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The impact of increasing state independence on the agricultural sector:
An analysis into Ireland and the Irish Church Act of 1869

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Abstract

In 1871 the Irish Church Act came into effect making the Irish church independent from the English crown, causing for decentralised financial investments in the agricultural sector. In this research the question what the impact is of the Irish Church Act on the Irish agricultural sector in the period of 1860-1880 is investigated. Upcoming state independence in other countries is not the only context in which the outcome of this research can provide insights, but also the response within the agricultural sector itself as its societal role in relation to not only food provision but also climate change is evermore increasing. With the use of the difference-in-difference method, agricultural variables of the posed hypotheses, expecting an increase in land value, labour wage, crop production, and crop value, are analysed. Both the hypotheses of land value and labour wage were rejected whereas that of the crop production and crop value had both insufficient evidence to reject.

Crop production seems to be affected with a reversed treatment effect at the start of the Act, whereas land use per capita appears to have a treatment effect increasing the trend of Northern Ireland rather than that of Free State. Moreover, an increase of farm labour wage index for Northern Ireland is found, which could possibly be an effect from its textile industry instead of the Irish Church Act. Generally, it seems that the crop production per acre increases for some crops, relative crop value increases, and smaller but more land improvement loans are provided short-term for all of Ireland.

The differing outcome of this with regard to the hypotheses can be due to the amount, allocation, and division across the dioceses of investments. Moreover, it could be that Northern Ireland also experienced a treatment effect from the decentralised investments, which makes the applied methodology unsuitable for the aim of this research. However, more research is required to clarify these findings.

Keywords: agriculture, state independence, Ireland, decentralised financial investments, policy change

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Dear reader,

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I hope you will read the paper with as much pleasure as I had making it.

Warm regards,

Vera Veltman

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1. Introduction

“We are bound to lose Ireland in consequence of years of cruelty, stupidity and misgovernment and I would rather lose her as a friend than as a foe” said by the former Prime Minister of Great Britain, William Gladstone (LoPatin-Lummis, 2016). Among other policies he introduced in line with his approach of rectifying matters with Ireland, the Irish Church Act got accepted in 1869 and came into effect from 1871 onwards. This meant separating the Irish Church from the English Crown and creating a decentralised financial system that would be responsible for various investments that also went into the agricultural sector. Even though this was a vast change, its impact of independence has never been researched, which leads us to the research question:

What is the economic impact of the Irish Church Act on the agricultural sector in the period of 1860-1880?

The independence of Ireland in 1922 has extensively been researched, however, the Irish Church Act, which has been said to be the key to office and power (Maziere Brady, 1869), is very much underexposed. More generally speaking, research to state and political independence has been done showing contradicting results to its effect on the economy (Girvin, 1997; Ngowi, 2009). As the event to more independence is more isolated in the Irish Church Act by its limited changes, it could therefore offer more concise insights in the area of increasing state independence and that of responses within the agricultural sector. Over the years areas across the world are demanding state independence for which the outcome of this research could shine more light on the possible implications of this change (BBC News, 2017). Furthermore, the societal role of the agricultural sector increases with its importance for climate change (Arora, 2018; Crane et al., 2011), wherefore this research could offer insights in possible effects of financial structures on such an important societal sector.

Throughout this paper, use will be made of the area name ‘Northern Ireland’ as it is currently known, including 6 out of the original 9 Ulster counties. The rest of the Irish island is referred to as ‘Free State’. Moreover, the Irish Church Act is from here onwards referred to as ‘the Act’.

Before getting into the methodological details of the research, the historical context of Ireland and more specifics of state independence impact are discussed along the lines of varied literature, presenting as well the hypotheses of this research in chapter 2. Thereafter, in

chapter 3, the data used for the research is looked at closer at the selection and construct, which is followed by the methodological details explaining how the data is analysed in chapter 4. The results of this process are first discussed individually, in chapter 5, before interpreting the variables altogether. Limitations throughout the research are then discussed in chapter 6, followed by the last chapter 7 where all of this research is concluded and implications of the results and further research are discussed.

2. Theoretical framework

In this section insights into the Irish historical background are first discussed before continuing to the question and hypotheses posed in this research.

Historical background Ireland

The dissatisfaction of the Irish against the United Kingdom and its desire to be independent did not appear out of nowhere but has a history of friction between the two starting as early as 1167. England had set foot on Ireland causing the English and Irish population to blend, however, both were never fully united. This left the Irish inhabitants, divided of interest and later in time of religion, living on the same piece of land. The most familiar aspect of this relation is the religious divide of the protestant Irish in the northern part of Ireland, in line with the protestant British crown, and the catholic Irish in the rest of the land (Vaughan, n.d.). This divide also became clear after the War of Independence from 1919 to 1921, where the Republic of Ireland was officially declared as an independent Irish Free State in 1922. This meant that Ireland was apart from Northern Ireland, which exists out of six of the nine counties of the traditional province of Ulster.

As of 1801, under the Acts of Union 1800, the Kingdom of Ireland allied with Great Britain amid great discontent from the Irish. During the ongoing rebellion, dissatisfaction grew with the established Protestant Church, which demanded its tithes mainly from Roman Catholic tenant farmers. In 1861 they found that less than one-eighth of the population belonged to the established church, and four-fifths were Roman Catholic, leading up to the Irish Church Act that became active from January 1871 onwards (The Editors of Encyclopaedia Britannica, 2013).

The Irish Church Act, among other policy changes, was set in motion under the ruling of former prime minister of the United Kingdom, William Gladstone, who stated his main aim was to "pacify Ireland". He was motivated by what he considered to be righteous, and he believed that many things in Ireland were wrong. That is why he set himself the task of rectifying these matters (Trueman, 2015). One of his major issues was that of the introduction of the Irish Church Bill passed in 1869, also known as the Irish Church Act. However, this was not his only attempt to resolve matters with Ireland. Central in Gladstone's policy was the Home Rule,

which entailed a process of increasing Ireland's voice in how it was governed (*Home Rule and Ireland, 2015*).

Among not only previous policy changes for Ireland but also its official independence in 1922, the Irish Church Act is cited as a key to office and power, because of the strong relationship between church and politics (Maziere Brady, 1869). This can be found in multiple connections in both the political and financial area. Although the Irish Church's bishops were removed from the House of Lords in Westminster as of the start of the Irish Church Act, the 103 Irish positions in the House of Commons remained. Together in the House of Lords and House of Commons the business of the United Kingdom's (UK's) parliament takes place. Even though the Irish Church was separated from the state, most members were very loyal unionists (Brockie & Walsh). Still within Ireland the Church's clergymen appeared to play an important role in politics, whereas a clergy had to go through a process and become elected by a constituency first to be able to carry that title (Birrell et al., 1979; Hickey, 1985). These political connections could therefore indicate a possible relationship to the effects the separation of the Irish Church from the state had on the Irish economy.

The Irish Church had an episcopal church governance and existed out of 13 dioceses at the time. Given the independent status the Irish Church Act had achieved, the Representative Church Body maintained and took on the responsibility of the Church's assets and financial management. With this independence and next to the sum of money for the life annuities of the clergies, an additional sum, sustentation money, for poverty relief was given by the British Government. The aim was to have one financial scheme to distribute the funds, however, it was found that the circumstances of the various dioceses were so different that the decision changed to decentralize this across 21 different financial systems governed by the dioceses to serve the local needs and requirements. The main societal division the money was spent on were agriculture, fishery, and education (Lurgan, Co. Armagh, Northern Ireland - Gladstone and The Irish Church Act - 1869, 2021; Traill, 1908b).

Prior to the Irish Church Act, the agricultural sector experienced events that affected the sector and with that the Irish society. One event in particular that had a significant impact was the potato blight. In 1845 the period of the Great Famine or Great Hunger began, which led to enormous famine and disease all over Ireland. The potato blight destroyed almost all of

Ireland's staple crops, reducing the Irish population by an estimated 20 to 25 percent and greatly impacting the economy. Remarkable is that research shows that exports have increased during these times (Mokyr, 2020). Within the export data of that period, reconstructed Irish export statistics from the nineteenth century shows that there is a clear divide in the type of exported and imported agricultural products (Solar, 1985).

Recovering from the potato blight, many Irishmen had already migrated to countries such as the United States and Canada from around 1852 (The Editors of Encyclopaedia Britannica, 2017, 2021). About one-eighth of the Irish population, which is an estimated one million, deceased. The period after the famine left some changes within the economic and political field. For the agricultural sector, bargaining power of labour increased, and any negative shock on landlords' income was compensated for. Furthermore, it was said that it left the survivors with a higher standard of living (O'Grada, 2008).

Impact of (state) independence

Across different time periods and parts of the world, research has been performed on the impact of independence in varying settings, where contradicting results have been found. In the context of Ireland many Irish were in favour of an independent Ireland, however, its impact on the economy was not yet known. A paper by Girvin (1997) studied the relationship between political independence and economic success. While the Republic of Ireland had the right conditions and position to achieve economic success after independence, Girvin says the results were not impressive. He concludes by stating he could not find a causal relationship between political independence and economic success. More recent research of Ngowi (2009) in the change of leadership and impact on the economic developments since independence of Tanzania, does show a relationship between political independence and economic success. It is said that the developments and change within economic developments can be highly attributed to the political leadership. Voigt et al. (2015) focused their international cross-country research on a different kind of independence, namely that of judicial, to see whether there is a relation between having a force in place that keeps a state to its promises is related to economic growth. They found that having a policy change in itself does not show any relation, however, having a power in place assuring the implementation of policy changes does relate to a higher economic growth.

What makes it interesting to study the impact increasing independence has on Ireland, Free State and Northern Ireland, is that it offers both its differences but also its broad similarities that offer the controls necessary for comparative analysis (O'Grada, 1997). After the War of Independence from 1919 to 1921, the Republic of Ireland was officially declared as an independent Irish Free State in 1922. This means that Ireland was apart from Northern Ireland, existing out of six of the nine counties of the traditional province of Ulster.

There were large differences to be found between the Northern part of Ireland and the rest of the land when it came to the belief in what manner the country should be ruled regarding the level of independence and the societal form it takes. In 1870 a majority of 97 per cent of the land was owned and rented out to tenant farmers. Many of these properties were owned by English Protestants or by families with strong personal and material connections with England (Land-Holding in Ireland 1760–1880, 2016). Similarly, political results over the years during both the Home Rule in 1885 and the general Election of 1918, showed a divide where Ulster and Northern Ireland evidently differ with the rest of Ireland in its political views (Maxwell, 2013; The Irish General Election of 1918, 2006). Therefore, it could make for a different response to the Irish Church Act and its investments in the agricultural sector. As in the northern area its societal values were already aligned for a major part with the previous centralised power, the British Crown. Whereas the purpose of the new setting caused by the Irish Church Act with the decentralised diocese financial system is to focus more on local needs.

Aspects across the agricultural sector show, solely and in interaction with each other, its performance. In general, the agricultural sector carries important roles in a society, one of production, social and demographic, ecological and landscape aesthetical (Machek, 2013). As Ireland is an agrarian regional economy, the size of the economy is highly dependent on exports, or in general terms, on its international competitiveness and on its agricultural sector (Barry, 1999).

As mentioned by Solar and Hens (2013) the value of land is a key indicator for an agrarian society, yet, only when considering other statistics such as wage rates and the agricultural produce price. These factors can influence the direction of innovation, choice of technique, and structure of agrarian social relations, whereas it can also show an indication of productivity of the agricultural sector. Other indicators that can reflect upon the performance

of the agricultural sector is the value of agricultural output, although it has to be noted that many of these product prices are set in the world market, agricultural labour productivity, and resource performance of the agricultural sector, as is also recorded by political institutions like the European Commission (European Commission, 2021). Within these measures they also include the expenditures on production enhancing products and tools, which were either not available or found within the archival data. However, the number of land improvement loans and the total amount of land improvement loans provided and requested were registered on a central level in Ireland. Expected is a decrease in number and amount due to increase of crop value, causing the tenants and landowners to have more money available to pay for land improvements without the need of a large loan. Production per piece of land can then show a possible response to production enhancing investments with help of more smaller valued loans, with either an increase or constant trend in production per capita as population might decrease in total, their consumption and with that their demand per capita should not go down, yet, the exported products might increase with sufficient supply available causing a higher number of crops produced per capita.

Girvin (1997) and Ngowi (2009) show ambiguous results whether state independence within a country affects the society, its economy and in what manner. In addition, Voigt et al. (2015) gathered evidence focusing on the implementation of judicial independence which keeps a state to its promises, which they found had a significant relation to higher economic growth. Meaning, that a state which can be kept to its promises and implementation of law changes is associated with higher economic growth. The hypotheses in this research that cover each of the aforementioned agricultural sector (sub) indicators are therefore formulated as follows:

Hypothesis 1: Free State land value significantly increases relative to that of Northern Ireland.

Hypothesis 2: Free State farm labour wage significantly increases relative to that of Northern Ireland.

Hypothesis 3: Free State crop production significantly increases relative to that of Northern Ireland.

Hypothesis 4: Free State crop value significantly increases relative to that of Northern Ireland.

Using the insights of the gathered literature on this research its hypotheses and its used (supporting) variables, the expectations are listed in the following table, Table 2.1.

Table 2.1. *Overview expectations associated hypotheses variables*

Hypothesis	Variable	Expected outcome
1	General land value	Increase
	Land improvement loans	Decrease in number and amount
2	Farm labour wage index	Increase
	Ratio farm labour wage to agricultural production price	Constant or increase
	Ratio farm labourers per 100 farms	Increase
	Ratio farm labourers to all occupied per acre	Increase
3	Crop production per acre	Increase
	Crop production per capita	Constant or increase
	Crop land use (domestic/export)	Change among types of domestic crops due to change in consumption (decrease in potatoes, increase in other domestic crops)
4	Production price index	Increase
	Crop production value per capita (domestic/export)	Increase

Note. The above mentioned variable expectations refer to the variable outcome of the Free State trend relative to that of Northern Ireland.

When it comes to consumption of the agrarian products, the change to disestablishment of the church could mean a change of consumer behaviour for both Irish, and its domestic markets, as for other countries, like Great Britain and its demand for Irish produce. However, considering that the export was reliant on shipping and mainly agricultural, this will not give sufficient information to analyse the impact on the entire Irish economy (Bloy, 2016; Solar, 2006). A GDP would show its national impact, however, this estimate must be sufficiently reliable to be able to include this in the research which is not the situation for the chosen time period (Andersson & Lennard, 2018).

Although in other parts of the world industrialisation took place, Ireland was lagging. The agricultural production techniques remained similar over the period until the late nineteenth century (Changes in the Food Chain since the Time of the Great Irish Famine, 1996).

3. Data

To take a closer look at the quantitative measures used to assess the performance of the agricultural sector, the collected data, which consists of 12 base variables, is examined in this chapter where after the constructed variables, which consists of 11 variables, on which the results are based are discussed.

All the data derive from personal and public registrations and public reports in the period between 1850 and 1881, which means there is complete dependence on the information that not only survived from that period but also is documented in published literature or is digitised and online accessible. Through references in sources or explanatory material how specific information was registered in that period, the variables were retrieved. However, there is always a probability of the existence of sources I was unable to find or retrieve, and the collection included in this research should by no means be a definite limit to possible other information that might be available.

The variables can be categorised as a component of the agricultural land, agricultural products, and agricultural labour. Land value in all variables is key in the agrarian society (Solar & Hens, 2013), which is included as a general land value. This does not only include the agricultural use of land but also other types of property. The tenant rent and tenant value, market value for those renting property, was reported on a broad scale from 1872 onwards which also includes other types of property besides agricultural use. Specifics of agricultural land is that of land use, which shows the acreages spent on specific crops, fruit, hay and pasture. Within the different crops, there is the distinction of those that are mostly produced for export and those for the domestic market. Any loans for land improvements in terms of drainage or farm building improvements are included as well, of which the number and amounts of issued loans are registered.

For the agricultural products, the production amounts in weights, and its prices are included. The prices are obtained from mainly two cities, Belfast and Waterford, which represent the greater markets of both northern and southern Ireland.

Lastly, the farm labourers are both included in their deployment ratio per 100 farms and to all employed males. The wages used for the analysis are retrieved from data on the real weekly wage that farm labourers received.

There are different possibilities as to how the above mentioned variables could be affected by the change caused by the Irish Church Act. With decentralised investments into the agricultural sector this can directly affect the behaviour of those owning the land, renting the land, and working the land. Besides this, due to interactions between these variables with others, more possibilities arise of causing an effect in any of these factors. For example, more intensive work on the land might require more labour therefore increasing labour demand which has its impact on wages.

The dataset period starting from 1850 to 1880 is chosen due to the event of the Great Famine prior and entries of significant impactful laws after. It is said that the Great Famine ended in 1849, however, the event had still a large effect short term and on debatable elements on the long term on the Irish population and the agricultural sector (Mokyr, 2020). To include the pre-trend of the variables with limited data points, decennial, 1850 was therefore included as a minimum point of time, whereas variables with more available data points, on an annual basis, are included with a minimum limit from 1860 onwards as the trend over that period is sufficiently visible. No data points beyond 1880 are included as from that point in time multiple laws came into effect that have a significant impact on the variables included in this research that makes it futile for the analysis.

To prepare the original data for the analysis, additional information of population, total agricultural acreages (land use), and inflation rate are used. Moreover, the conversion rate of both the currency and acreages are applied to the original data to be able to merge some of the data or to make a comparison across time and between variables. As some of the data is presented per county, this had to be converted to either a summed up or mean value for Free State and Northern Ireland. A full overview of all the variable sources can be found in Appendix A.

The analysis includes the variables in a constructed matter such that it becomes a comparable measure across the different regions and across time, which means the variables are per acre, capita, shilling (d.), hundredweight (cwt.), or converted to an index. For some variables the values have been demeaned or calculated to a 3-year mean as the data would otherwise deviate too much from each other in their trend or have a very volatile trend line which makes

it challenging to look at the parallelism of the pre-trend. Whether one or more of these adjustments are applied to the dataset is mentioned in each of the variable its graph presented in this report.

To prepare all the data in order to use this for the statistical analysis, this had to be converted in a general construct too. Each variable is split up in the treatment group, Free State, and control group, Northern Ireland, due to the chosen statistical method that is applied. A dummy was made, 'Free State', valuing 1 meaning the data sourcing from Free State and 0 if this originates from the control group Northern Ireland. Moreover, the dummy of 'Post 1871' is added carrying the value of 1 once the data is recorded in 1871 or after as the Act came into effect from January 1st, 1871, onwards and 0 if this was recorded prior.

The applied statistical method is discussed in more detail in the following chapter of research design.

4. Research design

In this section the methodological approach difference-in-difference (DiD), used for the variables to see whether the trend changes after the introduction of the Irish Church Act in 1871, and other possible methods are discussed in more detail. Additionally, potential threats to the used method and its assumptions are examined afterwards.

To perform a test on a panel dataset with the given research question in this thesis whether a change in trend is visible post-treatment, after the Irish Church Act started, several research methods can be used.

Given the characteristics of both groups, Free State and Northern Ireland, differ, and a non-randomized study into change post-treatment is taking place on an aggregate level, the method of Regression Discontinuity Design (RDD) is an option. The performance of RDD is done with data very close to the threshold of the start of the treatment. However, the data in this research is on an annual or decennial basis, which makes it unsuitable to observe any change near the threshold.

Another methodological option might be the use of synthetic controls in a DiD method, where a weighted combination of groups that serve as the control have similar demographic characteristics to that of Free State. Comparable circumstances and type of economy of that of Ireland might be England or Scotland if it were not for, among other historical events, the Great Famine that made for a completely different development of the Irish economy and society to that of other similar areas.

In this report the method of DiD is applied with a control and treatment group. The treatment group, Free State of Ireland, receives the treatment of a change in Acts, as the assumption is made that the control group, Northern Ireland, does not experience a change due to alignment in social norms and values before the Irish Church Act had started and would therefore continue like it would have when the Irish Church Act would not have been set in place.

The method of DiD includes main assumptions of consistency and parallel trends. The consistency assumption entails the outcome of the untreated treatment group is consistent with its pre-treatment outcomes. However, this is an outcome that will never be observed, wherefore the assumption the potential outcomes link to the observed outcomes. The parallel

trend assumption means it is expected that the treatment and control group follow a similar trend, besides the pre-treatment, in the post-treatment period would both not have received the treatment. Yet, again, this can not be tested as this involves an unobserved outcome.

The DiD model looks at the average effect of treatment on the treated (ATT), which in this context is the average effect of the Irish Church Act on Free State. The equation of this looks as follows:

$$ATT = E[Y^1(2) - Y^0(2)|A = 1]$$

The above states the ATT where $Y^1(2)$ refers to the potential outcome of the treatment group, Free State, post-treatment period. $Y^0(2)$ represents the potential outcome of the control group, Northern Ireland, post-treatment period. In this research the variables are subjected to the DiD method individually, such that the trend for both Free State and Northern Ireland are presented for a singular variable and the ATT accounts only for that variable specifically. The outcome that is statistically being measured is the difference between the outcomes that would have been expected when the treatment group would have followed the same trend of that of the control group with the actual outcome that is observed. The analyses are performed in STATA of which the performed commands can be found in Appendix C.

Still, with the use of the DiD method, there are also threats that come with its use that can bring its outcomes into question. A strong assumption is the existence of a parallel trend, however, there is no possibility to test for this and assuming the event had no impact on the average effect of treatment on the untreated (ATU) might be too strong causing a possible decrease in the reliability of the results that the post-trend of the control group shows.

Additionally, due to the scarce data points for some of the variables, it causes for a very limited visibility of the pre-trend. As the assessment of the existence of a parallel pre-trend is based on graphics, this might challenge the ability to judge whether there is indeed a parallel trend present in the data.

5. Results

In this section the results on the hypotheses are discussed prior to the interpretation of these results, how they relate to each other and to the literature. For all the hypotheses the analysis method of difference-in-difference is applied, as is described in more detail in the previous chapter.

Individual results

In the following table, Table 5.1, a summary is shown for all the variables used for the hypotheses where it states whether a parallel trend is present and whether the hypotheses are rejected or whether there is insufficient proof to do so. For those variables with a parallel pre-trend and a visible change in trend post-treatment, the statistical results of the ATT are presented in Table 5.2 at the end of this subsection.

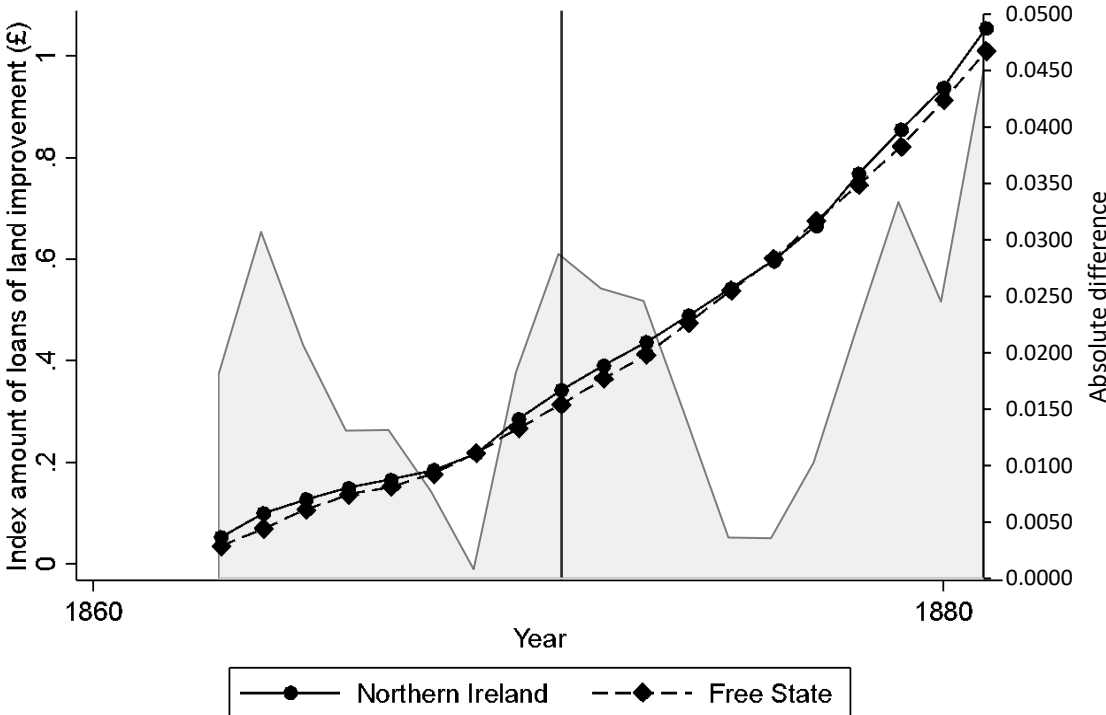
Table 5.1. *Summary parallel trend assumption variables and acceptance hypotheses*

Hypothesis	Variable	Parallel trend	Acceptance hypothesis
1	General land value	No	Rejected
	Land improvement loans	Yes	
2	Farm labour wage index	Yes	Rejected
	Ratio farm labour wage to agricultural production price	No	
	Ratio farm labourers per 100 farms	No	
	Ratio farm labourers to all occupied per acre	No	
3	Crop production per acre	Mixed, depends on the single crop	Insufficient evidence to reject
	Crop production per capita	Mixed, depends on the single crop	
	Crop land use per capita (domestic/export)	Yes for export (parallel for some single crops)	
4	Agricultural price index	Yes until 1867	Insufficient evidence to reject
	Crop production value per capita (domestic/export)	Yes for domestic, no for export	

Note. This table shows a summary of the main variables only. More variables are used in support of the hypotheses which are mentioned throughout the text and which can be found in the source overview in appendix A and the graphs presented in appendix B.

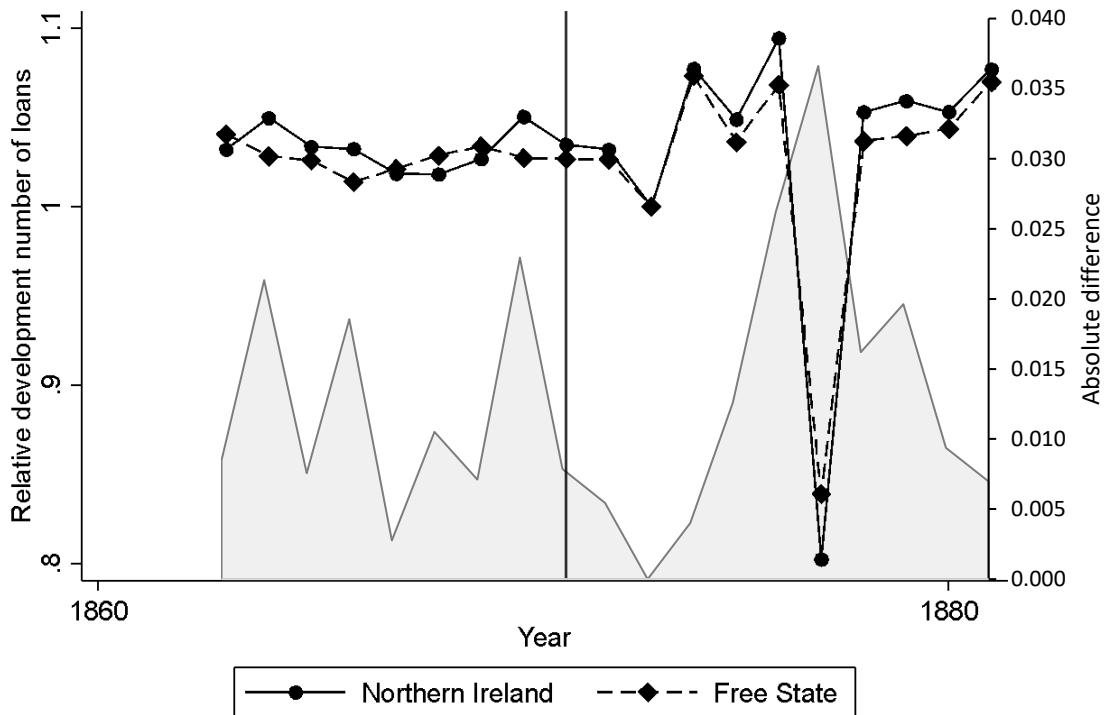
The first hypothesis, which states the trend of Free State significantly increases relative to that of Northern Ireland for land value after the Irish Church Act, is rejected based on the lack of a parallel pre-trend, as is seen in Figure A.1 in Appendix B. However, the land improvement loans provided show an interesting development. The number of loans provided, which increase at a steady pace, shows no change as seen in Figure 5.1. The amount of loans in shillings show for both lines a relative decrease after an increase which happened from 1873 onwards as seen in Figure 5.2.

Figure 5.1
Index monetary amount of loans for land improvement 1862-1881



Note. The index in this graphs shows an index based on annual data points from the original monetary amount of loans for land improvement. With the annual data points, a relative development to the mean of the chosen base years was calculated representing the index above, with 1862 = 100. See Appendix A for details of the data sources.

Figure 5.2
Relative development number of loans 1863-1881

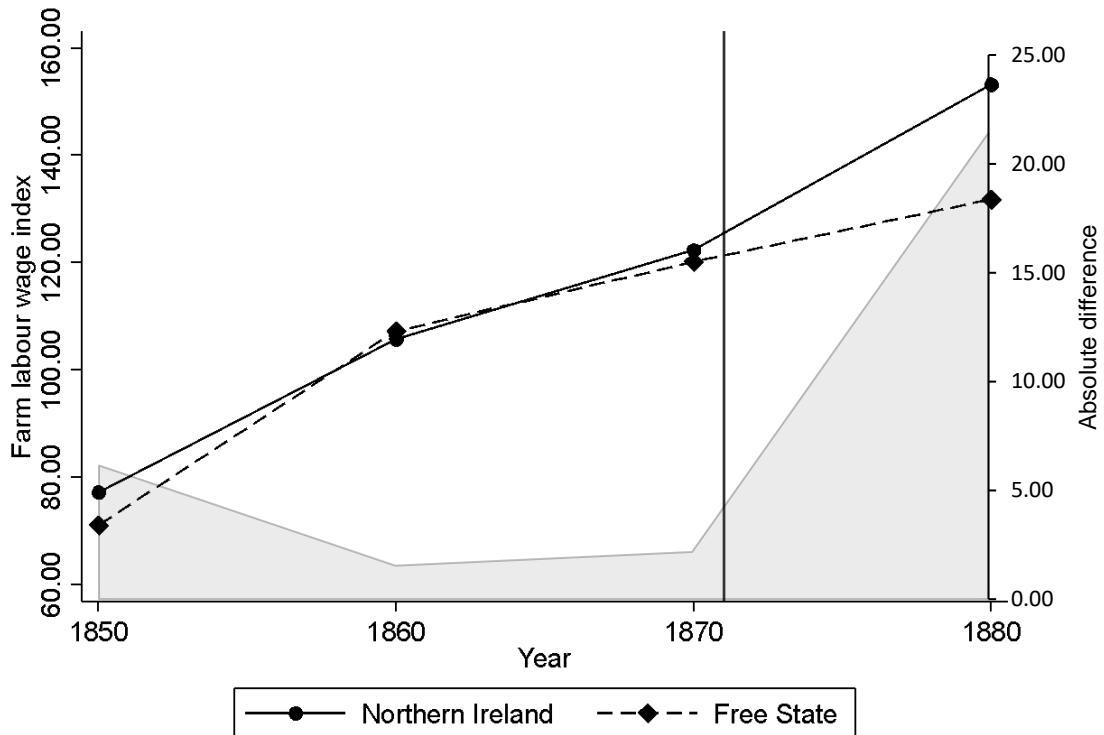


Note. The graph presents the development of the number of land improvement loans provided relative to the previous year. See Appendix A for details of the data sources.

The second hypothesis, which states the trend of Free State significantly increases relative to that of Northern Ireland for farm labour wage after the Irish Church Act, is rejected based on the statistical results and the graphic trend lines. The farm labour wage is converted into a wage index, as is seen in Figure 5.3 Here it shows that both lines are parallel in its pre-trend, however, the post-treatment only seems to change for Northern Ireland, not Free State, as it also appears for the variable of the wage ratio to agricultural price index, seen in Figure A.2 in Appendix B. In addition, information on farm deployment and the ratio of farm labourers to employed males seem to both relatively increase for Northern Ireland in contrast to Free State after the Act has come into effect seen in Figure A.3 and A.4 in Appendix B.

Figure 5.3

Farm labour wage index 1850-1880

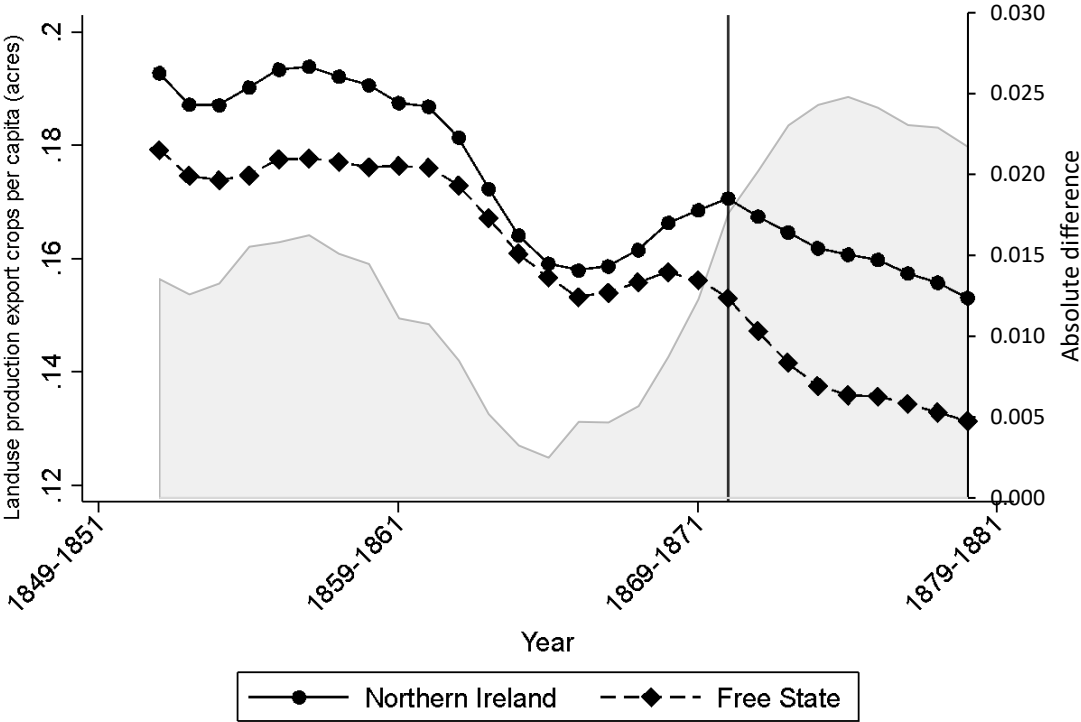


Note. The index in this graphs shows an index based on the interpolated annual data points from the original nominal farm labour wage. With the annual data points, a relative development to the mean of the chosen base years was calculated representing the index above, with 1856-1860 = 100. See Appendix A for details of the data sources.

The third hypothesis, which states the trend of Free State significantly increases relative to that of Northern Ireland for agricultural crop production after the Irish Church Act, is not rejected due to insufficient evidence. Though there is a lack of parallel trends in the data of individual crops, as can be seen in Figure A.8, A.9, A.10, A.12 in Appendix B, there are also some that do present a parallel trend, as can be seen in Figure A.6, A.7, A.11 in Appendix B. All the graphs of individual agricultural crop production per acre, presented in Figure A.6 to A.12 in Appendix B, increase post-treatment. The lines of production per acre for oats and wheat, of which the trend lines were apart, come together after 1871 which appear to have a reversed treatment effect. When the data is converted to production per capita for the individual crops, the trends either continue uninterrupted or also increases post-treatment as can be seen in Figure A.13 to A.17 in Appendix B.

When looked at the land use for these crops, both trends of agricultural domestic and export crop decreases overtime as seen in Figure 5.4 and 5.5, where the trend line of Free State appears to decrease at a faster pace. A significant ATT is found for the export production at an alpha level of 5 percent. However, Figure 5.5 of the domestic production shows a non-parallel trend pre-treatment. The individual graphs of crops land use, shown in Figure A.18 to A.24 Appendix B, almost all show a steeper decrease of Free State immediately after the Irish Church Act where it drops below that of Northern Ireland. The only exception is that of the turnips of which the trend of Northern Ireland increased, whereas Free State continued at a similar pace as before the treatment.

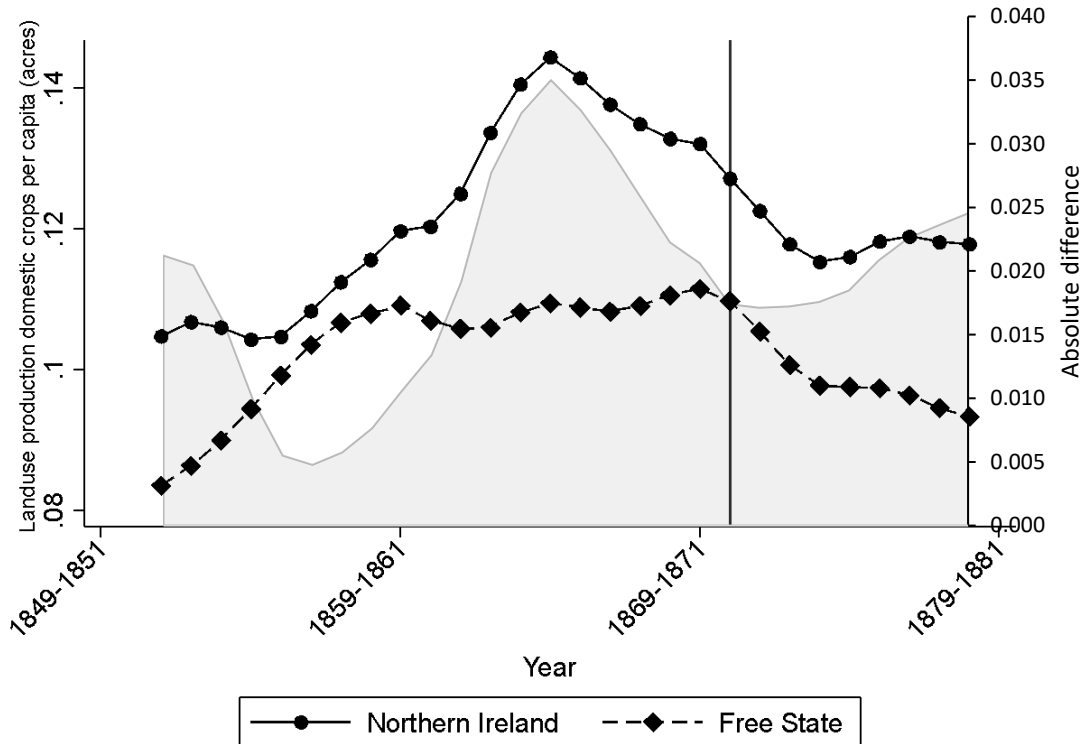
Figure 5.4
Land use production export crops per capita 1852-1880



Note. This graph shows a 3-year mean of summed up land use of individual crops that are categorised as export production (i.e. wheat, oats, and barley) divided by the number of state population of the matching year. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure 5.5

Land use production domestic crops per capita 1852-1880

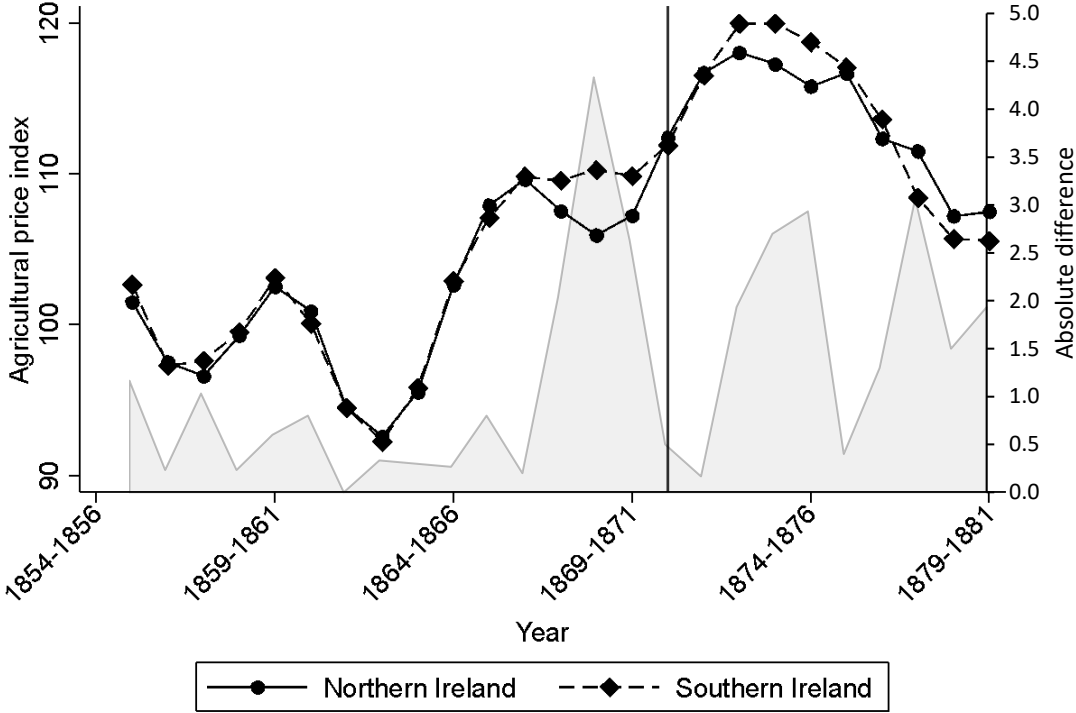


Note. This graph shows a 3-year mean of summed up land use of individual crops that are categorised as domestic production (i.e. potatoes, flax, and hay) divided by the number of state population of the matching year. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

The fourth hypothesis, which states the trend of Free State significantly increases relative to Northern Ireland for agricultural crop value after the Irish Church Act, is not rejected as there is insufficient evidence. No statistically significant result for the ATT of the agricultural price index is found, as shown in Table 5.2, however, the differing price index values right before the Act came into effect do seem to continue to differ afterwards as seen in Figure 5.6. As the index is created through weights of individual agricultural prices, the price of butter and milk accounts for a quarter of all the weights. But looking at Figure A.5 in Appendix B, it shows the existence of the gap between both lines in the agricultural price index is not due to the price difference in butter alone, meaning that other agricultural prices also have to differ to come to the index difference that it shows. Altogether, this does not completely rule out that no effect from the Act on the crop value of Free State is present. The trends for the domestic and export agricultural crop values, shown in Figure 5.7 and 5.8, appears to increase around 1873

for both domestic agricultural production and that of export. The lines seem to close for export shortly before moving apart again, similar to what appears to happen in the agricultural price index.

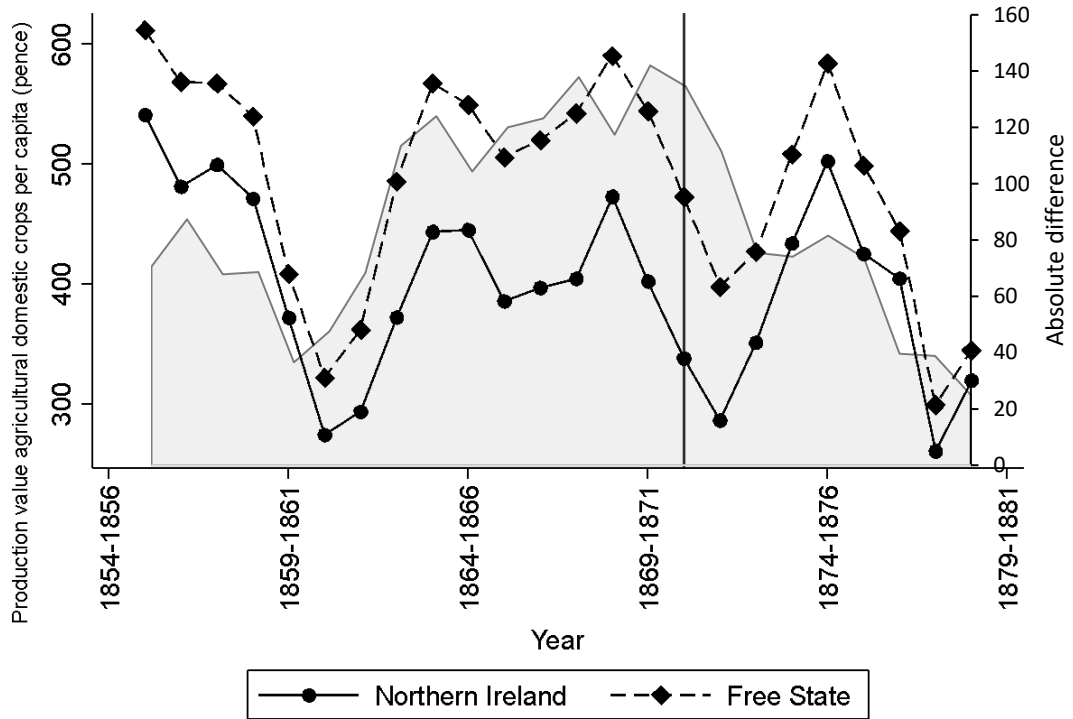
Figure 5.6
Agricultural price index 1855-1881



Note. The above graph represents the index numbers as retrieved in the original dataset, which is based on price weights and shows a relative development to the mean of the chosen base years. The 3-year mean is manually created by averaging the annual index numbers over a period of 3 years. The base years for this index are 1856-1860 = 100. See Appendix A for details of the data sources.

Figure 5.7

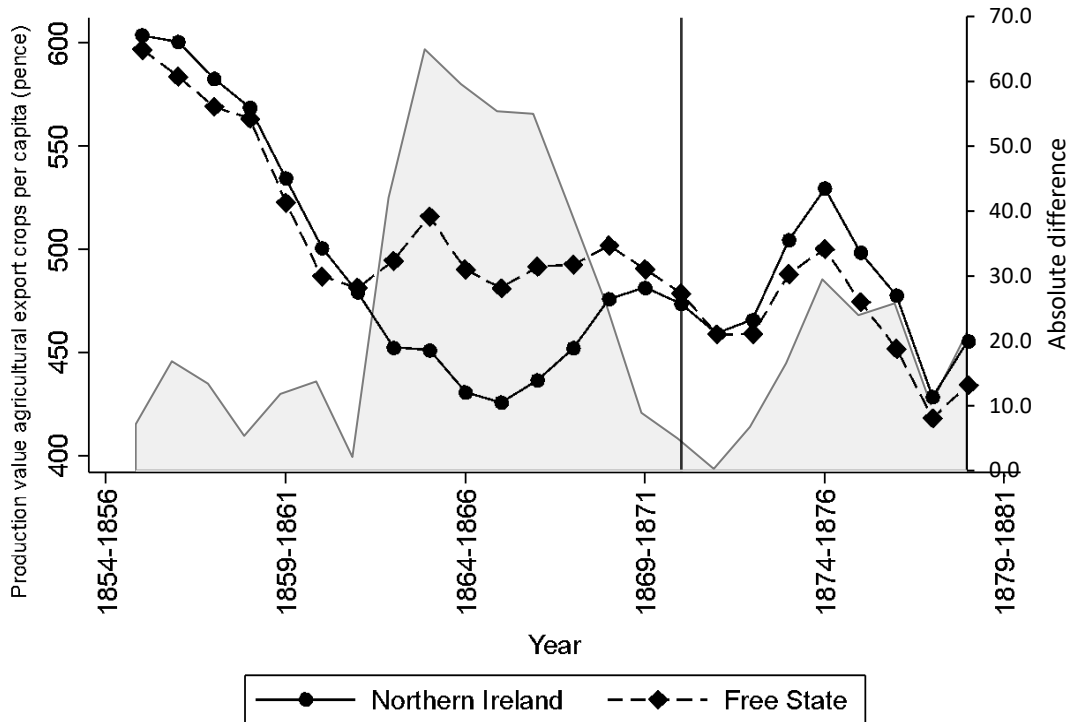
Production value agricultural domestic crops per capita 1855-1880



Note. This graph shows a 3-year mean of summed up domestic agricultural production multiplied by a fixed price of that of 1870. The value exists of individual crops that are categorised as domestic production (i.e. potatoes, flax, and hay) divided by the number of state populations of the matching year. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure 5.8

Production value agricultural export crops per capita 1855-1880



Note. This graph shows a 3-year mean of summed up export agricultural production multiplied by a fixed price of that of 1870. The value exists of individual crops that are categorised as export production (i.e. oats, barley, and wheat) divided by the number of state populations of the matching year. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Table 5.2. Overview Average effect of the Treatment on the Treated of the agricultural sector variables

Variable	Farm labour wage index	Agricultural price index	Crop production value (exp.)	Crop production value (dom.)	Crop land use (exp.)	Crop land use (dom.)
Free State	-2.259 (19.737)	0.709 (1.979)	19.083 (16.650)	95.273*** (29.370)	-0.010*** (0.003)	-0.019*** (0.003)
Post1871	51.465* (27.912)	12.082*** (2.212)	-21.428 (19.226)	-47.918 (33.913)	-0.017*** (0.004)	-0.003 (0.004)
Free State* Post 1871	-19.165 (39.473)	-0.499 (3.129)	-33.448 (27.190)	-22.582 (47.961)	-0.012** (0.006)	-0.001 (0.006)
Constant	101.742 (13.956)	101.458*** (1.399)	498.500*** (11.773)	417.150*** (20.768)	0.179*** (0.002)	0.122*** (0.002)

Note. This table presents the statistical results from a difference-in-difference test performed in Stata. Used commands for the above results can be found in Appendix C. *p<0.1, **p<0.05, p***<0.01

Interpretation results

As an individual result can tell something specific, we do require a broader interpretation between these variables to be able to say something about the entire agricultural sector. The outcomes of the research its analysis show several potential interesting findings between variables.

The first hypothesis, which is rejected, has a lack of parallel pre-trends in the general land value data in order to draw a clear conclusion, however, the supportive data of land improvement loans does have a parallel pre-trend. It shows that for both groups from 1873 onwards more land improvement loans were provided for relatively smaller amounts. This appears to continue for around 3 to 4 years, where after it seems to continue at the same development rate as prior to the increase. However, as no difference between both groups seem to occur it is unclear whether this was caused by the Act. Given the outcome of other variables, a possible explanation for this could come from an internal financing source. As stated in the individual results, it seems as if more agricultural production was achieved with less land. This could potentially cut costs for the farmer, leaving more money for land improvements. As is seen in the production value per capita, this also increased in the same period. With these findings it perhaps created the situation where more farmers were eligible to apply for a loan with already having a (small) budget in place requiring less additional loaned money for land improvements. Another explanation of the increase of the amount of land improvement loans and decrease in the mean loan applications could come from a new Drainage and Improvement of Lands Act that came into effect in 1872 (Drainage and Improvement of Lands Amendment Act (Ireland), 1872. (35 & 36 Vict.) Chapter 31, 1872). However, this Act did not bring new information with it but united existing ones. If any response at all it could have been that the change of this Act brought back awareness of its existence, yet, it would not explain why this created more smaller loan applications.

For the second hypothesis, which is rejected, the results of the farm labour wage index show an increase in post-treatment trend for Northern Ireland instead of Free State as well as for the ratio of farming labour to thousand employed males per acre and the ratio of farm labourers per hundred farms. Although it is important to note that the latter two variables do not have a parallel pre-trend. Moreover, due to the limited data points it is unclear whether

the wage increases occurred prior to the increase in the labourer ratio to farms and employed males per acre. Yet, in absolute terms, Free State remains to have more farm labourers per hundred farms whereas in ratio more farm labourers to employed males per acre are present in Northern Ireland and even increasing in 1881 which do not offer any clear cut explanation for the Northern Ireland wage index increase. O'Malley (1981) mentions that there was not only a decline in agricultural workers present due to the Great Famine, but also a decline in industry with the exception of Belfast and its linen industry of which was highly dependent on the flax production. With a larger industry in place reliant on agricultural production it might be that in order to get sufficient labour in place to provide sufficient flax production and the upcoming labour unions in the textile industry, the farm labour wages relatively increased.

Moreover, the increase in farm labour wage and the ratio of male farm labourers to employed males in Northern Ireland which could be an effect of farm labourers either changing from job or leave Ireland, as was seen overall in the population, since the Great Famine (Fitzpatrick, 1980). This could lead to a scarcity in farm labour, however, this does not then align with the consistent farm labourers per hundred farms over time for Northern Ireland.

Another explanation might be that due to the heritage system of farms across Ireland, land was divided up to pass on to sons within the family, creating more farms but less land per farm and therefore less labour required to work the land. It should also be noted that the numbers presented in the data only represent males and not females working the land, who most often were positioned on different tasks. A possible shift in type of farm work could potentially add to explaining the findings, however, more research is needed to clarify this.

For the third hypothesis, where there is insufficient evidence to reject, the difference in trend between the groups of the crop production variables with a present parallel pre-trend, oats and wheat, appear to have a reversed treatment effect where both trend lines come together after the Act whereas there was a consistent gap between them prior. This also appears to be the result for the wheat production per capita. Even though this appears as a treatment effect, it is difficult to conclude which of the two groups deviated in its trend. As for land use per capita, those crops with a parallel pre-trend all seem to appear to increase for Northern Ireland instead of Free State, for turnips, oats, and potatoes. In short, it is difficult to draw a conclusion on the production per acre and capita for some of the crops although it seems to be affected by the Act, whereas the land use per capita actually appears to have a treatment

effect on Northern Ireland rather than Free State. An increase of land use per capita, combined with an almost overall increase of agricultural production per acre and capita for the crops, might imply that a larger, domestic or external, demand for a selection of the agricultural crop production appeared for either consumption or other uses.

As for the overall trend, it seems to appear from 1873 onwards the land being used is far more productive in terms of agricultural crop production for both Free State and Northern Ireland.

For the fourth hypothesis, where there is insufficient evidence to reject, the price index deviates just before the treatment itself, where the trend of Northern Ireland increases to the same point of Free State at the starting point of treatment. From 1873 they differ again where Free State has a higher index. The production value for domestic crops has a parallel trend, however, the trend lines do not appear to deviate from each other. It is therefore difficult to conclude on this outcome whether there was indeed a treatment effect on the value of the agricultural crops. Generally, looking at the movement of both trend lines across for domestic and export crop value groups, this appears to increase from 1873 till 1875. As for both lines of the price index, this increases in the same pace starting in 1871 but deviates again from each other from 1873 onwards.

6. Limitations

This section discusses the limitations that are present throughout this research. The found limitations mostly discussed are those in the Irish Church Act event itself, the analysed dataset, and applied methodology.

The Irish Church Act caused for a decentralisation of financial investments across Ireland which can bring limitations for this research. First, due to the 21 different financial systems, the amounts invested across Ireland might deviate from each other therefor impacting the possible treatment effect of the Act. Moreover, as a new body had to be set up, the RCB, a large sum of money came in their hands. Where in other organisations the experience might grow with the amount of money being responsible for, the RCB was very inexperienced when it came into position. They did had help from financial experts, however, it might lead to less optimal choices for the investments being made, possibly causing for a different impact of the Irish Church Act (Traill, 1908).

Within the dataset, shortcomings in the chosen period, construct of the original dataset itself, and the extent to which data is used within this research can be present. Within the chosen period, other different events might have occurred influencing the results analysed within this research. For the majority of Ireland these events can be analysed for their possible impact, like the Drainage Act in 1872 or the Land Act in 1870, which is said to have no or minor impact on the agricultural sector (Drainage and Improvement of Lands Amendment Act (Ireland), 1872. (35 & 36 Vict.) Chapter 31, 1872; Guinnane & Miller, 1997). However, other events and developments outside of Ireland might have impacted the sector as well through a change in demand in the (agricultural) export as industrial developments in other countries took place earlier and in a faster pace than was present in Ireland itself.

Regarding the construct of the original data, there was great dependence on what and how this was registered in the first place and what the registered data entails. As Ireland was still one country and Ulster was taken as one province instead as the divide that it currently is in between Northern Ireland and Free State, some of the data is difficult to trace back to the specific regions as this is only available on a provincial level. The central registration depended highly on the laws in place and any use that the data could offer at that time, making the data not always available for each year but in some cases only decennial or even as a single

registration. Other literature shows how difficult it is to truly rely on statistical information as this does not capture all that it seems to. Fitzpatrick discusses, for example, that when looking at Irish farm workers, their wages, and employment status, the majority are not included (1980). This is due to the way (farm) labour in that period existed, where at times no payment took place but a trade in the form of food and lodgement, farm labourers only worked in seasons and switched jobs outside of this or where labourers existed out of family members who participated in maintaining the farming practices. This creates for incomplete data even though it says it is registered by official offices and can therefore cause for incorrect outcomes of an analysis.

However, even though the data might be available and complete, the chosen methodology might still cause for limitations within the research as the DiD method comes with strong assumptions, of which consistency is one of them. As the Irish Church Act invests in agriculture across Ireland, it might be that given the additional financial input it also causes a type of treatment effect for Northern Ireland. Yet, no possibility has been found within this research for a better control group that fits the DiD assumptions as the Northern Ireland group would. Which means when interpreting the results, awareness is needed for these included constraints. Moreover, to interpret the pre-trend, sufficient data points are required. As mentioned in this section, data availability is highly dependent on the registration that took place in the researched period. Having limited amount of data points can also limit the precision of the used DiD method and its final interpretation.

7. Conclusion

To conclude, the main results and hypotheses are summarized in this section, where after the research question is discussed, continued by the possible implications this might have in practice. Finally, the robustness of the research is examined followed by further research possibilities.

For the first hypothesis regarding land value, this is rejected due to a lack of parallel pre-trends combined with a lack of a treatment response from the supporting variables of land improvement loans. The movement in both lines do appear to show a short term increase of smaller and more loans between the period of 1873 and 1877.

The second hypothesis on the topic of labour wage is rejected given that the analysed change in trend appears to be for Northern Ireland rather than Free State. The ratio increases for the labour variables also increase for Northern Ireland, however, these do not have a parallel pre-trend.

For the results for the third hypothesis regarding crop production, which had insufficient evidence to reject, it appears that a part of the agricultural crop production per acre and capita are affected by the Act as their trend lines come together post-treatment. Yet, it is unclear which of the groups deviates from its former trend. The data on land use per capita tells us that rather Northern Ireland seems to be affected by the Act by showing an increase for crops rather than Free State.

The fourth hypothesis concerning the crop value, which could not be rejected due to insufficient evidence, shows a deviating trend line of the price index where Free State increases above Northern Ireland, however, this already starts right before the treatment period. As for the domestic crop value results, there does not appear to be any change in trend between the two lines.

For the overall development of both groups, it appears that agricultural land for a short period of time became more productive as land use per capita decreased, production per acre increased, and production per capita either remained stable or also increased. Moreover, from 1873 onwards, an increase of crop value and a larger number of on average smaller loans appeared in the same time period.

Bringing these results back to the research question, what the economic impact of the Irish Church Act is on the agricultural sector between 1860 and 1880, it might possibly affect the agricultural land production and agricultural land improvements. Even though answering the hypotheses show quite an ambiguous outcome as approximately half of the hypotheses, of land value and labour wage, stating the trend of Free State increases post-treatment relative to Northern Ireland were rejected, where the other hypotheses regarding agricultural production and agricultural production value, did not have sufficient evidence to reject the hypotheses. Even though the outcome of the hypotheses are mixed, the results can still give insights into the movements that occurred over the period and possible (local) effect that the Irish Church Act could have. The main impact could be that the Act led to a short-term effect of higher productivity of the agricultural land and a potential change of the agricultural price index. Due to limited data, it is difficult to say whether the increase in the farm labour wages trend in Northern Ireland came prior to the increase of farm labourers or not. This might have to do with a response on and interaction with the textile industry rather than the Irish Church Act.

Previous research of Girvin (1997) and Ngowi (2009) presented contradicting results with regard to the impact of increasing state independence on the economy, of which this research can neither reject or confirm either as it seems the impact of increasing political independence is far more complex than having either a 'positive' or 'negative' effect on the agricultural sector. The factorial interactions between one another can include an increase in one level causing a possible decrease in another, creating seemingly an ambiguous outcome. However, it very much depends on where the focus is on, e.g. the export market, to judge how this is impacted. Voigt et al. (2015) also brought more contrast to the difference between the impact of a change in policy and having a force ensuring the compliance of the actual policy change, whereas the latter seems to be associated with a higher economic growth. Given the literature where the Irish Church Act seemed to be fully implemented, the outcome of this research does not align completely across all the findings of the hypotheses. Still, more research is needed to fully confirm or reject this.

Additionally, as it is generally taken that Northern Ireland and Free State differ significantly from each other in their political views and policy approaches (Maxwell, 2013), it is

noteworthy how alike they often both respond in the agricultural factors covered in this research.

As mentioned in this section, the outcome of the hypotheses is ambiguous, where the statistical and economic significance differed herein. The hypotheses that included statistical insignificant results had most often very limited data points, which might have been the cause of this. However, this does not say there is no significant impact in practice, as clear deviations from parallel trends can tell us there has indeed been an effect in place, however, more research is required to rule out whether this is due to the Irish Church Act or a different event or change. Additionally, the robustness of the research is limited as only the control and treatment group were analysed, of which its results could be confirmed more strongly with additional robustness tests. Possibilities for this are researching the effects on the fishery sector of which the Irish Church also invested in. However, given that the fishery sector is a different setup, this might not suffice to all the conditions taking place in the agricultural sector. Besides this, it can also be looked at a more local level, counties, to see what the impact of the specific investment is and how this takes place on a national scale, as currently possible effects might be overlooked by combining all the areas as one.

Recommendations

With a careful recommendation, as more research is needed before any of the findings in this research can be accepted, in the case that the findings are indeed caused by the Irish Church Act and its decentralised financial investments, it seems as if there is an increase in production for a part of the crops with a possible effect of a crop price increase. If this is so, then it should also be noted that this effect seems to be short-lived. Again, more research is needed as the results might give more concrete information on the expenditure and investment cycle within the agricultural sector and the developments that this creates.

Looking at the current developments of both areas campaigning for independence (BBC News, 2021; Euronews, 2021; Henander, 2020) but also the growing importance of the agricultural sector in the challenge of the climate change (Arora, 2018; Crane et al., 2011), it is therefore of great importance to understand the movements of financial investments and the system that this operates in to get a better grasp on the possible future consequences that this can have.

Further research

There are many ways to continue researching with the findings in this paper. First of all, as it is uncertain how the investments were made, how much the amount per area was, over what time this was spent, and how this was spent per area, it might be very valuable retrieving more insights in the precise financial structure to retrieve a better understanding to the specific factors this might have impacted and its following interactions within the agricultural sector. Furthermore, there are multiple additional sources of the discussed agricultural factors, e.g. export data that are available, however, more challenging to retrieve that might give a better and more detailed development which can clarify the timing of change. Also, even though Northern Ireland was included in this research as a control group, it did appear at times as if it responded stronger than Free State. It might be interesting to continue research more into the specific setting of Northern Ireland as industrialisation was more actively taking place which might bring more insights into these developments and its interaction with the agricultural sector. Fourthly, it appears as there are quite some overlapping movements within the researched variables from the year 1873 onwards which might be interesting what specifically caused for this joint response. Lastly, as only crops were included in this research and not livestock as the data appeared to be quite constant, it might be interesting to look more into detail in its general development Ireland and especially its relation to that of export as this was a large part of the agricultural sector and adds to valuable insights on a different agricultural product which is also dependent on different agricultural, economical, and political factors.

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Appendix A: Overview data sources

Table A.1. Overview sources of variable datasets

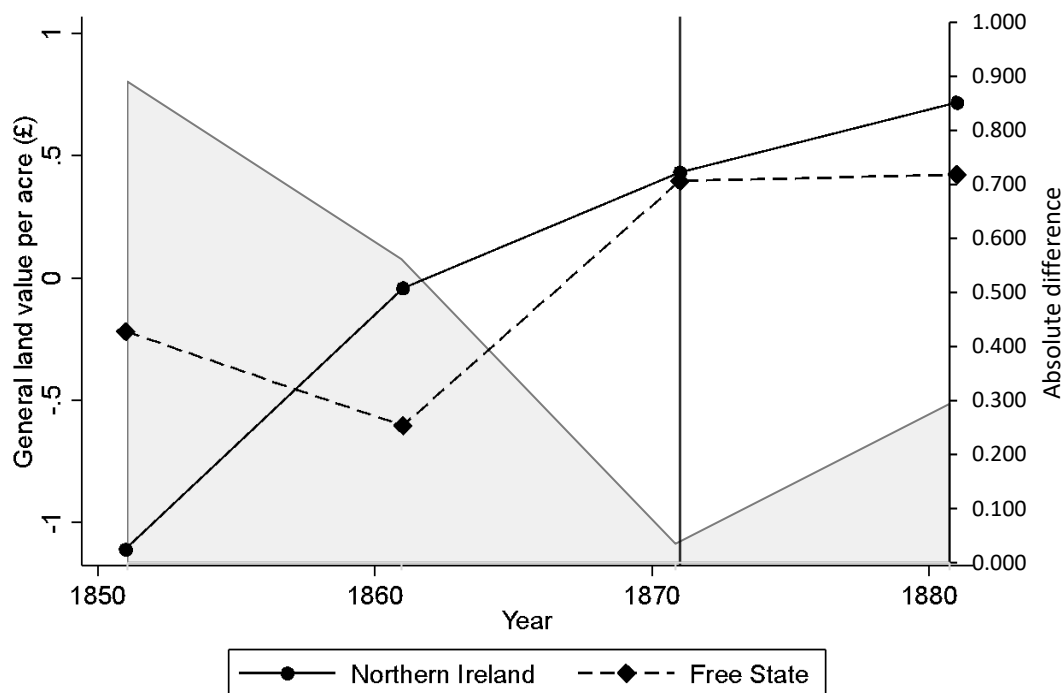
Variable	Sources
General land value	<p><i>Return of the agricultural statistics of Ireland for the year 1851.</i> (1851). https://www.dippam.ac.uk/eppi;</p> <p><i>Return of the agricultural statistics of Ireland for the year 1861.</i> (1861). https://www.dippam.ac.uk/eppi;</p> <p><i>Return of the agricultural statistics of Ireland for the year 1881.</i> (1881). https://www.dippam.ac.uk/eppi</p> <p><i>Return of owners of land of one acre and upwards in the several counties, counties of cities, and counties of towns in Ireland.</i> (1871). https://www.dippam.ac.uk/eppi</p>
Land use	<p><i>Saorstát Éireann Agricultural Statistics 1847–1926: Report and Tables.</i> (1926). Department of industry and commerce.</p> <p><i>Agricultural Census historical data Department of Agriculture, Environment and Rural Affairs.</i> (2017, August 22). DAERA. https://www.daera-ni.gov.uk/articles/agricultural-census-historical-data</p> <p><i>Farming Since the Famine, 1847–1996.</i> (2021). https://www.cso.ie/en/statistics/othercsopublications/farmingsincethefamine1847-1996/</p>
Loans land improvement	<p><i>Commissioners of Public Works (Ireland).</i> (1862–1881). https://www.dippam.ac.uk/eppi</p>
Rent value	<p><i>Commissioners of Public Works (Ireland).</i> (1872–1881). https://www.dippam.ac.uk/eppi</p>
Output agricultural production	<p><i>Saorstát Éireann Agricultural Statistics 1847–1926: Report and Tables.</i> (1926). Department of industry and commerce.</p> <p><i>Agricultural Census historical data Department of Agriculture, Environment and Rural Affairs.</i> (2017, August 22). DAERA. https://www.daera-ni.gov.uk/articles/agricultural-census-historical-data</p> <p><i>Farming Since the Famine, 1847–1996.</i> (2021). https://www.cso.ie/en/statistics/othercsopublications/farmingsincethefamine1847-1996/</p>
Agricultural production prices	<p>Kennedy, L., & Solar, P. M. (2007). <i>Irish Agriculture: A Price History from the Mid-Eighteenth Century to the Eve of the First World War.</i> (2007) Hardcover. Royal Irish Academy.</p>
Labour wages	<p>Fitzpatrick, D. (1980). The Disappearance of the Irish Agricultural Labourer, 1841–1912. <i>Irish Economic and Social History</i>, 7(1), 66–92. https://doi.org/10.1177/033248938000700105</p> <p>Bowley, A. L., & Wood, G. H. (1906). The Statistics of Wages in the United Kingdom during the Nineteenth Century (Part III). Engineering and Shipbuilding. E. Averages, Index Numbers, and General Results. <i>Journal of the Royal Statistical Society</i>, 69(1), 148. https://doi.org/10.2307/2339551</p> <p><i>Reports from poor law inspectors on the wages of agricultural labourers in Ireland.</i> (1870). Alexander Thom, 87 & 88 Abbey-Street, for her Majesty’s Stationary Office.</p>
Labourer ratios to farms and employed males	<p>Fitzpatrick, D. (1980). The Disappearance of the Irish Agricultural Labourer, 1841–1912. <i>Irish Economic and Social History</i>, 7(1), 66–92. https://doi.org/10.1177/033248938000700105</p>

<p>Population</p>	<p><i>Saorstát Éireann Agricultural Statistics 1847–1926: Report and Tables.</i> (1926). Department of industry and commerce.</p> <p><i>The census of Ireland for the year [Year] showing the area, population, and number of houses by Townlands and Electoral Divisions.</i> (1851–1881).</p> <p>http://www.histpop.org/ohpr/servlet/PageBrowser?path=Browse/Census%20(by%20date)/1851/Ireland&active=yes&mno=389&tocstate=expandnew&tocseq=100&display=sections&display=tables&display=pagetitles&pageseq=first-nonblank</p>
<p>Inflation rate</p>	<p><i>Home.</i> (2021). Office for National Statistics. https://www.ons.gov.uk/</p> <p><i>Inflation Rate between 1850–2021 UK Inflation Calculator.</i> (2021). UK Inflation Calculator.</p> <p>https://www.officialdata.org/uk/inflation/1850?+endYear=1881&amount=100</p>

Appendix B: Figures

Figure A.1

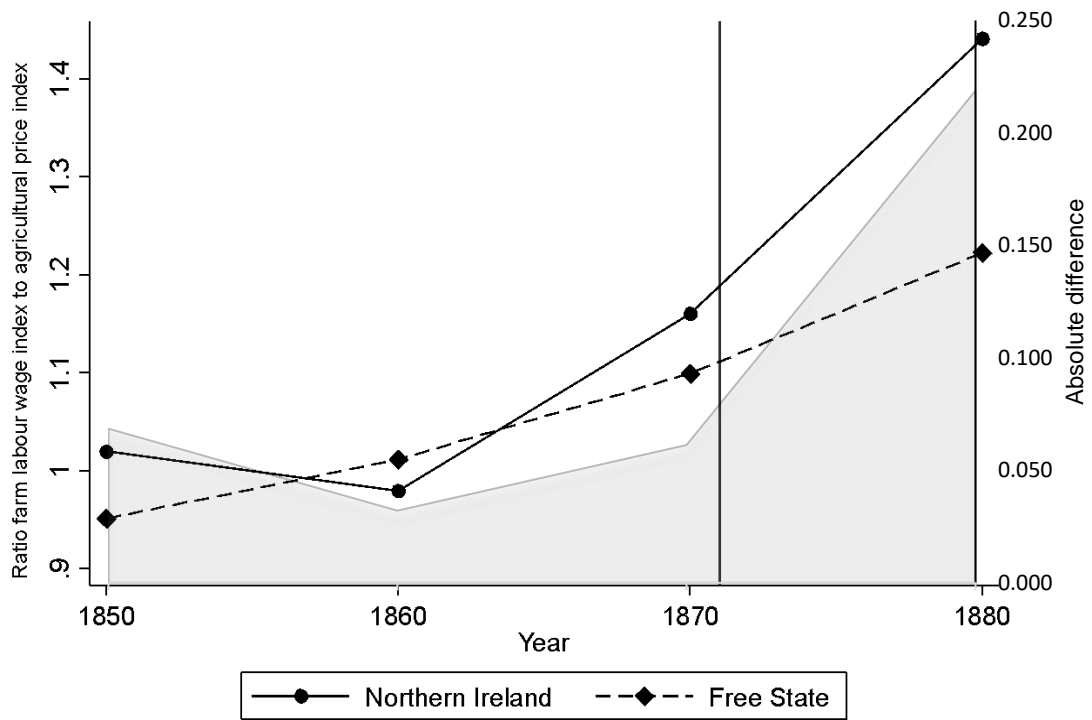
General land value per acre 1851-1881



Note. This graph shows a relative value of general land per acre. The number shows a demeaned mean, which contains the mean across the analysed period is subtracted from its mean value, of general land value divided by the number of acres of general land. See Appendix A for details of the data sources.

Figure A.2

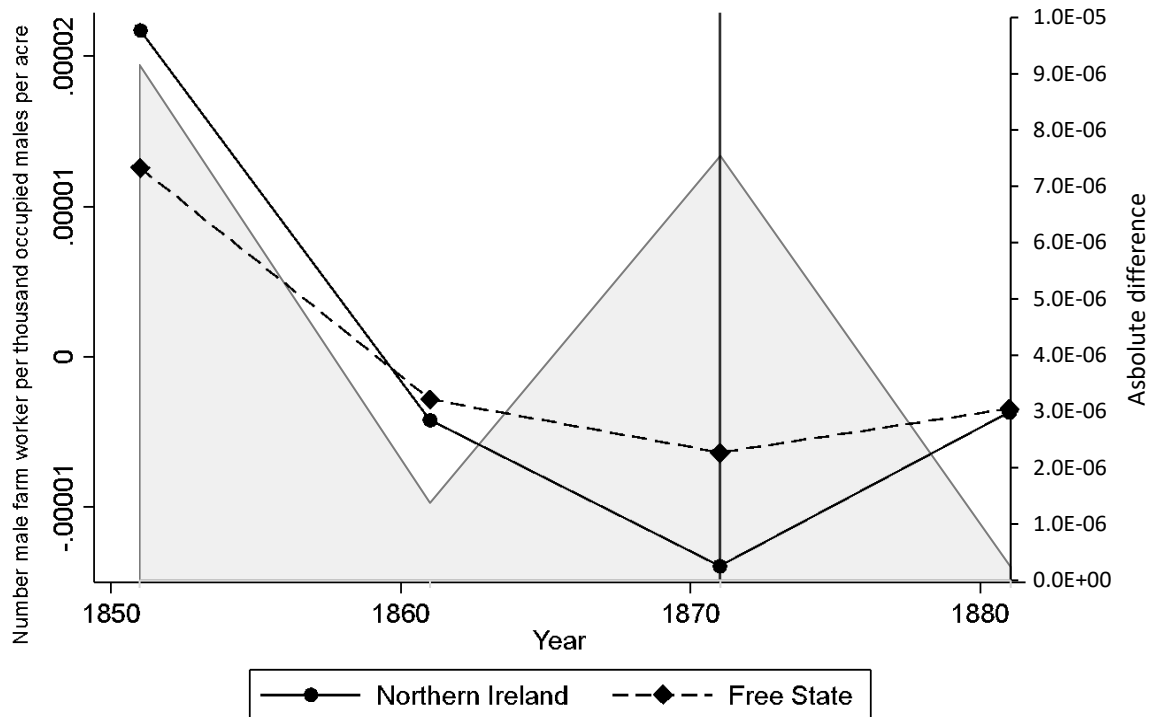
Ratio farm labour wage index to agricultural price index 1850-1880



Note. The above index shows the obtained dataset of the linearly interpolated nominal farm labour wage divided by the obtained index numbers of the agricultural price index based on price weights, of which its annual data points are taken relative to that of its base years' mean. Base years for both farm labour wage and agricultural price index are 1856-1860 = 100. See Appendix A for details of the data sources.

Figure A.3

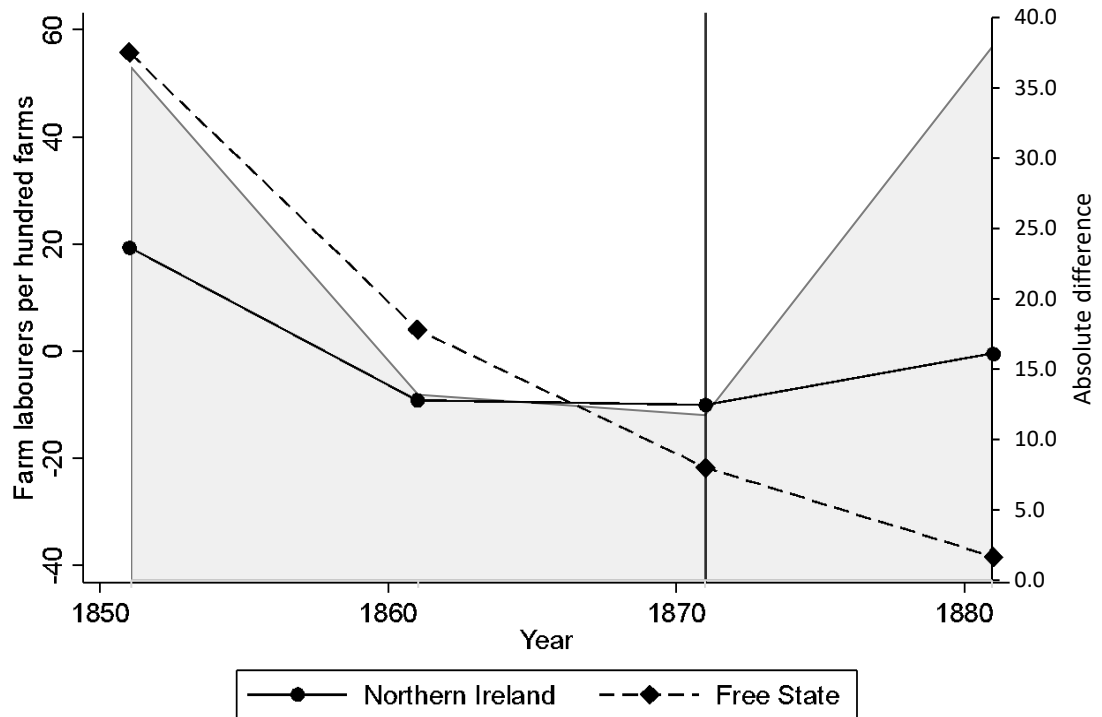
Number per thousand occupied males engaged in farming per acre 1851-1881



Note. This graph shows the relative ratio of male farm employment to an agricultural acre. The number shows a demeaned mean, which includes the mean across the total analysed period subtracted from its mean value, of the obtained ratio employed farm labour males to all employed males divided by the agricultural acreages in use. See Appendix A for details of the data sources.

Figure A.4

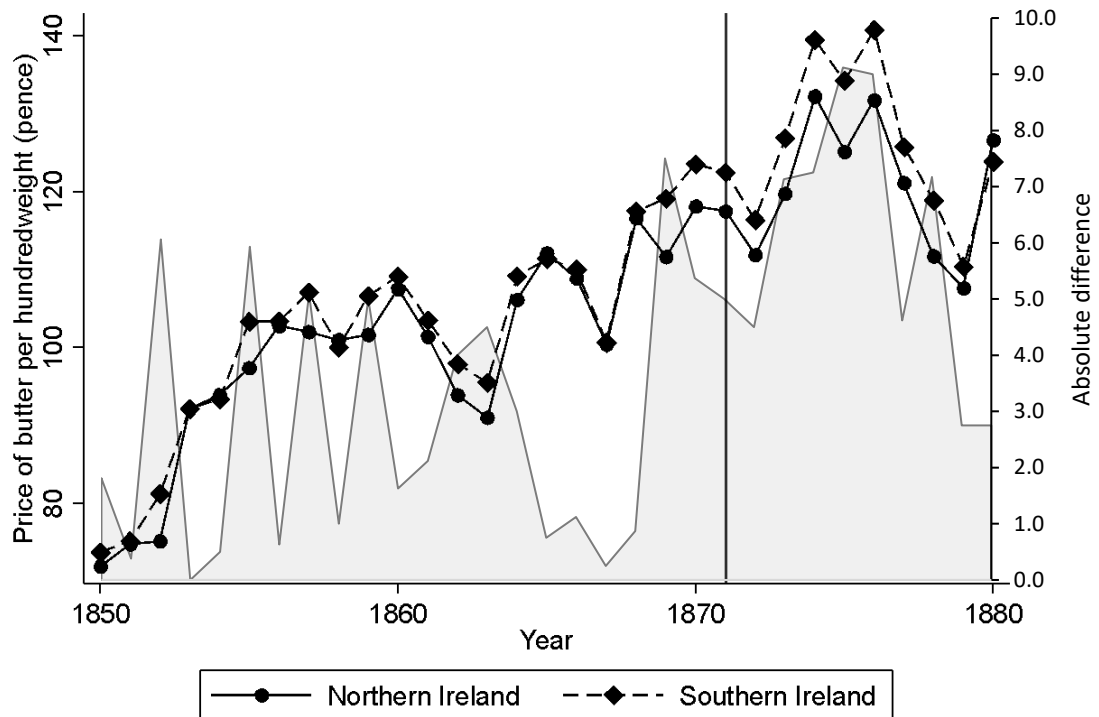
Farm deployment per hundred farms 1851-1881



Note. This graph shows the relative ratio of male farm labourers to a hundred farms. The number shows a demeaned mean, which includes the mean across the total analysed period subtracted from its mean value, of the obtained ratio employed male farm labourers to a hundred farms. See Appendix A for details of the data sources.

Figure A.5

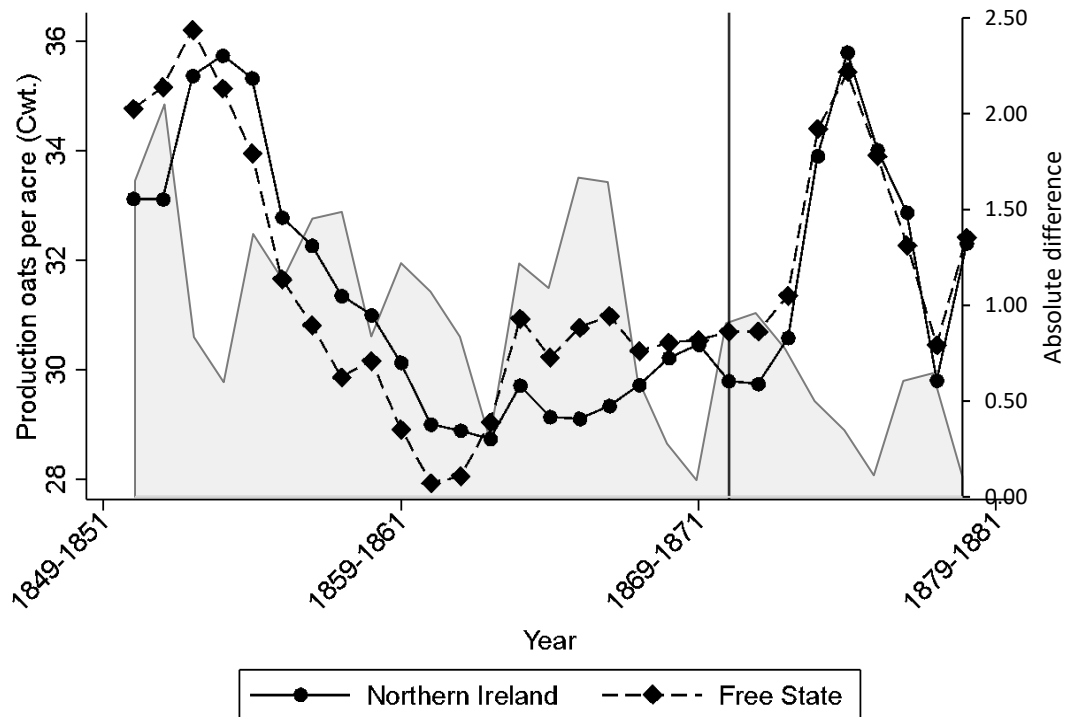
Price of butter 1850-1880



Note. This graph shows the price in pence per hundredweight of butter per year as this was registered for the areas of Belfast and Waterford. See Appendix A for details of the data sources.

Figure A.6

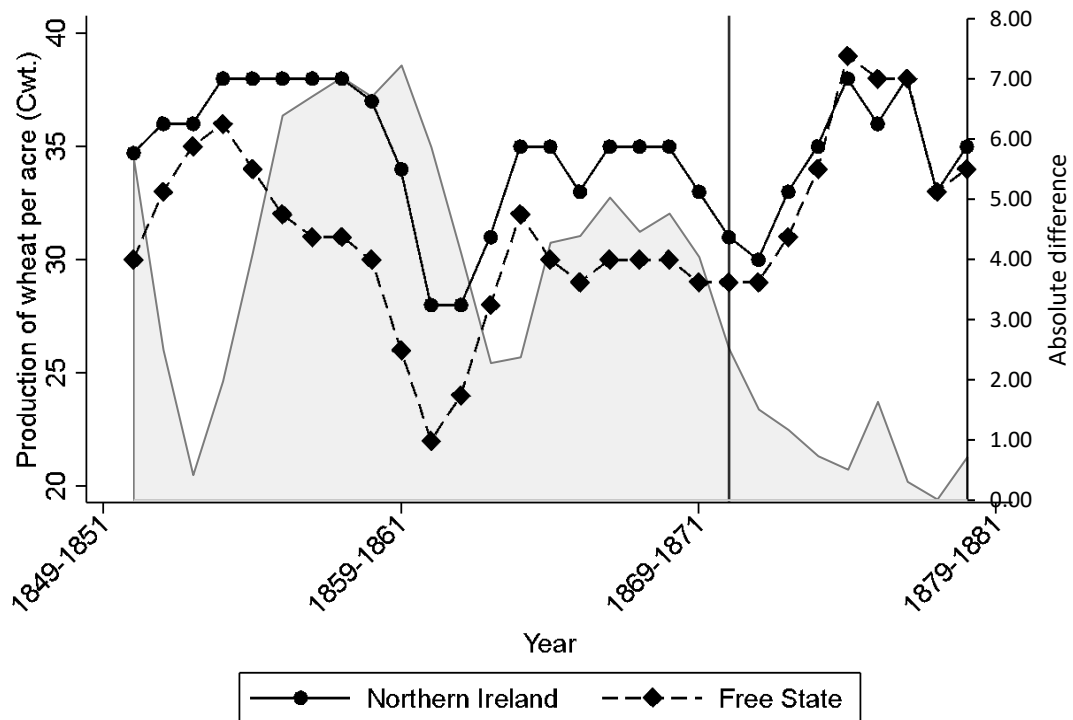
Production oats per acre 1850-1880



Note. This graph shows a 3-year mean of the total oats production divided by the registered agricultural land use for oats. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.7

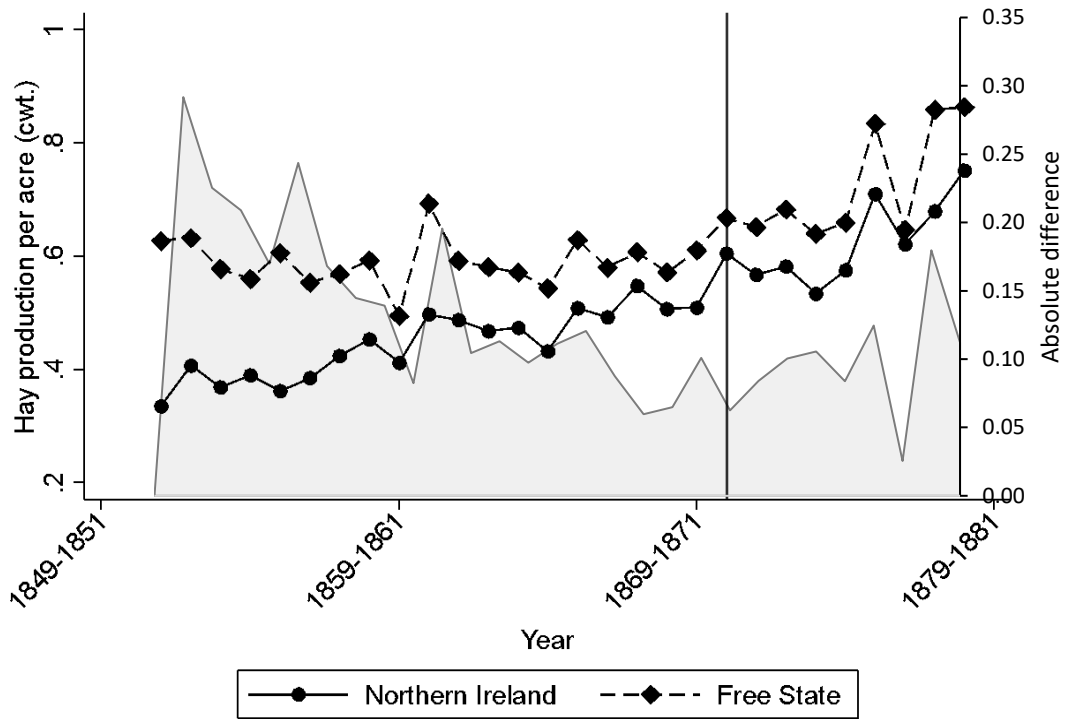
Production wheat per acre 1850-1880



Note. This graph shows a 3-year mean of the total wheat production divided by the registered agricultural land use for wheat. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

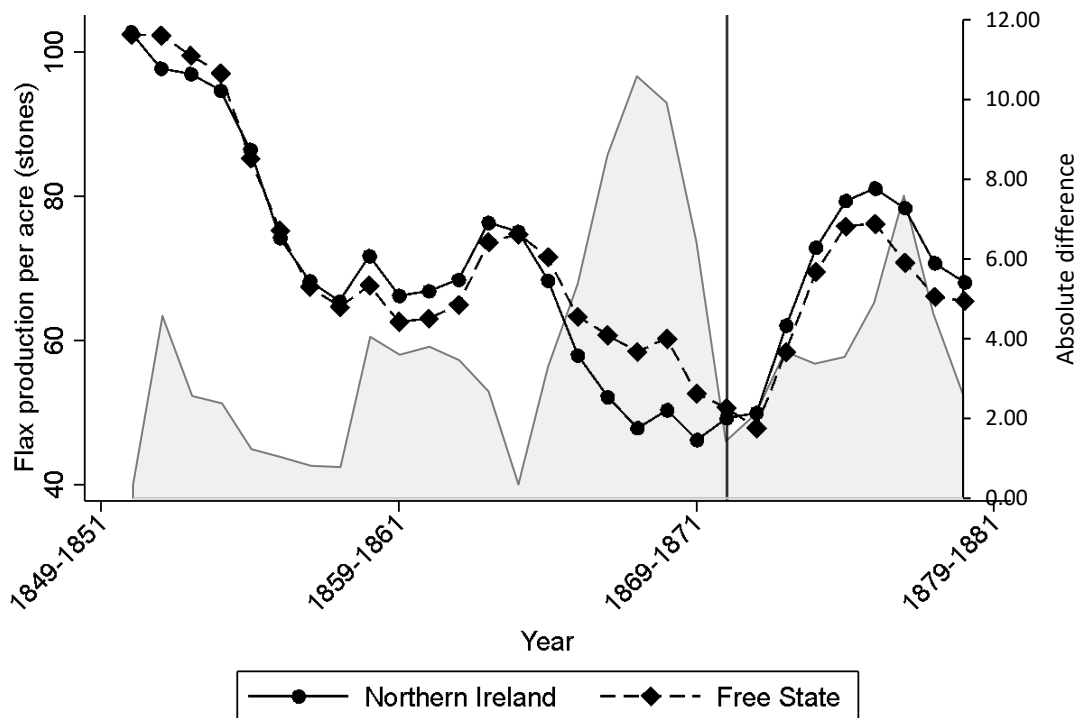
Figure A.8

Production hay per acre 1850-1880



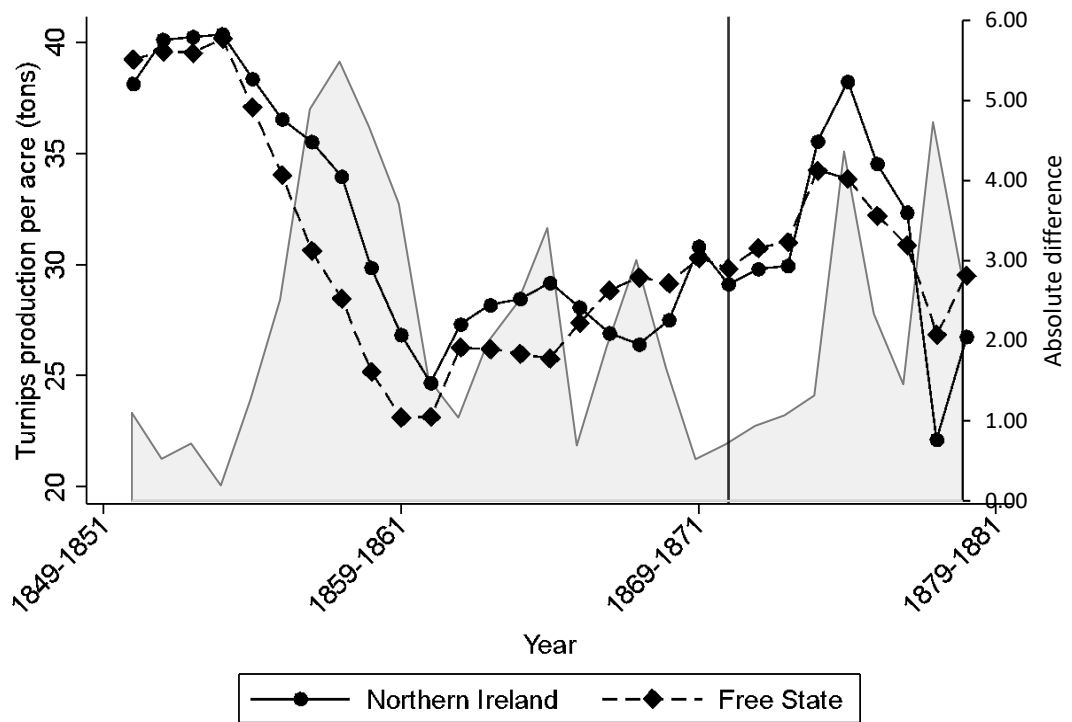
Note. This graph shows a 3-year mean of the total hay production divided by the registered agricultural land use for hay. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.9
Production flax per acre 1850-1880



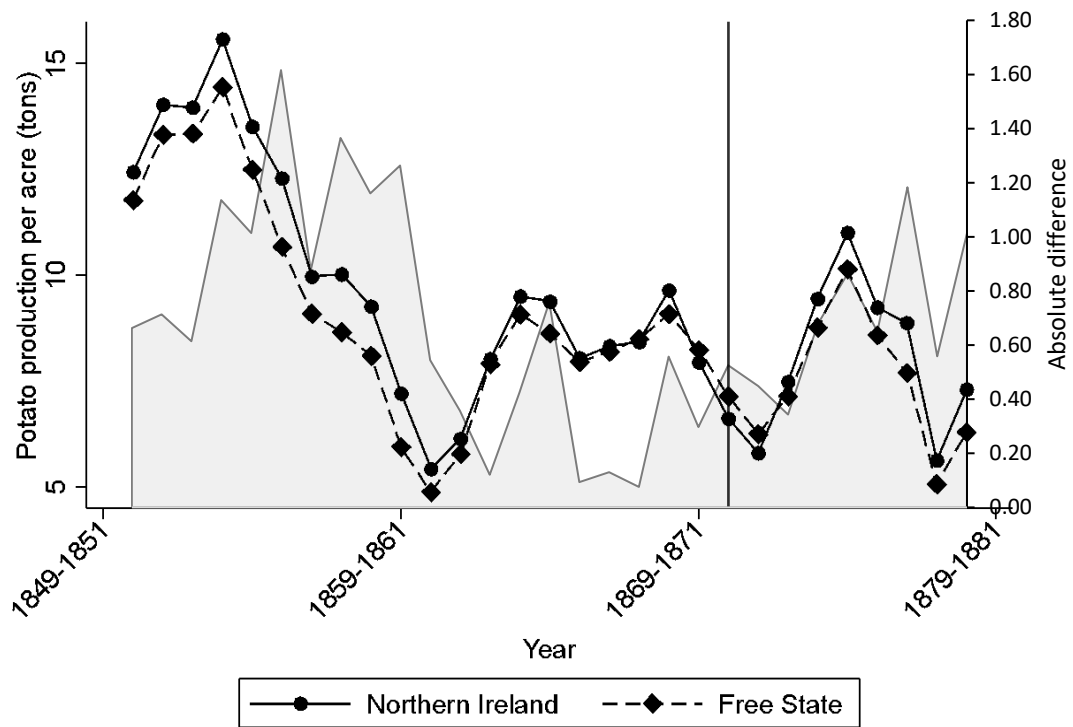
Note. This graph shows the total flax production divided by the registered agricultural land use for flax. See Appendix A for details of the data sources.

Figure A.10
Production turnips per acre 1850-1880



Note. This graph shows a 3-year mean of the total turnips production divided by the registered agricultural land use for turnips. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

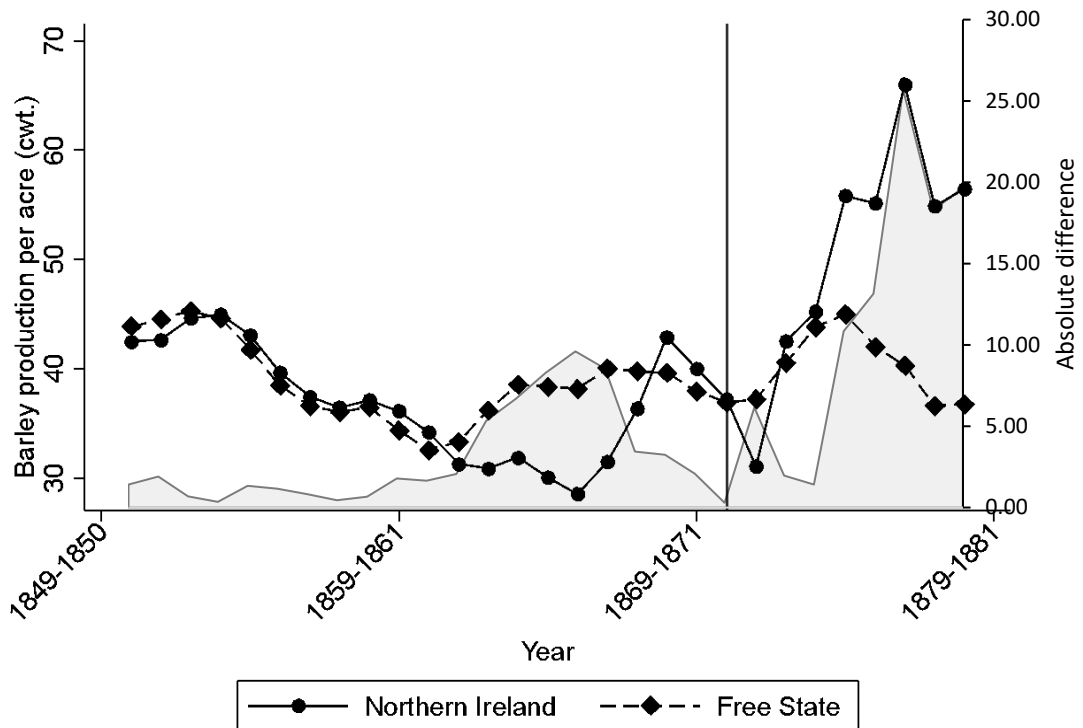
Figure A.11
Production potatoes per acre 1850-1880



Note. This graph shows a 3-year mean of the total potato production divided by the registered agricultural land use for potatoes. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.12

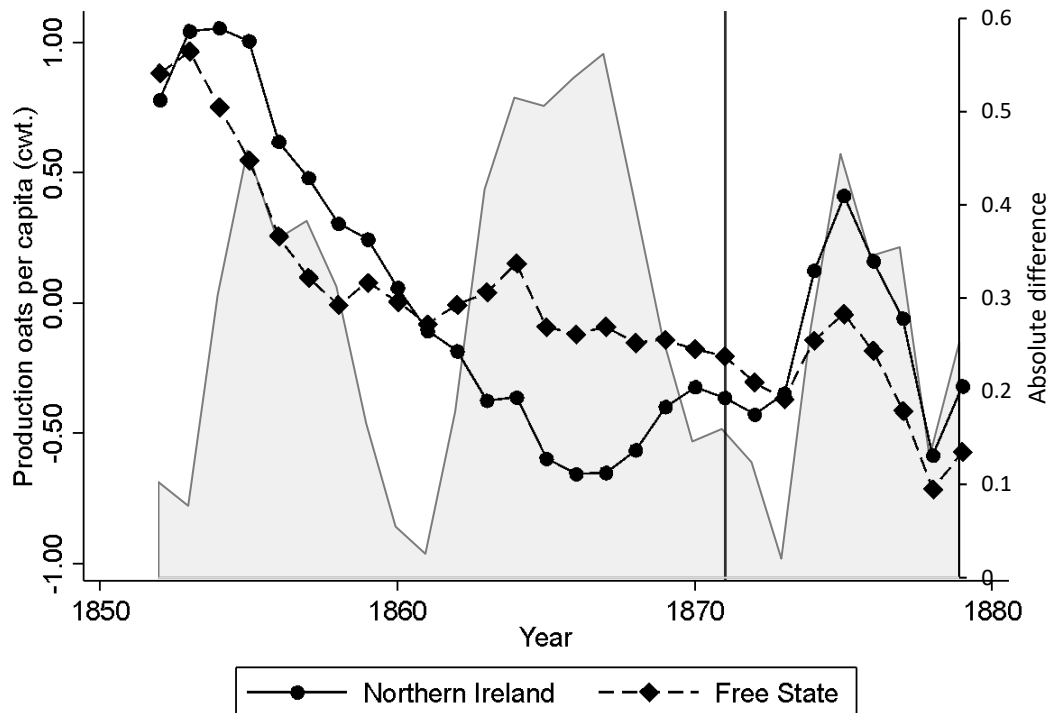
Production barley per acre 1850-1880



Note. This graph shows a 3-year mean of the total barley production divided by the registered agricultural land use for barley. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.13

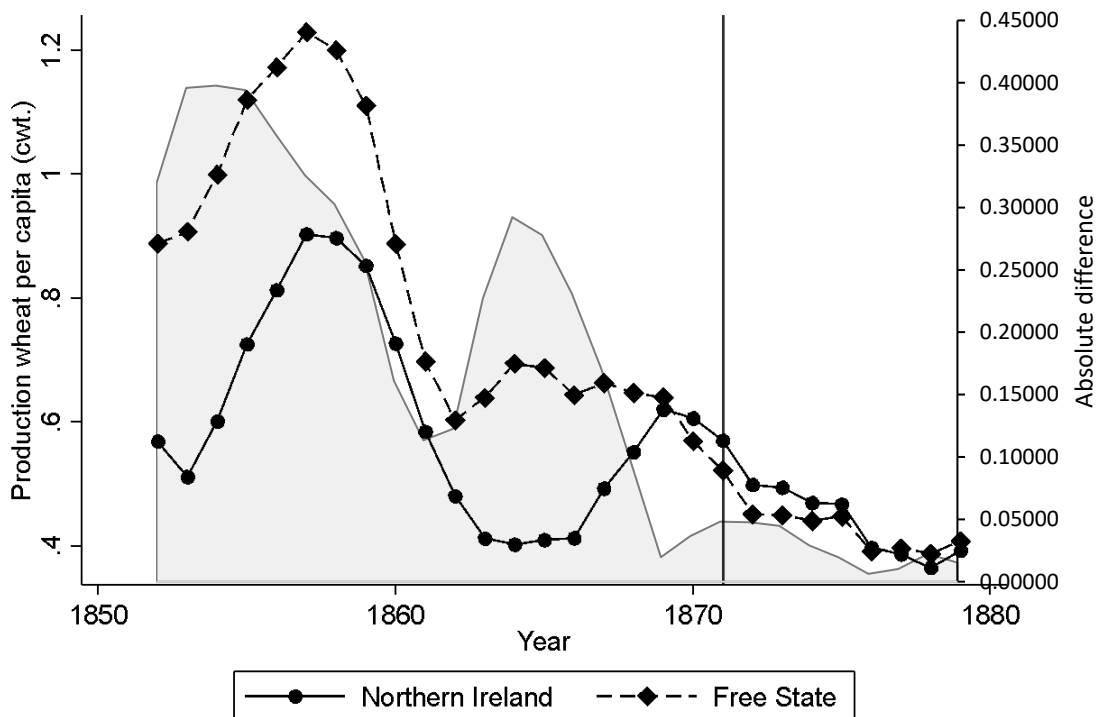
Production oats per capita 1860-1880



Note. This graph shows a 3-year demeaned mean of the total oats land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.14

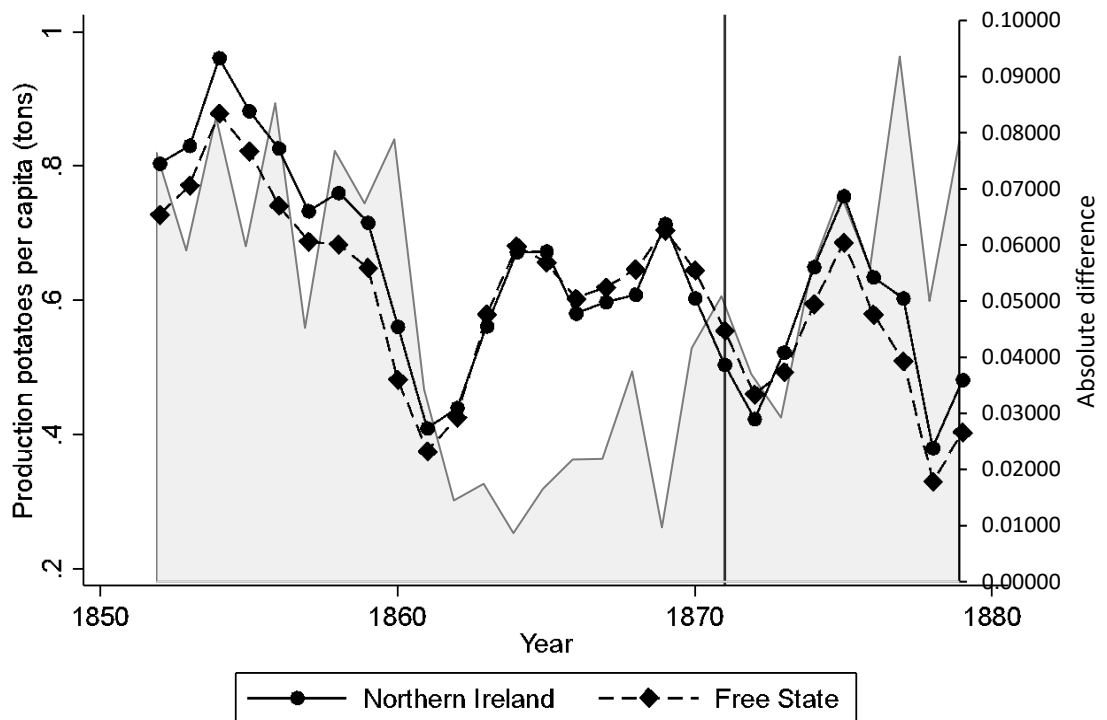
Production wheat per capita 1860-1880



Note. This graph shows a 3-year mean of the total wheat production divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.15

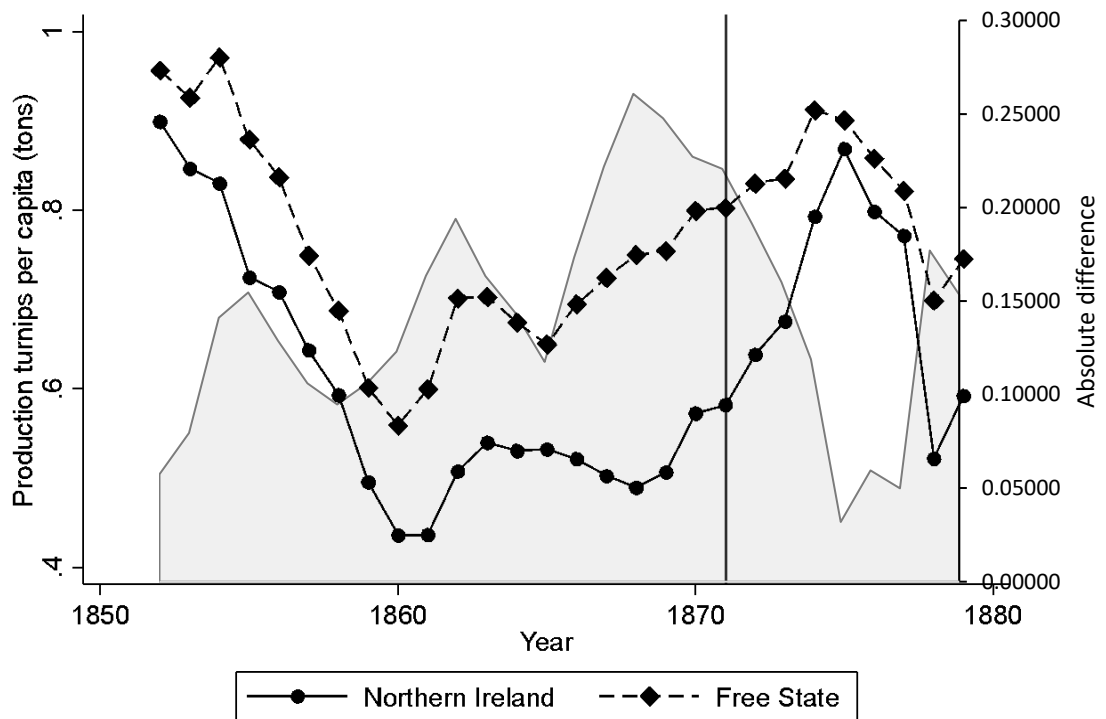
Production potatoes per capita 1860-1880



Note. This graph shows a 3-year mean of the total potato production divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.16

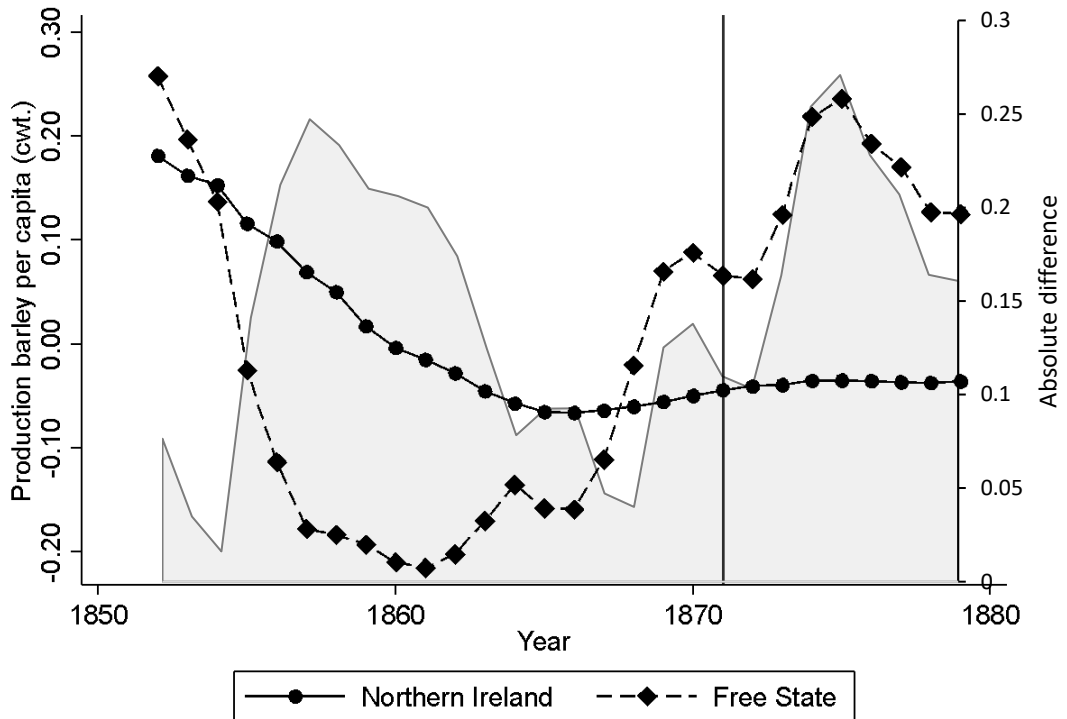
Production turnips per capita 1860-1880



Note. This graph shows a 3-year mean of the total turnips production divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.17

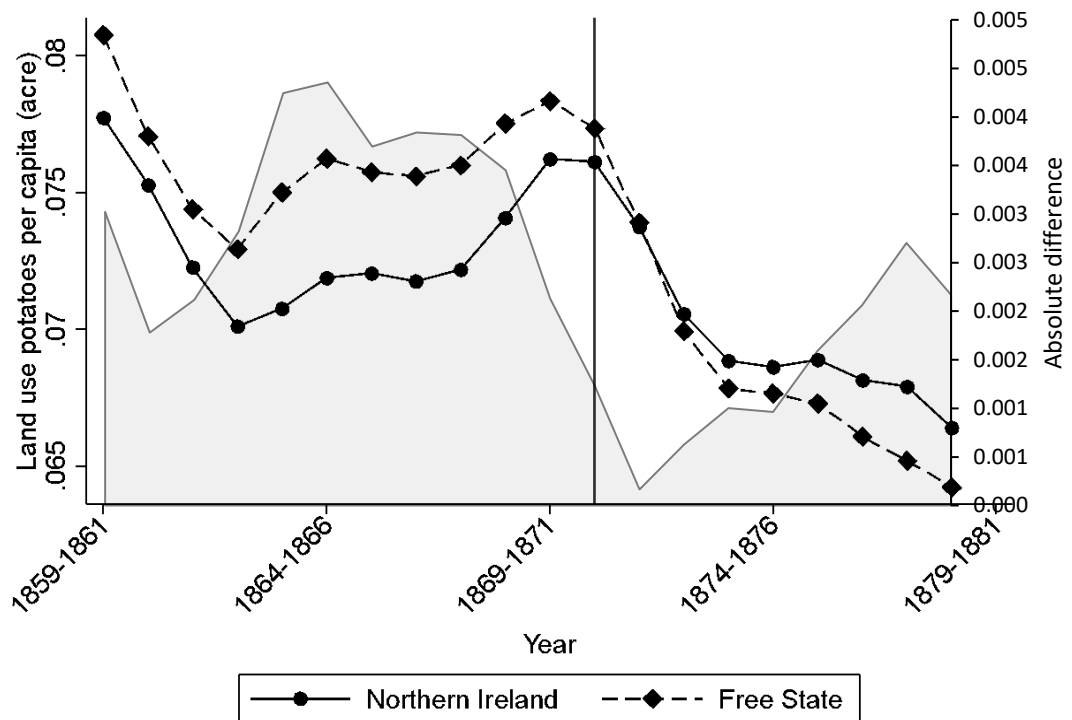
Production barley per capita 1860-1880



Note. This graph shows a 3-year demeaned mean of the total flax production divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.18

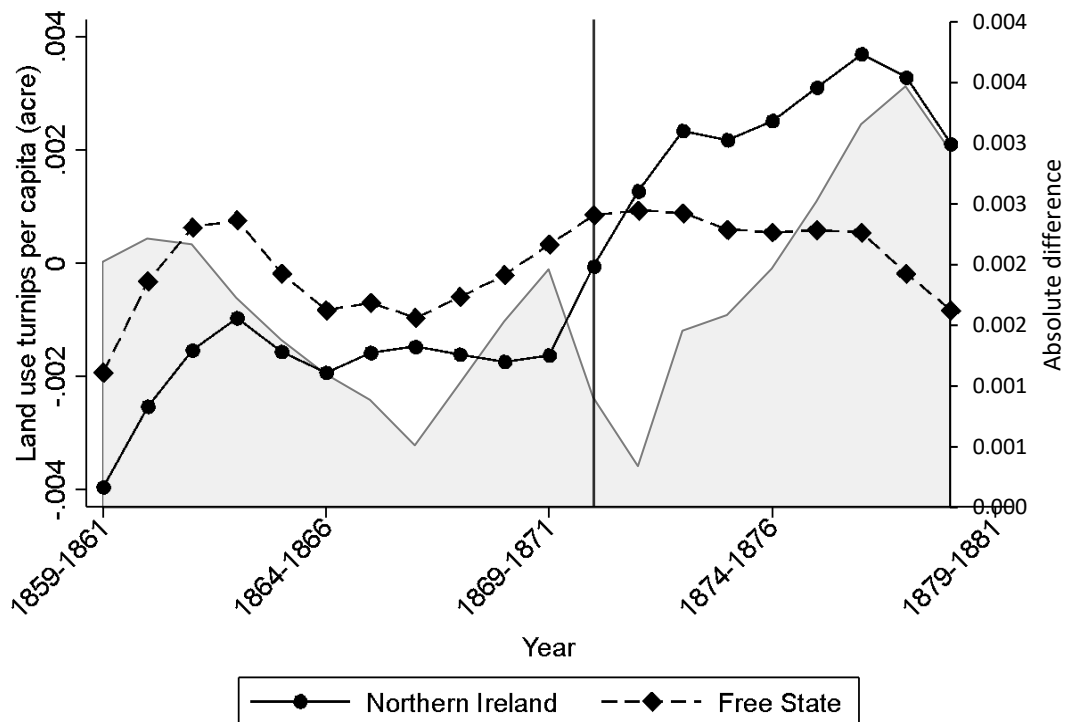
Land use potatoes per capita 1859-1880



Note. This graph shows a 3-year mean of the total potato land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.19

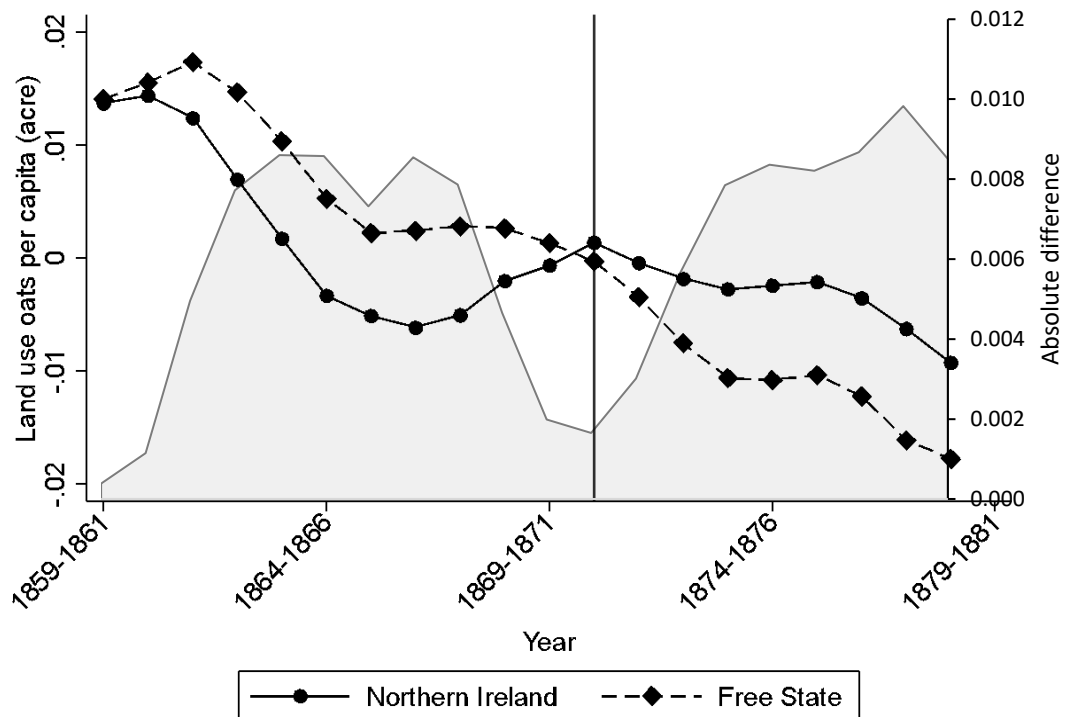
Land use turnips per capita 1859-1880



Note. This graph shows a 3-year demeaned mean of the total turnips land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.20

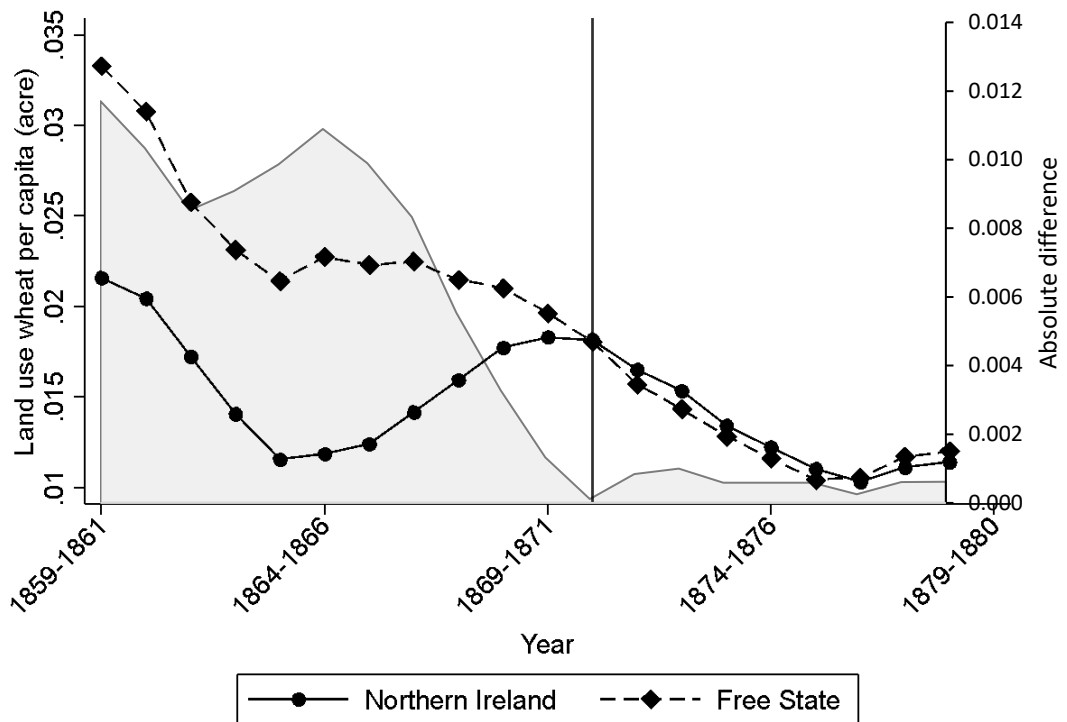
Land use oats per capita 1859-1880



Note. This graph shows a 3-year demeaned mean of the total oats land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.21

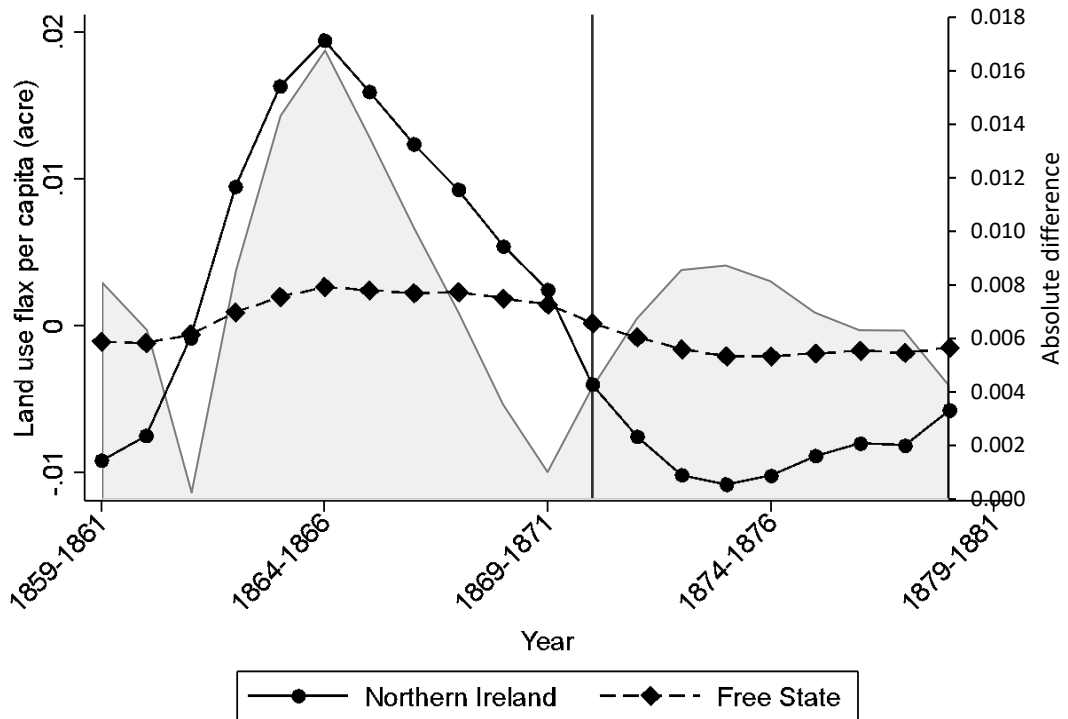
Land use wheat per capita 1859-1880



Note. This graph shows a 3-year mean of the total wheat land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. See Appendix A for details of the data sources.

Figure A.22

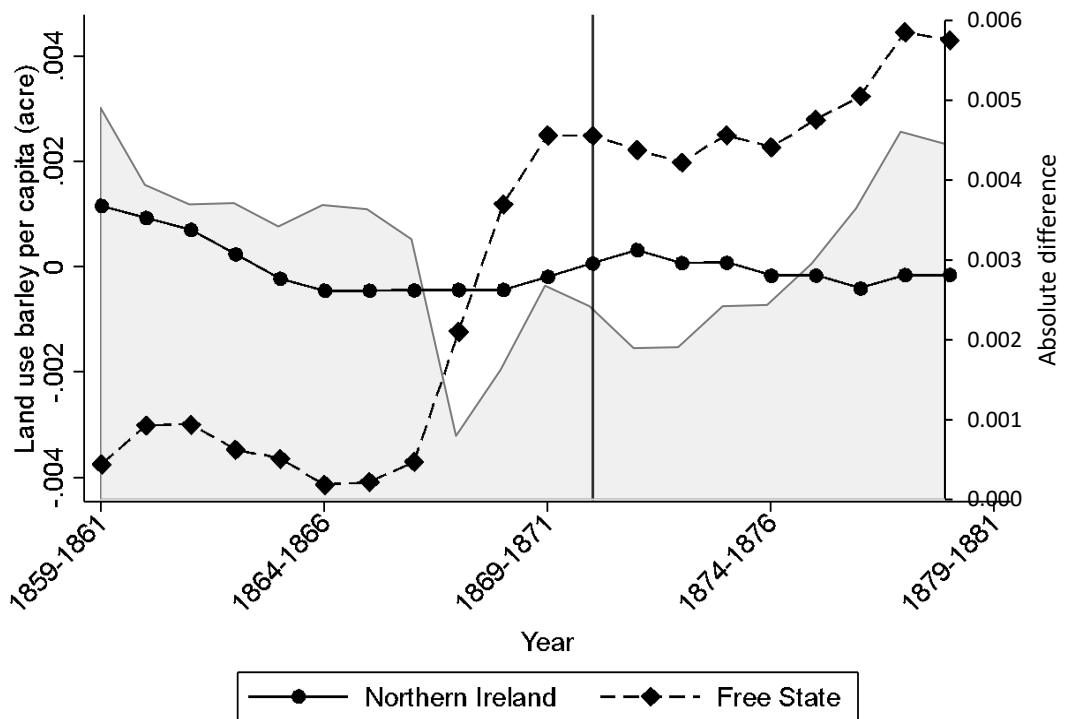
Land use flax per capita 1859-1880



Note. This graph shows a 3-year demeaned mean of the total flax land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.23

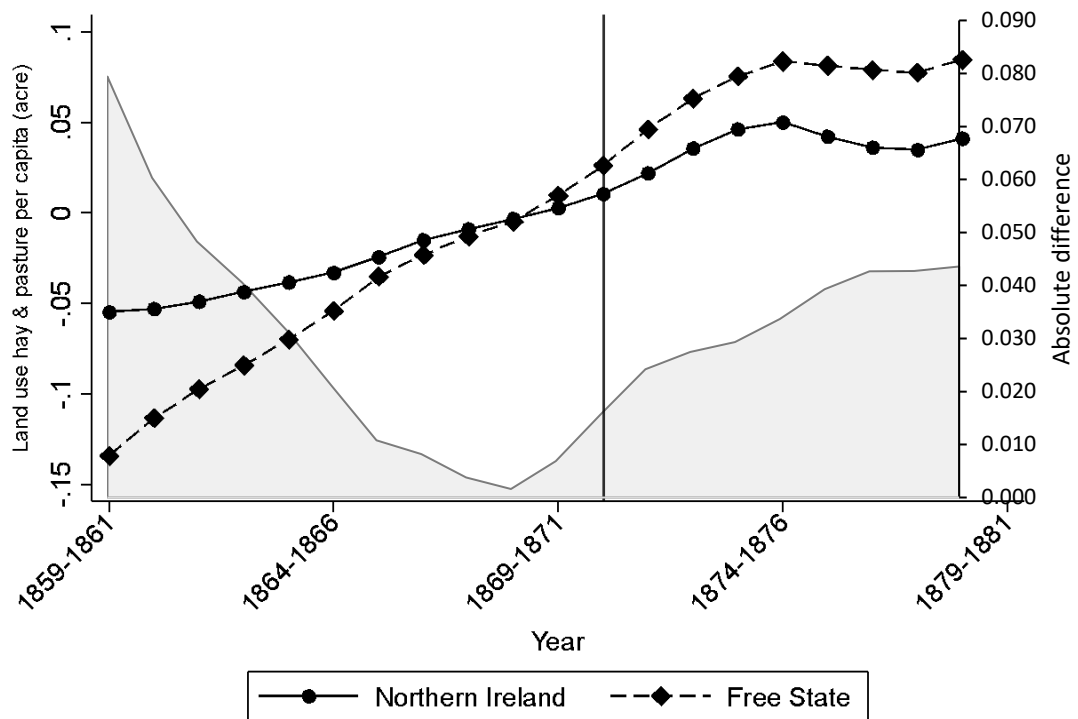
Land use barley per capita 1859-1880



Note. This graph shows a 3-year demeaned mean of the total barley land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Figure A.24

Land use hay and pasture per capita 1859-1880



Note. This graph shows a 3-year demeaned mean of the total hay and pasture land use divided by the registered state population. The 3-year mean is manually created by averaging the annual numbers over a period of 3 years. The mean across the total period was thereafter subtracted from its original mean value. See Appendix A for details of the data sources.

Appendix C: Do-file stata

```
ssc install lgraph, replace
```

```
*Real Wage*
```

```
lgraph AverageRealWageLabourers Year, by(DummyFarmLabourers) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono) graphregion(color(white))
```

```
table DummyFarmLabourers Post1871, c(mean AverageRealWageLabourers)
```

```
xtset DummyFarmLabourers Year
```

```
xtreg AverageRealWageLabourers i.DummyFarmLabourers i.Post1871
```

```
i.DummyFarmLabourers#i.Post1871
```

```
drop if Year==1862
```

```
lgraph AverageRealWage Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean AverageRealWage)
```

```
xtset DummyState Year
```

```
xtreg AverageRealWage i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
*Farm Labour Wage Index*
```

```
lgraph WageIndex Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
```

```
graphregion(color(white))
```

```
table DummySouth Post1871, c(mean WageIndex)
```

```
xtset DummySouth Year
```

```
xtreg WageIndex i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
*Loans improvement - Amount in pounds*
```

```
lgraph LoansAmount Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
```

```
graphregion(color(white))
```

```
table DummyState Post1871, c(mean LoansAmount)
```

```
xtset DummyState Year
```

```
xtreg LoansAmount i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Loans improvement - Number

```
lgraph NumberLoans Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean NumberLoans)
xtset DummyState Year
xtreg NumberLoans i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph RelNumbLoans Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean RelNumbLoans)
xtset DummyState Year
xtreg RelNumbLoans i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Agricultural price index and butter

```
lgraph AgriPriceIndex Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummySouth Post1871, c(mean AgriPriceIndex)
xtset DummySouth Year
xtreg AgriPriceIndex i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph PriceProduction Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean PriceProduction)
xtset DummyState Year
xtreg PriceProduction i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Farm deployment ratio to farms

```
lgraph FarmDeploy Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean FarmDeploy)
xtset DummyState Year
xtreg FarmDeploy i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Labourers relative to male occupied per acre

```
lgraph RelativeOccupiedAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean RelativeOccupiedAcre)
xtset DummyState Year
xtreg RelativeOccupiedAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

General land value per acre, demeaned

```
lgraph GeneralValueAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean GeneralValueAcre)
xtset DummyState Year
xtreg GeneralValueAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Produce per acre

```
lgraph WheatAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean WheatAcre)
xtset DummyState Year
xtreg WheatAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph OatsAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean OatsAcre)
xtset DummyState Year
xtreg OatsAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph BarleyBereAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean BarleyBereAcre)
xtset DummyState Year
xtreg BarleyBereAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph PotatoesAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
```

```
table DummyState Post1871, c(mean PotatoesAcre)
xtset DummyState Year
xtreg PotatoesAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph TurnipsAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean TurnipsAcre)
xtset DummyState Year
xtreg TurnipsAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph FlaxAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean FlaxAcre)
xtset DummyState Year
xtreg FlaxAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph HayAcre Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean HayAcre)
xtset DummyState Year
xtreg HayAcre i.DummyState i.Post1871 i.DummyState#i.Post1871
```

Production value per capita with price=1870

```
lgraph ProductionValueExportCapita Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueExportCapita)
xtset DummySouth Year
xtreg ProductionValueExportCapita i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueDomesticCapita Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueDomesticCapita)
xtset DummySouth Year
xtreg ProductionValueDomesticCapita i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueCapitaWheat Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueCapitaWheat)
xtset DummySouth Year
xtreg ProductionValueCapitaWheat i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueCapitaOats Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueCapitaOats)
xtset DummySouth Year
xtreg ProductionValueCapitaOats i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueCapitaBarley Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueCapitaBarley)
xtset DummySouth Year
xtreg ProductionValueCapitaBarley i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueCapitaPotatoes Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueCapitaPotatoes)
xtset DummySouth Year
xtreg ProductionValueCapitaPotatoes i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
lgraph ProductionValueCapitaHay Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean ProductionValueCapitaHay)
xtset DummySouth Year
xtreg ProductionValueCapitaHay i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

Butter Export

```
lgraph ButterExport Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummySouth Post1871, c(mean ButterExport)
xtset DummySouth Year
```

```
xtreg ButterExport i.DummySouth i.Post1871 i.DummySouth#i.Post1871
```

```
*Landuse per capita*
```

```
drop if Year <1860
```

```
lgraph LanduseCornCropsCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean LanduseCornCropsCapita)
```

```
xtset DummyState Year
```

```
xtreg LanduseCornCropsCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseWheatCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean LanduseWheatCapita)
```

```
xtset DummyState Year
```

```
xtreg LanduseWheatCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseOatsCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean LanduseOatsCapita)
```

```
xtset DummyState Year
```

```
xtreg LanduseOatsCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseBarleyCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean LanduseBarleyCapita)
```

```
xtset DummyState Year
```

```
xtreg LanduseBarleyCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseRootGreenCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
```

```
scheme(s2mono) graphregion(color(white))
```

```
table DummyState Post1871, c(mean LanduseRootGreenCapita)
```

```
xtset DummyState Year
```

```
xtreg LanduseRootGreenCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LandusePotatoesCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LandusePotatoesCapita)
xtset DummyState Year
xtreg LandusePotatoesCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseTurnipsCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseTurnipsCapita)
xtset DummyState Year
xtreg LanduseTurnipsCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseFlaxCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseFlaxCapita)
xtset DummyState Year
xtreg LanduseFlaxCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseCropsFruitPastureCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseCropsFruitPastureCapita)
xtset DummyState Year
xtreg LanduseCropsFruitPastureCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseHayPastureCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseHayPastureCapita)
xtset DummyState Year
xtreg LanduseHayPastureCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph LanduseCropsPastureCapita Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseCropsPastureCapita)
xtset DummyState Year
xtreg LanduseCropsPastureCapita i.DummyState i.Post1871 i.DummyState#i.Post1871
```



```

lgraph LanduseExportProduction Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseExportProduction)
xtset DummyState Year
xtreg LanduseExportProduction i.DummyState i.Post1871 i.DummyState#i.Post1871

```

```

lgraph LanduseDomesticProduction Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean LanduseDomesticProduction)
xtset DummyState Year
xtreg LanduseDomesticProduction i.DummyState i.Post1871 i.DummyState#i.Post1871

```

Ratio Absolute Farm Labour Wage Index to Agricultural Price Index

```

lgraph RatioWagePrice Year, by(DummySouth) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummySouth Post1871, c(mean RatioWagePrice)
xtset DummySouth Year
xtreg RatioWagePrice i.DummySouth i.Post1871 i.DummySouth#i.Post1871

```

Production per capita

```

lgraph WheatPerCap Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean WheatPerCap)
xtset DummyState Year
xtreg WheatPerCap i.DummyState i.Post1871 i.DummyState#i.Post1871

```

```

lgraph OatsPerCapDem Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean OatsPerCapDem)
xtset DummyState Year
xtreg OatsPerCapDem i.DummyState i.Post1871 i.DummyState#i.Post1871

```

```

lgraph BarleyPerCapDem Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid)
scheme(s2mono) graphregion(color(white))
table DummyState Post1871, c(mean BarleyPerCapDem)

```

```
xtset DummyState Year
xtreg BarleyPerCapDem i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph PotatoesPerCap Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean PotatoesPerCap)
xtset DummyState Year
xtreg PotatoesPerCap i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph TurnipsPerCap Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean TurnipsPerCap)
xtset DummyState Year
xtreg TurnipsPerCap i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph FlaxPerCap Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean FlaxPerCap)
xtset DummyState Year
xtreg FlaxPerCap i.DummyState i.Post1871 i.DummyState#i.Post1871
```

```
lgraph HayPerCap Year, by(DummyState) stat(mean) xline(1871) ylab(, nogrid) scheme(s2mono)
graphregion(color(white))
table DummyState Post1871, c(mean HayPerCap)
xtset DummyState Year
xtreg HayPerCap i.DummyState i.Post1871 i.DummyState#i.Post1871
```