to be involved in importing activities. We also found that the size of a business impacted its relationships with land-based sectors. Non-land-based small

businesses were more likely to have a relationship with the farming, forestry and landed estate sectors, while large businesses tended to have relationships with only the farming and forestry sectors. We also discovered that non-land-based businesses that operate in the primary sector (e.g., mining, quarrying, etc.) were more likely to have relationships with the farming and forestry sectors. Additionally, those businesses in the professional sector were more likely to have relationships with the farming and landed estate sectors, while businesses in the financial sector tended to have a relationship with the forestry sector. Additionally, non-land-based businesses in construction and wholesale/retail sectors were more likely to have a relationship with the farming sector.

Regarding business challenges, we found different patterns across non-land-based businesses in four Scottish regions. The results show that non-land-based businesses that reported skilled staff recruitment, access to training and digital connectivity as their major business concerns were more likely to have a relationship with the landed estate sector. This is because the landed estate sector includes a mix of farming, sporting, forestry and other ventures, and therefore requires a specific labour force with decent digital skills and connectivity as well as training support to operate their businesses. Interestingly, non-land-based businesses that reported cash flow as a major constraint tended to have relationships with all three land-based sectors. These land-based sectors' income and likelihood rely on their farming outputs, which are usually seasonal. Therefore, non-land-based businesses linked to these sectors often face seasonal cash flow pressures from time to time [46]. Non-land-based businesses that reported access to appropriate suppliers and access to new markets as a major business constraint were less likely to have a relationship with the farming sector. Farming businesses often sell or supply their products to the same buyers, retailers and/or dealers, with whom they have a strong relationship. Thus, non-land-based businesses that already had an established relationship with farming sectors did not find these issues to be business challenges. Likewise, those that reported finding and retaining customers as a major constraint for conducting business were less likely to have a relationship with the landed estate sector. The landed estate sector includes a range of different business activities, and thus requires a larger customer base than the farming and forestry sectors.

5.2. The Determinants of the Relationships between Land-Based Sectors and Non-Land-Based Businesses in Rural Scotland

In Table 3 (Model IV, Model V and Model VI), we focus only on non-land-based rural businesses. The key findings show that non-land-based businesses in rural areas that had imported goods/services were more likely to have relationships with all the land-based sectors, but those that had exported goods/services were more likely to have a relationship with the forestry sector. This suggests that non-land-based rural businesses tend to be involved in importing and exporting activities. In particular, the forestry sector in Scotland mainly produces products for export, such as paper and timber. The UK is the main market for Scottish timber and processing, being ranked second in Europe for paper and wood product consumption [47]. Scottish Forest and Timer Technologies Industry Leadership Group [48] also reports that the Scottish forestry sector sources processed wood products from outside of Scotland to supply their customers in the country and the rest of the UK. Therefore, businesses having a relationship with the forestry sector are significantly associated with internationalisation.

We also found that women controlled non-land-based businesses in rural areas were less likely to have a relationship with the landed estate sector. Women owning non-land-based businesses in rural areas are significantly disadvantaged relative to their male counterparts regarding their land rights [45], which can reduce their power to own, manage and transfer their land. Consequently, this often hinders women with businesses in rural areas in cooperating with other landed estates. However, non-land-based small businesses in rural areas tend to have a relationship with the farming sector. Phillipson et al. [34] and

Tiwasing [39] posit that businesses in rural areas are predominantly small businesses and they are mainly associated with agricultural and farming businesses.

The results also reveal that non-land-based rural businesses that rely on access to government services were more likely to have a relationship with the farming and landed estate sectors. This emphasises the importance of government services among non-land-based businesses linked to the farming and landed estate sectors, particularly in rural and remote areas. Non-land-based rural businesses in the primary sector are more likely to have a relationship with farming and forestry sectors. Additionally, the businesses that have a relationship with the farming sector tend to operate their businesses in the construction, wholesales, professional and administrative sectors. However, non-land-based rural businesses in construction and information/communication sectors are less likely to have relationships with the forestry and landed estate sectors, respectively. These results emphasise that different sectors have a large impact on the relationships between non-land-based businesses and land-based sectors in rural Scotland. In addition, non-land-based rural businesses over 25 years old were more likely to have a relationship with the farming sector. This result is in line with a study by Tiwasing [39] that found businesses that operate in primary sectors in rural areas tend to be older businesses.

Regarding business constraints, non-land-based rural businesses that reported difficulties in skilled staff recruitment and digital connectivity as major constraints were more likely to have a relationship with landed estate sector only, while those that reported cash flow as a major concern tended to have a relationship with all the land-based sectors. Businesses in the landed estate sector in rural areas are diverse in their activities and assets [3], and thus require specific skilled labour and decent digital technology. Thomson et al. [3] also point out that rural businesses linked to the farming, landed estate and forestry sectors are regularly faced with cash flow problems amongst their clients, facing knock-on impacts from this problem. Additionally, non-land-based rural businesses that reported government financial support as their main concern tended to have a relationship with the farming sector. This emphasises that businesses outside of land-based sectors still require financial support from the government. Those who reported access to new markets as their main obstacle were less likely to have a relationship with the farming sector. Traditionally, agricultural and farm businesses in rural areas tend to produce the same products from generation to generation and sell their products to the same dealers since the failure of such an investment may potentially lead to a loss of profitability or a lack of return on investment [16]. This may result in unwillingness for such firms to adopt new working styles or access new markets due to the uncertainty of learning processes, the role of learning by doing and risky investments [49–51]. Additionally, these businesses often lack business development skills, market information and digital literacy [34,39], which potentially lead to a lack of motivation in accessing new markets.

5.3. Exploring Differences in Business Performance, Future Plans and Business Challenges among Non-Land-Based Business in Different Rural Town Classifications

Regarding business performance, we focused only on annual turnover since in the survey non-land-based rural businesses were asked about their amount of annual turnover. Table 4 reports the results of the comparative analysis of annual turnover between non-land-based businesses having relationships with the farming, forestry and landed estate sectors in different rural classifications. The results of χ^2 show that there were no statistically significant differences in annual turnover between non-land-based businesses in three rural town classifications that had relationships with the farming and forestry sectors. However, we found significant differences among non-land-based rural business having a relationship with the landed estate sector. More non-land-based businesses having a relationship with the landed estate sector in accessible rural areas had an annual turnover of more than GBP 500K than those in small towns and remote rural areas.

Table 4. Comparative analysis of annual turnover among non-land-based businesses in different rural town classifications.

Annual Turnover	Farming (%)			Forestry (%)			Landed Estate (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Less than GBP 50,000	29.8	27.6	22.5	41.3	27.1	20.3	50.0%	23.9%	23.0%
GBP 50,001–GBP 200,000	33.3	30.4	38.1	28.3	35.3	35.1	21.4%	34.5%	35.0%
GBP 200,001–GBP 500,000	14.9	15.0	20.0	10.9	14.1	23.0	7.1%	12.4%	18.0%
GBP 500,001 plus	21.9	27.1	19.4	19.6	23.5	21.6	21.4%	29.2%	24.0%
Total	114	214	160	46	85	74	56	113	100
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

We also asked non-land-based businesses in different rural town locations whether their annual turnover had changed in the last 12 months or not. Table 5 reports the results of the comparative analysis of turnover changes between non-land-based businesses in small towns, accessible rural and remote rural areas. No significant differences in turnover changes among rural non-land-based businesses in three different rural locations were identified. However, most of the rural non-land-based businesses reported that their turnover stayed the same in the last 12 months, followed by increased annual turnover and decreased turnover.

Table 5. Comparative analysis of turnover changes among non-land-based businesses in different rural town classifications.

In the Last 12 Months, Has Your Annual Turnover Changed?	Farming (%)			Forestry (%)			Landed Estate (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Increased	36.4	31.2	30.4	39.7	35.1	23.2	35.1	29.0	30.4
Stayed the same	37.1	42.5	43.0	37.9	41.0	48.4	41.9	42.6	44.0
Decreased	26.4	26.3	26.6	22.4	23.9	28.4	23.0	28.4	25.6
Total	140	308	207	58	134	95	74	162	125
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

The analysis further explored the differences in future business plans among rural non-land-based businesses. We asked these rural businesses about their investment plans for the next five years. In Table 6, the results of χ^2 show that there were significant differences in investment plans for digital equipment between rural non-land-based businesses in three rural classifications. More non-land-based businesses having relationships with the farming, forestry and landed estate sectors in accessible/remote small towns reported digital equipment as their main investment plan than those in remote rural areas and accessible rural areas. This could be explained by the fact that many non-land-based businesses in small towns rely on digital infrastructure for their online business services and operations. However, digital technology and connectivity in these areas are still poor compared to in urban areas [39,52]. This emphasises digital inequality not only for business in rural and remote areas, but also for those in small towns in Scotland. Additionally, non-land-based businesses having relationships with the farming and landed estate sectors in accessible/remote small towns were more likely to invest in staff recruitment and skills compared to those in remote rural areas and accessible rural areas, respectively. This highlights the needs of non-land-based businesses in these areas related to business support or advice on skilled staff recruitment and skills development. The results also show that more non-land-based businesses having a relationship with the forestry sector planned to invest in machinery in the next five years than those in remote rural areas and accessible rural areas.

Table 6. Comparative analysis of future plans among non-land-based businesses in different rural town classifications.

Within the Next 5 Years, Which of the Following Investments Are You Planning on Making for Your Business?	Farming (%)			Forestry (%)			Landed Estate (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Land/buildings	20.9	25.7	27.2	24.2	32.6	31.7	20.0	26.2	28.8
Machinery	36.5%	37.8	37.3	29.0	47.1	37.6	30.7	39.5	40.9
Digital equipment	46.6	32.2	33.2	54.8	39.9	42.6	54.7	37.2	40.2
Other equipment (e.g., office equipment, furniture, etc.)	35.8	26.9	27.6%	30.6	31.2	31.7	37.3	26.7	26.5
Staff recruitment/skill trailing	41.2	27.6	33.6	46.8	37.7	39.6	42.7	27.9	41.7
None	15.5	25.4	24.0	14.5	19.6	20.8	10.7	24.4	25.8
Total	148 100.0	323 100.0	217 100.0	62 100.0	138 100.0	101 100.0	75 100.0	172 100.0	132 100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

Considering the impact of Brexit on non-land-based businesses among rural–small-town classifications, in our survey businesses were asked whether they see Brexit as a challenge or an opportunity for their businesses. Six business concerns were listed in the survey (see Tables 7–9). For the farming sector (Table 7), as a result of Brexit, there were no statistically significant differences in business concerns between non-land-based businesses having a relationship with the farming sector in small towns, accessible rural and remote rural areas. Interestingly, non-land-based businesses in accessible and remote rural areas tended to report business regulations, access to regular labour and access to seasonal labour as their major challenges.

Table 7. Comparative analysis of challenges related to Brexit between rural non-land-based businesses in different rural classifications that have a relationship with the farming sector in Scotland.

As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Imports (%)			Exports (%)			Access to Public/Private Finance (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	53.0	60.6	59.8	31.0	54.8	54.2	51.8	52.2	62.8
Opportunity	21.2	15.2	16.5	35.7	20.4	25.0	24.1	26.9	25.6
Both	25.8	24.2	23.7	33.3	24.7	20.8	24.1	20.9	11.6
Total	66 100.0	132 100.0	97 100.0	42 100.0	93 100.0	72 100.0	54 100.0	134 100.0	86 100.0

As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Business Regulations (%)			Access to Regular Labour (%)			Access to Seasonal Labour (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	49.5	61.7	63.7	47.6	62.8	63.1	51.3	66.3	67.7
Opportunity	23.2	18.4	22.6	30.2	25.7	19.1	30.8	21.7	16.9
Both	27.4	19.9	13.7	22.2	11.5	17.9	17.9	12.0	15.4
Total	95 100.0	195 100.0	124 100.0	63 100.0	113 100.0	84 100.0	39 100.0	83 100.0	65 100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

In Table 8 (Forestry sector), the results of χ^2 show that non-land-based businesses having a relationship with the forestry sector in remote areas were more likely to report business regulations as a major challenge at 62.5% compared to those in accessible rural areas (60.0%) and accessible/remote small towns (46.7%) ($\chi^2_4 = 11.05$, *p* <0.05). For the landed estate sector (Table 9), the results of χ^2 reveal that non-land-based businesses having a relationship with the landed estate sector in accessible rural areas were more likely to report access to regular labour as their key challenge as a result of Brexit (67.6%) compared to those in remote areas (57.9%) and small towns (48.9%) ($\chi^2_4 = 9.65$, *p* <0.05). Likewise, more non-land-based businesses in accessible rural areas reported access to

seasonal labour as a major business obstacle (78.7%) than those in remote rural areas (67.4%) and small towns (50.0%) ($\chi^2_4 = 9.96$, $p < 0.05$). These results suggest that these non-land-based businesses in accessible rural areas may rely on EU labour for both short-term and long-term jobs. Therefore, without a clear immigration policy, Brexit would add more pressure to the current and future situation of skill shortages for rural businesses and land-based sectors [38].

Table 8. Comparative analysis of challenges related to Brexit between non-land-based rural businesses that have a relationship with the forestry sector in different rural classifications in Scotland.

As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Imports (%)			Exports (%)			Access to Public/Private Finance (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	37.0	58.7	58.0	38.1	52.1	52.9	36.4	37.5	57.5
Opportunity	25.9	22.2	20.0	33.3	18.7	29.4	22.7	37.5	30.0
Both	37.0	19.1	22.0	28.6	29.2	17.7	40.9	25.0	12.5
Total	27	63	50	21	48	34	22	56	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Business Regulations (%)			Access to Regular Labour (%)			Access to Seasonal Labour (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	46.7	60.0	62.5	42.3	63.0	57.5	50.0	68.4	71.0
Opportunity	22.2	18.9	29.7	23.1	27.8	19.1	21.4	21.1	19.3
Both	31.1	21.1	7.8	34.6	9.3	23.4	28.6	10.5	9.7
Total	45	90	64	26	54	47	14	38	31
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

Table 9. Comparative analysis of challenges related to Brexit between non-land-based rural businesses that have a relationship with the landed estate sector in different rural classifications in Scotland.

As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Imports (%)			Exports (%)			Access to Public/Private Finance (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	71.0	62.0	50.8	48.0	56.4	47.8	55.6	50.7	62.8
Opportunity	13.2	16.5	16.4	28.0	14.5	26.1	14.8	28.2	25.5
Both	15.8	21.5	32.8	24.0	29.1	29.1	29.6	21.1	11.7
Total	38	79	61	25	55	46	27	71	51
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
As a Result of Brexit, Do You See the Following as a Challenge or an Opportunity for Your Business?	Business Regulations (%)			Access to Regular Labour (%)			Access to Seasonal Labour (%)		
	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural	Accessible/ Remote Small Towns	Accessible Rural	Remote Rural
Challenge	55.1	59.3	66.2	48.5	67.7	57.9	50.0	78.7	67.4
Opportunity	16.3	18.5	20.8	18.2	23.5	24.6	22.7	17.0	20.9
Both	28.6	22.2	13.0	33.3	8.8	17.5	27.3	4.3	11.6
Total	49	108	77	33	68	57	22	47	43
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: shading denotes statistically significant response using chi-square test ($\chi^2 < 0.05$).

6. Conclusions and Policy Recommendations

Through a unique survey of 1500 non-land-based rural businesses in Scotland, this study identified the key determinants of the relationships between non-land-based businesses and land-based sectors (i.e., farming, forestry and landed estate) in rural Scotland and revealed the differences in business performance, future plans and challenges of non-land-based rural businesses in different rural classifications having relationships with these land-based sectors. This result confirms that non-land-based businesses in rural areas are

significantly associated with land-based sectors, a finding that is in line with the theoretical perspectives. Focusing on non-land-based rural businesses regarding their relationship with farming, the key findings show that small businesses, importing, access to government services, businesses sectors (primary, construction, wholesale/retail, professional and administrative sectors), businesses operating for over 25 years and businesses experiencing challenges related to cash flow and access to government financial support and other constraints are more likely to have a connection to the farming sectors. Regarding relationships with forestry, business engaging in exporting and importing goods/services, businesses in the primary sector and businesses reporting cash flow as a constraint are more likely to have a relationship with the forestry sector. Regarding the relationship with landed estate, importing, access to government services, skilled staff recruitment, cash flow and digital connectivity as a constraint tend to be associated with businesses having a relationship with the landed estate sector, while women-led businesses are less likely to have a connection to this sector. Thus, we have achieved our first objective.

The results also reveal differences in business performance, future investment plans and business challenges related to Brexit among non-land-based rural businesses having relationships with land-based sectors in different rural locations; we have therefore achieved our second objective. In particular, non-land-based businesses that have a relationship with landed estate sector in accessible rural areas are more likely to have higher turnover than those in remote rural and accessible/remote small towns. Regarding future plans, non-land-based businesses having relationships with the three land-based sectors in accessible/remote small towns are more likely to plan to invest in digital technology than those in remote rural and accessible rural areas. Additionally, staff recruitment and training are reported as the main investment plan of non-land-based businesses having relationships with farming and landed estate sectors in accessible/remote small towns, while investing in machinery is reported as the main future plan for non-land-based businesses that have a relationship with the forestry sector in accessible rural areas compared to those in remote rural areas and accessible/remote small towns. Regarding the impact of Brexit, non-land-based-businesses having a relationship with the forestry sector in remote rural areas are more likely to report business regulations as a business challenge than those in accessible rural areas and accessible/remote small towns, while non-land-based-businesses having a relationship with the landed estate sector in accessible rural areas are more likely to report access to regular and seasonal labour as business challenges than those in remote rural and accessible/remote small towns. Therefore, the results show that it is critical that agencies supporting businesses recognise the breadth of characteristics of non-land-based business in rural Scotland and how these vary across different rural locations, and support all of these businesses appropriately in terms of their business plans and investments, staff recruitment and skills development, financial support, internationalisation and digital infrastructure. Additionally, future policies and business support should also focus on the specific needs of these non-land-based rural businesses, particularly small businesses, women-led firms and exporting/importing businesses.

Considering our empirical evidence, we can also highlight some policy recommendations. Firstly, digital connectivity and digital infrastructure improvement are urgently needed for non-land-based businesses not only in remote rural areas, but also in small towns, particularly for those that rely on digital platforms for their online business services. However, to sustainably overcome the digital disadvantages in rural areas and underserved areas, government and business support should not only focus on digital investment but also target digital skills development and promote the uptake of digital services for the specific needs of each rural area [8,39]. In particular, digital training and IT support programmes (e.g., rural digital hubs) should be available for businesses in rural areas to help them improve their digital skills, since several government services have now moved to online platforms [8]. Secondly, cash flow is seen as a major concern for non-land-based rural businesses having relationships with farming, forestry and landed estate sectors. This emphasises the need for improved communication and collaboration between suppliers,

financial agencies (e.g., banks) and non-land-based businesses to help them focus on the immediate needs of budgeting and managing payments and repayments. Additionally, timely distribution of payments to non-land-based businesses having relationships with agricultural, forestry and landed estate sectors and their supply chains with clear communication of projected timescales should not only help ease cash flow difficulties, but also boost morale in these sectors in rural areas [46]. This result could highlight a key urgent action for future Scottish policies related to land-based sectors and rural economy, such as agriculture bills, the National Strategy for Economic Transformation [53], etc. Finally, the impacts of Brexit are reported as business challenges for non-land-based business in different rural classifications, especially access to seasonal and regular labour and business regulations. Brexit rules apply to things such as travel, immigration and trading with EU businesses. Therefore, the Scottish Government should provide tools and services to guide non-land-based businesses in rural areas to help understand and comply with laws and regulations arising from Brexit. In particular, non-land-based businesses likely rely on EU labour for both regular and seasonal labour, particularly in accessible rural areas. Therefore, the government should reconsider the restrictions on recruiting key skilled workers from the EU as both short-term and long-term workers and should also provide long-term investments in skills training for the Scottish and UK labour force to help businesses cope with extra demand from these industries [38].

This empirical evidence also provides key implications for business practices since our evidence-based analysis can help business owners and managers, particularly those of non-land-based rural businesses, to understand the key determinants and challenges of establishing relationships between their businesses and land-based sectors to improve their business growth and future plans. In particular, the key findings highlight business constraints such as cash flow, digital connectivity, access to government services and access to government financial support as major challenges for their relationships with land-based sectors. Moreover, this paper also provides a theoretical contribution to research that focuses on businesses outside of land-based sectors. We applied the notion of rural economic development, rural–urban linkage and value chain perspectives to develop an improved understanding of the multifaceted connections between non-land-based businesses and land-based sectors, particularly in rural areas. Through the lenses of these theoretical perspectives, we can understand the importance of diversification in rural areas through the development of a diverse range of industries and businesses and the dynamics of supply chains in different actors and geographical locations. Therefore, by understanding these theoretical frameworks, policymakers and practitioners as well as academic researchers can help develop more effective strategies and policies to promote the economic well-being of rural communities and enhance the relationships between land-based and non-land-based businesses in rural areas.

7. Limitations and Future Research Directions

This study highlights some avenues for further research. Firstly, given the main focus of this study on the quantitative analysis, interviewing management-level personnel is recommended to gain a deeper understanding of possible business support strategies and needs among non-land-based rural businesses for business growth and economic development in rural areas. Secondly, future research should also consider the impact of the uncertainties of new agricultural support payments (e.g., future agriculture bills) on non-land-based rural businesses since our survey was conducted in relation to CAP and before the introduction of new agricultural support payments. Additionally, it would be interesting for future research to further explore the challenges and opportunities in women-led businesses since our results reveal that women-led businesses are less likely to have a connection to the estate sector. Next, it is important to note that the scope of this study is limited to three land-based sectors. As such, future research could further explore the relationship between forested land and protected areas, given that many of Scotland's substantial systems of protected areas encompass a significant amount of forestland, which

can provide valuable ecosystem services when managed for conservation. Such research would contribute to a more comprehensive understanding of the economic benefits of conservation practices in Scotland. Furthermore, it would be interesting for future research to examine the effects of the COVID-19 crisis on businesses outside land-based sectors in rural areas during the crisis and its aftermath. Finally, due to data limitations, future research would benefit from a longitudinal data analysis to better identify the connections among non-land-based rural businesses to the land-based sectors over time.

Author Contributions: Conceptualisation, P.T., J.A. and S.G.T.; methodology, P.T. and S.G.T.; formal analysis, P.T.; data curation, P.T., J.M. and S.G.T.; writing—original draft preparation, P.T. and L.P.; writing—review and editing, P.T., L.P., J.M., J.A. and S.G.T.; funding acquisition, S.G.T. and J.A. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement: Data will be made available upon request.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

1.   In line with Thomson et al. [3], this study adopts the term 'non-land-based businesses' to refer to businesses that are not in the land-based sectors, since the observations in this study include businesses providing services, as well as those engaged in manufacturing or other types of production.

2.   The 'financial and other activities' sector consists of financial and insurance activities, real estate activities, professional, scientific and technical activities, administrative and support service activities, arts, entertainment and recreation and other service activities [2].

3.   Crofters traditionally refer to small-scale farmers who work on small plots of land, often on the fringes of the Highlands and Islands. These crofters are typically tenants who rent their land from larger landowners or estates, and grow crops or raise livestock for their own use or for sale.

4.   For example, areas with a population of fewer than 3000 people, and within a 30 min drive time of a settlement of 10,000 or more, are classified as accessible rural areas. Areas with settlements of 3000 to 9999 people, and with a drive time of over 30 min to a settlement of 10,000 or more, are classified as remote small towns (See the Scottish Government's Urban Rural Classification 2016 from the Scottish Government [13]).

5.   The results of the multicollinearity test can be made available upon request.

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