Essays on Marital Sorting and Fertility

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To Josep Tràfach i Carreras

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Abstract

This thesis examines the interactions between marital patterns, inequality, and fertility. In the first chapter I analyze the impact of search frictions on marital assortative matching. I exploit a temporary interruption of the "London Season" — a central marriage market where the nineteenth-century British aristocracy courted. I find that the reduction of search frictions associated with this institution explains between 70 and 80 percent of sorting in social status and land-holdings, generating a huge concentration of landed wealth. In the second chapter I examine the relationship between land inequality and the introduction of public education in late-Victorian England and Wales. I show that counties where landownership was more concentrated systematically under-invested in public schooling. In the final chapter I estimate the effects of cousin marriage on fertility in the British peerage. I find that consanguinity initially increases the number of births, but constraints reproductive success in the long-run.

Resum

En aquesta tesis s'examina la interacció entre els patrons matrimonials, la desigualtat i la fertilitat. En el primer capítol s'analitza l'impacte de les friccions en el procés de cerca sobre l'emparellament selectiu. L'anàlisi es centra en una interrupció de la "London Season" — un mercat de matrimonis centralitzat on els nobles Britànics buscaven esposa. S'estableix que la reducció en les friccions de cerca associades a aquesta institució explica entre un 70 i un 80 per cent de l'emparellament selectiu en termes d'estatus social i de terratinença, afavorint la concentració de terres en poques mans. Al segon capítol s'examina la relació entre la desigualtat en la distribució de la terra i la introducció de l'educació pública a l'Anglaterra victoriana. Els resultats indiquen que els comptats més desiguals varen patir un dèficit sistemàtic en educació pública. Al capítol final s'estimen els efectes de l'endogàmia sobre la fertilitat a la noblesa Britànica. L'endogàmia sembla augmentar el nombre de naixements, però alhora limita l'èxit reproductiu en el llarg termini.

Preface

On 29 April 2011, the daughter of a former flight attendant married the future king of England. The wedding of Kate Middleton to Prince William, however, was rather an exception. One of the hallmarks of modern marriage in OECD countries is that people tend to marry other people who have similar education, income, or social status (Chen et al. 2013). From an economic perspective, who marries who has important implications for fertility and education, and ultimately affects the distribution of wealth within a society. In recent years a flourishing literature has arisen on both the causes and the effects of marital sorting (see Fernandez and Rogerson 2001, Fernandez et al. 2005, Fisman et al. 2008, Hitsch et al. 2010, Greenwood et al. 2014 and references therein).

One of the most important questions in this literature is where sorting comes from. Homophily — a preference for others who are like us — is only one reason for assortative matching. Every relationship not only reflects who we chose but also depends on who we meet. Do the "rich" marry each other because they have a taste for money, or just because they go to the same bars, attend the same schools, or live in the same neighborhoods?

Assignment theory suggests a strong link between these search frictions and marital sorting (Collin and McNamara 1990, Burdett and Coles 1997, Eeckhout 1999, Shimer and Smith 2000, Bloch and Ryder 2000, Adachi 2003, Atakan 2006, Jacquet and Tan 2007). Notable papers have tested this relation using speed dating (Fisman et al. 2008) or dating websites (Hitsch et al. 2010). Although such modern-day datasets contain a lot of information, they present several shortcomings. Dating is not marriage; in most cases, it does not lead to long-term partnerships. Also, nowadays we continuously interact with people from the opposite sex, in a multitude of settings. As a consequence, we can only observe imperfectly who is actually on the marriage market and who meets whom.

Going back to history can be most helpful in solving these issues. I turn to a unique historical setting to study marital sorting. In the nineteenth century, for seven months each year, Parliament was in session and the British elite converged on London. Their offspring participated in a string of social events designed to introduce rich and influential bachelors to eligible debutantes. This "matching technology," known as the London Season, reduced search costs for partners. After the death of Prince Albert, however, the Season was interrupted for three consecutive years (1861–63). The first chapter of my thesis exploits this exogenous shock to identify the effect of search frictions on marital sorting. My results suggest that the link is strong: between 70 and 80 percent of sorting in social status and land-holdings in the nobility was explained by the reduction in search frictions associated with the London Season.

Apart from its causes, the literature on marital sorting is also concerned with its economic consequences. There is a large body of work using modern-day data to evaluate the impact of marital sorting on inequality (see Kremer 1997, Fernandez and Rogerson 2001, Fernandez et al. 2005, Greenwood et al. 2014). The advantage of using historical data is that it sheds light on the nature of this interaction in the long-run.

My results suggest that marital sorting was important in perpetuating the English nobility's role as an unusually small, exclusive, and rich elite. In detail, marital sorting and inequality of landownership reinforced each other over centuries. This allowed the British peerage to accumulate the lion's share of land.[1]

In the second chapter of my thesis I evaluate whether this huge concentration in landownership was harmful for Britain's performance. By 1860, it did not seem so: Britain was the first industrial country and the world's workshop. However, the provision of public education lagged behind Prussia and the United States, nations that eventually overtook the world's industrial leadership (McCloskey and Sandberg 1971). Why was public education not established earlier on? Sokoloff and Engerman (2000) famously suggested that where land is unequally distributed, institutions may end up in the back pockets of landowners. This may slow down the provision of public schooling, since landowners do not need their farmers to be educated and want to reduce labor mobility. This ex-

[1] Around 1880, fewer than 5,000 landowners still owned more than 50 percent of all land (Cannadine 1990).

planation seems particularly suited for England given the way in which public education was introduced for the first time: it was to be funded through local property taxes (rates). In theory, where landowners held most of the land, they had to effectively pay for all of the education. In practice, they took over School Boards — the public bodies in charge of raising funds for education locally — and undermined the provision of public schooling.

Exploiting the rich reports of the Committee of Council on Education, I find that School Boards located in counties where landownership was more concentrated systematically under-invested in public schooling and present worse educational outcomes. In contrast, counties with a large share of manufacturing employment were more eager to subsidize public education, reflecting a clash between peer landowners and emerging industrialists. Hence, the concentration of landed wealth associated with marital sorting crucially contributed to undermine the introduction of effective public schooling in England and Wales.

Besides inequality and education provision, marriage patterns may also have important effects on fertility (Fernandez and Rogerson 2001). In the third chapter of my thesis I exploit the vast genealogical material on the British Peerage to shed light on the consequences of cousin marriage. Despite being widespread in developing societies[2] cousin marriage has seldom been considered in the economic literature.

Existing empirical evidence on the effect of consanguinity on fertility is contradictory and does not always confirm the stigma that the Western world has attached to cousin marriage. When estimating this relation, one should not ignore that consanguineous unions may confer greater reproductive success through earlier age at marriage or by preserving landholdings and wealth within the family. This is particularly important in communities with large socio-economic disparities, which also happen to be those with higher rates of consanguinity. A second key challenge is unobserved heterogeneity. Unobserved characteristics affecting the decision to marry a cousin may be correlated with unobservable factors influencing

[2]Estimates suggest that more than 10 percent of people worldwide are either married to a close relative or are the offspring of such a marriage (Bittles 2012).

fertility, such as personality, intelligence, or beauty (Kim 2013).

I address these empirical challenges by exploiting the interruption of the London Season (1861–63) and the shift in marriage decisions to local markets populated by blood-related noblemen. Cousin marriage blossomed, and these unions gave birth to more offspring. However, the time elapsed from marriage to the first birth increased, indicating a larger probability of miscarriage. The children of consanguineous unions were less likely to reach the typical age at which noblemen married, had fewer children, and were 50 percent more likely to be childless. Thus, although consanguinity may have an initial positive effect on fertility, it is offset in the next generation, severely constraining reproductive success in the long-run.

Throughout these three chapters, my thesis pins down the determinants as well as the effects of marital sorting in nineteenth-century Britain. Admittedly, this thesis looks at a very specific historical setting. Nonetheless, today's marriage markets are not free of segregation. Sixty percent of Americans met their future partners at school, at work, at a private party, at church, or at a social club (Laumann et al. 1994, Table 6.1). In these marriage markets, entry is somehow restricted to similar others. Dating agencies that cater to rich clients are also spreading across the world. Seventy Thirty, for example, requires that both male and female members have assets worth £1m. In a world were the top 1 percent income share has already more than doubled over the last decades (Piketty and Saez 2006), evaluating the interaction between such segregative marriage practices, inequality, and fertility is crucial. My thesis shows that historical idiosyncrasies, such as the unique way in which the British aristocracy courted, can be used to shed light on these important questions.

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Chapter 1

Assortative Matching and Persistent Inequality: Evidence from the World's Most Exclusive Marriage Market

1.1 Introduction

Dentists marry dentists, Hollywood stars marry each other, and economists marry economists. Marital assortative matching — the tendency of people of similar social class, education, and income to marry each other — has important implications for education and inequality (Fernandez and Rogerson 2001, Fernandez et al. 2005). To investigate these implications further, it is crucial to first understand what drives marital sorting. Homophily — a preference for others who are like ourselves — is only one reason for assortative matching. In addition, the people we meet also circumscribes the set of mates we can chose from. In other words, every relationship not only reflects who we chose but also depends on who we meet. A robust prediction of marriage models is that search frictions affect marriage outcomes (Collin and McNamara 1990, Burdett and Coles 1997, Eeckhout 1999, Shimer and Smith 2000, Bloch and Ryder 2000, Adachi 2003, Atakan 2006, Jacquet and Tan 2007).

Confirming this prediction with data is not straightforward. Recent empirical work has used speed dating (Fisman et al. 2008), marriage ads in newspapers (Banerjee et al. 2009), or dating websites (Hitsch et al. 2010). Results are at odds with the theory — preferences appear to be an important determinant of sorting, but the matching technology does not seem to clearly affect the outcomes. Does this discrepancy reflect flaws in search theory or in modern-day data? Dating is very different from marriage. In most cases, it does not reflect the long-term partnership formation at the core of search and matching theory (Diamond 1981, Mortensen 1993, 1988, Pissarides 1984, Mortensen and Pissarides 1994). Relating marriage outcomes to the matching technology is also complicated by the fact that the latter is hard to measure. In modern marriage markets, members of the opposite sex continuously interact in a multitude of settings. As a consequence, it is virtually impossible to isolate a particular matching technology from other courtship processes.

In this paper, I use a unique historical setting to investigate these issues further. I examine the marriage strategies of the British upper classes in a search and matching framework. In the nineteenth century, from Easter to August every year, a string of social events was held in London to "aid the introduction and courtship of marriageable age children of the nobility and gentry"[1] — the London Season. It was at the heart of the British upper class social life, and almost all of the peerage and gentry was involved. Courtship in noble circles was largely restricted to London; in most cases, the only place where a young aristocrat could speak with a girl was at a ball during the Season. Crucially, the Season was interrupted by a major, unanticipated, exogenous shock: the death of Prince Albert. When Queen Victoria went into mourning, all royal dinners, balls, and luncheons were cancelled for three consecutive years (1861–63). I use this large shock —

[1]Motto of the London Season at `londonseason.net`.

unrelated to the Season's main function — to identify the effects of the Season on marriage outcomes. In addition, I exploit changes in the size of the marriageable cohort as a source of identifying variation. This allows me to quantify the magnitude of the gains in matching efficiency created by the Season in the long-run (1851–75).

I find a clear, strong link between search costs and marital sorting. Using a combination of hand-collected and published sources on peerage marriages,[2] I find that in years when the Season effectively reduced search costs, the nobility's daughters sorted more in the marriage market: they were less likely to marry a commoner and were increasingly likely to marry husbands from families with similar landholdings. When the Season was disrupted, spouses came instead from geographically adjacent places, indicating that local marriage markets became a more important source of partners. There, markets were more shallow, reducing the strength of marital sorting.

Once the forces behind marital assortative matching are identified, I turn to examine the broader economic implications of sorting. I look at the effects of the Season — and its implied marriage patterns — on social mobility, inequality, and the provision of public education. A counterfactual analysis shows that if the Season had not existed, marriages between peers' daughters and commoners' sons would have been 30 percent higher in 1851–75. The institutional innovation of the Season, thus, helped the British elite erect an effective barrier that kept out newcomers (Stone and Stone 1984). Without the Season, England would have looked much more like continental countries, with large and not very rich aristocracies.

Because marriage is important for the intergenerational transmission of inequality, the Season also contributed to the extreme concentration of wealth in the hands of the British aristocracy. Compared to the nobility of many other countries, the British aristocracy not only "held the

[2] I use the Hollingsworth genealogical data on the peerage to describe the marriage behavior of the British elite. Hollingsworth (1957 and 1964) compiled evidence on marriage and social status for 26,000 peers and their offspring for the period 1566–1956. I complement this dataset with additional information from two published sources and from the archives (see data section).

lion's share of land, wealth, and political power in the world's greatest empire" (Cannadine 1990),[3] its members towered over their continental cousins in terms of exclusivity, riches, and political influence. My results strongly suggest that a high degree of assortative matching contributed to this outcome. In a cross-section of English and Welsh counties, I find that where noble dynasties intermarried less with commoners over centuries, land was more unequally distributed. Economic inequality, in turn, can actually inflict a lot of harm on a country's long-term economic prospects (Persson and Tabellini 1994). In this paper, I discuss the effects of landownership concentration on public schooling (Sokoloff and Engerman 2000, Galor et al. 2009). Counties where land was more concentrated systematically under-invested in public education. With Forster's Education Act (1870), England recognized it was the role of the state to provide public education, which was to be subsidized mainly through property taxes (rates). This suggests that England and Wales fell behind in terms of educating the workforce because its entrenched landed elite, especially the anointed peers, was powerful enough to undermine the introduction of effective public schooling.

The Season provides a unique setting to study the determinants and the implications of marital sorting because it allows me to open the "black box" of the matching technology. Marriage markets today are typically informal. We can only guess who is on the market and who meets whom. In contrast, the matching process embedded in the London Season was explicit. Before the Season started, young ladies aged 18 were presented to the Queen at court. This formal act was a public announcement of who was on the marriage market. The *debutante* was then introduced into society at the balls and concerts organized during the Season. The purpose of these events was twofold: first, to allow for frequent encounters between suitors, and second to limit entry to "desirable" candidates. Guests were carefully selected by social status, and the high cost involved in participating even excluded aristocrats if they were pressed for money.[4] Overall,

[3]Around 1880, fewer than 5,000 landowners still owned more than 50 percent of all land (Cannadine 1990).

[4]The cost was driven by the need to host large parties in a stately London home; only

the matching process greatly reduced search frictions for the children of Britain's elite.

Several unique features of the historical setting allow me to identify the effects of the matching technology on marriage outcomes. The death of Prince Albert in 1861 was an exogenous disruption of the Season with strong effects on marriage outcomes. Figure 1.1 illustrates the consequences in one particular dimension: the rate of intermarriage between peers and commoners. The chart plots the number of people attending royal parties in the Seasons between 1859 and 1867 and the percentage of marriages outside the peerage. The latter is presented as a ratio of the rate for women older than 22 in 1861 relative to women below this cutoff age. I separate these two groups because one would not expect younger ladies to be severely affected by the interruption of the Season; they could simply delay their choice of husband until everything went back to normal. However, women aged 22 and over in 1861 could not wait long if they wanted to avoid being written off as a failure based on the social norms of the time.[5] Thus, they were forced to marry one of the first suitable suitors. Before Albert's death and after the Season resumed, women in both age groups were equally likely to marry a commoner. However, a great gap between the two opens after 1861. Those who had to marry when the Season was disrupted performed much worse in the marriage market. Their likelihood of marrying a commoner was 80 percent higher than that of the younger ladies who could wait for the Season to resume. This suggests that the Season was highly effective as a matching technology — by announcing who was on the market, creating multiple settings for the opposite sexes to meet, and segregating the rich and powerful from the poor and insignificant, it crucially determined who married whom.

My results contribute to the rich literatures on assortative matching

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those who issued invitations to balls, dinners, and luncheons could expect to receive them.

[5]According to these norms, if a lady was not engaged two or three Seasons after "coming out" into society, she was written off as a failure (Davidoff 1973: p. 52). Furthermore, in the early 1860s most ladies married when between the ages of 22 and 25. Since the older cohort would be 25 or more when the Season resumed in 1864, waiting was not an option for them.

and the importance of search costs. The study of marriage from an economic perspective dates back to the seminal works of Gale and Shapley (1962) and Becker (1973). These authors characterized the set of stable marriage assignments and derived the conditions for positive assortative matching. A classic insight from the assignment literature, however, is that once a search friction is introduced into the matching process, sorting is weakened or might even be lost. In other words, as the speed of encounters between singles increases, spouses will sort more in the marriage market (Collin and McNamara 1990, Burdett and Coles 1997, Eeckhout 1999, Bloch and Ryder 2000, Shimer and Smith 2000, Adachi 2003, Atakan 2006). In addition, Bloch and Ryder (2000) and Jacquet and Tan (2007) analyze endogenous market segmentation. They conclude that limiting people's choice set to those who are most similar reduces the congestion externality, which refers to the time an agent spends meeting people with whom she will never match. Since people then meet desirable partners at a higher speed, sorting increases.

Surprisingly, this well-accepted theoretical insight lacks clear-cut empirical support. Hitsch et al. (2010) estimate mate preferences from a dating website and then use the Gale-Shapley algorithm[6] to predict frictionless matches. Since the predicted matches are as selective as those achieved by the dating site, they conclude that "assortative mating [in dates] arises in the absence of search frictions" (p. 162). The simulated matches also broadly resemble actual marriage patterns, although sorting by education or ethnicity are somewhat underpredicted. This suggests that search frictions would, in fact, increase sorting. Hitsch et al.'s (2010) result, however, may be explained by the fact that the preferences of online

[6]The Gale-Shapley algorithm (Gale and Shapley 1962) involves a number of stages. In the first stage, each boy proposes to his most preferred girl. Each girl then replies "maybe" to her favorite suitor and "no" to all others. In the second stage, boys who were rejected propose to their second choices. Each girl replies "maybe" to her favorite among the new proposers and the boy on her string, if any. She says "no" to all the others (again, perhaps including her provisional partner). The algorithm goes on until the last girl gets her proposal. Each girl is then required to accept the boy on her string. This algorithm guarantees that marriages are stable, that is, no pair of woman and man prefers each other over their current partners.

dating users differ from the preferences of the population at large.[7] Lee (2008) obtains similar results in the context of a Korean match-making agency. Banerjee et al. (2009) estimate preferences for caste from marital advertisements in Indian newspapers. Their results suggest that search frictions play little role in explaining caste-endogamy on the arranged marriage market. Fisman et al. (2008) design a speed-dating experiment such that people of different ethnic groups meet at a high speed. The observed matches still display ethnic sorting, especially for women. This indicates that the low degree of interracial marriage in the Unites States stems not from segregation in the marriage market but from same-race preferences.

In addition to preferences and the matching technology, several studies analyze sex ratios as a potential determinant of sorting. Abramitzky et al. (2011) show that after World War I, French males married up[8] to a greater extent in regions where more men had died in the trenches. Angrist (2002) examines the effect of male-biased migration flows in the United States between 1910 and 1940 on various marriage and labor outcomes.

Another set of related papers uses implicit differences in marriage market depth between the city and the countryside as a source of identifying variation. Gautier et al. (2010) look at migration flows in and out the city and find that it is a more attractive place to live for singles because it offers more potential partners. Botticini and Siow (2011) compare the city and countryside marriage markets in the United States, China, and early renaissance Tuscany. They find no evidence of increasing returns to scale in the matching function. While these papers analyze whether an agglomeration makes matching more efficient, I consider a different

[7] Alternatively, the discrepancy between estimated frictionless matches and actual marriages may stem from methodological issues. First, the Gale-Shaply algorithm used to predict frictionless matches assumes nontransferable utility. This assumption appears appropriate to describe dating but not marriage, where explicit transfers play a large role nowadays. Furthermore, when estimating mate preferences, the authors rule out the possibility that there is noise in users' behavior. Once they take this into account, results suggest that preferences alone explain all marital sorting (Hitsch et al. 2010: pp. 160).

[8] That is, they married spouses of higher socio-economic status.

matching technology. The Season not only pooled large numbers of eligible singles together, but it was also meant to facilitate their introduction and courtship. My findings suggest that this particular matching process displayed increasing returns to scale.[9]

This paper also sheds light on the relation between marital sorting, inequality, and economic growth. Although inequality is widely recognized as an important economic outcome, marital sorting has not received much attention as one of its potential determinants. Kremer (1997), Fernandez and Rogerson (2001), Fernandez et al. (2005), and Greenwood et al. (2014) establish a theoretical and empirical correlation between the degree to which spouses sort in the marriage market, economic inequality, and per capita incomes.[10] Therefore, any process that increases inequality (e.g., skill-biased technological change) or reduces search costs for partners (e.g., Internet dating) could well lead to greater sorting and hence greater inequality. Because my paper considers a historical setting, I am able to analyze this relation in the very long-run. Understanding the long-run trend in inequality is important given the enormous concerns over this as a policy issue. Piketty and Saez (2006) use historical tax statistics to construct a long-run series for income and wealth concentration. For most Western democracies, they find a trend of increasing inequality over the last 25 years. High inequality, in turn, may have dramatic effects on important economic outcomes such as taxation (Persson and Tabellini 1994) or the provision of public education (Sokoloff and Engerman 2000), ultimately affecting the growth process.

[9]In particular, when royal parties were attended by less than 2,000 guests, the probability of marrying a spouse with similar landholdings increased by 0.25 percent for every additional 100 attendees. When the Season gathered more than 4,000 people, the same marginal effect jumps to 0.5 percentage points, and when royal parties reach 7,000 attendees, it increases to 1 percent.

[10]The idea is that greater inequality may reduce the rate of intermarriage between individuals of different socio-economic status, as the cost of "marrying down" increases. This increase in pickiness, in turn, raises the net return of being at the top of the distribution. In the presence of credit market frictions, only the offspring of richer couples adapt to the new circumstances, leading to inefficiently low aggregate levels of investment in human capital, higher wage inequality, and lower per capita incomes.

My paper is not the first to analyze long-run trends in inequality and social mobility in Britain. Miles (1993, 1999), Mitch (1993), and Long and Ferrie (2013) analyze intergenerational occupational mobility in nineteenth century England. Clark (2010) and Clark and Cummins (2012) use rare surnames to gauge the rate of social mobility between 1200 and the present day. They conclude that England was a mobile society except at the very top of the distribution. My paper helps to explain the persistence of this elite.

The study of the London Season is also relevant because it adds to our understanding of the British nobility. This class, with all its opulence and ostentatious lifestyle, is usually regarded as a barrier to development. Doepke and Zilibotti (2008) argue that upper-class families relying on rental income cultivated a taste for leisure instead of hard work. According to the authors, the aristocratic devotion to leisure grew more sophisticated over time and was ultimately reflected in the London Season (p. 778). I argue that the Season was not only a notorious amenity but also an efficient institution for the British nobility, allowing them to remain in a privileged position for much longer than their continental counterparts. In line with this interpretation, Allen (2009 and 2012) notes that the British aristocracy ruled England from 1550 to 1880 and oversaw its metamorphosis from a small state to the richest country on earth, the first industrial nation, and the heart of the largest empire in human history. He suggests that the pomp associated with the aristocratic lifestyle was in fact a sunk investment and that social endogamy was aimed at maintaining the elite as a small, exclusive, and largely closed group. This allowed the nobility to ensure trustworthy service to the Crown at a time when uncertainty was high and trust was particularly important. The London Season can be interpreted both as a sunk investment in the marriage prospects of one's children and as a barrier against newcomers.[11]

[11] Stone and Stone (1984), Spring and Spring (1985), and Wasson (1998) debate whether the English elite was open to newcomers. Their analysis is based on the rate of entry of newcomers into the elite. In my paper, I go one step beyond, looking not only at newcomers but also examining what the elite was actually doing to remain a closed group.

Relative to the existing literature, I make the following contribution: First, this paper is one of the first to provide empirical evidence that search frictions affect marriage decisions. Second, I highlight the importance of endogenous segregation in marriage markets. My findings call for the incorporation of this element in the theoretical search literature applied to marriage. Third, my results suggest that over the very long-run, marital sorting may well lead to larger inequality, with broad effects on outcomes such as the provision of public schooling. Fourth, I shed light on how the marriage behavior of the British peerage shaped the class structure of Victorian Britain. This paper unveils one of the mechanisms that helped sustain the British nobility's role as an unusually small, exclusive, and rich elite.

The remainder of the paper is organized as follows. Section 1.2 depicts the London Season and the historical background. Section 1.3 describes the data sources. Section 1.4 presents the empirical analysis. First I show some descriptive statistics that pin down marriage outcomes in the golden days of the Season (1801–75). I then identify the effect of the Season on these marriage outcomes using exogenous variation in attendance to royal parties coming from changes in the size of the marriageable cohort. Finally, I establish a causal link between search frictions and sorting by analyzing the interruption of the Season during Queen Victoria's mourning (1861–63). Section 1.5 examines the robustness of the results. Section 1.6 discusses the role of preferences. Section 1.7 investigates the long-run economic implications. In detail, I examine the relation between sorting, inequality, and the provision of public schooling. Section 1.8 develops a simple two-sided search model to formalize the main results of the paper. Finally, section 1.9 concludes.

1.2 Historical background: the London Season

In this section, I describe the institutional arrangements that, in combination, constituted the London Season. The London Season arose some-time in the seventeenth century. British peers typically resided in isolated manors on their countryside estates. From February to August, however, they moved to London to attend Parliament. Their whole family accompanied them to enjoy a more eventful lifestyle.

Why did such a Season not emerge in continental Europe?[12] Continental noblemen were not as rural as British peers. Also, most parliaments in the continent did not meet as regularly as in Britain, so continental aristocracy did not annually migrate to the capital. In addition, primogeniture and entailment allowed the peerage and gentry to remain small enough that these meetings in London were possible. Around 1900, only 1 in 3,200 people in Britain was an aristocrat. In comparison, the proportion in continental Europe was 1 in 100 (Beckett 1986: pp. 35-40).

The Season peaked between the 1800s and the 1870s (Ellenberger 1990). During that period, the London Season was a huge event that almost all of the British nobility and gentry attended. Figure 1.2 (Sheppard 1977) plots more than 4,000 movements into and out of London by members of the "fashionable world," as was reported in the *Morning Post* in 1841. At the beginning of the year, most people of fashion were out of town. The biggest influx came at the end of January when Parliament convened and anyone who was anyone in the elite moved from their country seats to London. This convergence gave rise to a brief pre-Easter season, marked by numerous dinners and soirées. On April 20, the Queen returned from Windsor, and the first debutante was presented at court, officially entering the marriage market. This marked the commencement of the main Season and was the most crowded time of year in London. Many social events designed to introduce bachelors to debutantes took place. For example, on May 15 — the day of the royal ball at Buckingham — more than 800 "fashionable" families were in London. After a gradual drift away from London, the Season was officially over by August 12, when the shooting season started and most peers moved back to their country estates. This seasonal migration was repeated annually.

What was the purpose of the Season? Although in 1841 seasonal mi-

[12] Although Paris and Vienna developed their own marriage markets, they never eclipsed the London Season.

grations coincided with the Parliamentary calendar, cumulative inflows peaked between Easter and August, when most of the social events crucial to the "matching process" took place. In addition, Sheppard (1977) notes that families that were not prominent in politics, such as the earls of Verulam and Wilton, also showed the same migration pattern, indicating that the Season provided opportunities other than political lobbying.[13]

The unspoken purpose of these festivities was to bring together the right sort of people, thus "providing the setting for the largest marriage market in the world" (Aiello 2010). The Season became crucial in the nineteenth century, when

> arranged marriages were no longer acceptable so that individual choice must be carefully regulated to ensure exclusion of undesirable partners É Under such a system it was vital that only potentially suitable people should mix. To meet these ends, balls and dances became the particular place for a girl to be introduced into Society. (Davidoff 1973: p. 49)

To restrict the pool of singles, most of the social events in the Season took place in private venues or in the homes of the elite, who carefully selected their guests based on status (Davidoff 1973). Public meeting places like Ranelagh or Hurlingham closed down, and the "fashionable world" put a stop to masked balls, easily gate-crashed by commoners (Ellenberger 1990: p. 636). The expenses required to participate in the Season also selected the most suitable candidates. Renting a house in Grosvenor Square or organizing a ball for hundreds of guests was extremely expensive. Earl Fitzwilliam devoted £3,000 in 1810 solely to entertaining guests. The Duke of Northumberland spent around £20,000 in the Season of 1840 (Sheppard 1971), at a time when a bricklayer could expect to earn 6 shillings (3/10 of a pound) for a 10-hour day (Porter 1998: p. 176). Very few could afford this standard of living. The arrangement

[13]One can presume that the Parliamentary motive actually played a secondary role. Parliament sessions were adjourned when the Derby took place. As *Harper's Monthly Magazine* stated once, "The Season depends on Parliament, and Parliament depends on sport" (May issue, 1886; quoted in Aiello 2010).

also excluded impoverished peers who, after generations of gambling or mismanagement, were hard-pressed for money. Participating in the Season, thus, also signaled financial strength.

Within the best circles, the race to find a proper husband started with presentation at court and was followed by a whirl of social events. Lucy, daughter of the fourth Baron Lyttelton, kept a diary. She described June 11, 1859 as "a very memorable day" and a "moment of great happiness."[14] She was to be presented to Queen Victoria at court, officially coming out into society. In the following weeks, before returning to Hagley Hall, the family seat in Worcestershire, Lucy attended countless breakfasts, evening parties, concerts, and balls, where she danced with the most eligible bachelors. She even participated in a royal ball at Buckingham Palace, where she thought her heart "would crack with excitement!"[15]

Lucy's experience was not unique. Before the start of the Season, the most fortunate 18-year-old girls were presented to the Queen at St. James's Palace.[16] This event, considered the most important day in a woman's life, symbolized the change in status from childhood to adult life (Davidoff 1973). In practice, it was a public announcement of who was on the marriage market.

As reflected in Lucy's diary, after coming out young ladies began a stressful routine: balls, concerts, breakfast with guests, equestrian events, cricket matches, promenades, tea parties, opera, theater ... During the Season, it was usual for a young lady to start the day with a ride across Hyde Park at 10 am and end up at 3 am the following morning at a ball (Malheiro 1999). Lady Dorothy Nevill remembered than in her first Season she attended "50 balls, 60 parties, 30 dinners and 25 breakfasts" (Nevill 1920). This whirlwind of social events facilitated frequent encounters between singles. In particular, the Royal Academy Summer Exhibition was considered the first round for debutantes, and "ascot races were always the high point of the Season." They were described as "the

[14]The diary of Lady Frederick Cavendish, June 11, 1859.

[15]Diary, June 29, 1859.

[16]To be eligible, a young lady had to be sponsored by someone who had already been accepted in the royal circle, usually her mother.

Eden of debutantes and the milliners' harvest" (*Harper's Monthly Magazine*, 1886; quoted in Aiello 2010). Meetings at Almack's were popular, but royal parties were the most exclusive events, giving "a stamp of authority to the whole fabric of Society" (Davidoff 1973: p. 25). Many ladies met their future husbands at these balls, which have been described as "mating" rituals (Inwood 1998).

The pressure for these ladies to get married was enormous. They had only two to three Seasons to get engaged to a suitable partner. After that, they were written off as failures. If they "crossed the Rubicon" of 30 years, they became confirmed spinsters (Davidoff 1973: pp. 52, 54). The fate of Georgiana Longestaffe, a lady in her late 20s in Trollope's *The Way We Live Now*, illustrates how much a girl's marriage prospects deteriorated as years went by. Georgiana "had meant, when she first started on her career, to have a lord; but lords are scarce [...] She had long made up her mind that she could do without a lord, but that she must get a commoner of the proper sort [...] But now the men of the right sort never came near her" (Ch. 32).

Couples did not have much time to get to know each other. For example, decorum rules prevented a girl from dancing more than three times with one particular partner or sitting out a dance with a young bachelor (Davidoff 1973: p. 49). Unsurprisingly, marriages were not typically love matches but based on money or eligibility. Adultery was consequently commonplace. Oscar Wilde wrote, "I don't care about the London Season! It is too matrimonial. People are either hunting for husbands, or hiding from them."[17] Davidoff summarizes the materialistic view of marriage by the British aristocracy:

> Marriage was considered not so much an alliance between the sexes as an important social definition; serious for a man but imperative for a girl. It was part of her duty to enlarge her sphere of influence through marriage. (Davidoff 1973: p. 50)

The demise of the Season in the late nineteenth century is inextricably linked with the decline of the British nobility. The immense economic

[17] Oscar Wilde, *An Ideal Husband* (First Act).

power of this aristocracy rested on a simple foundation: wealth in the form of land. According to Cannadine (1990), protection from foreign competition and light taxes made British agriculture very profitable from the 1840s to the 1870s. However, an agricultural downturn began in the 1870s. Estates that could once support their mortgages — and their proprietors' opulent lifestyles — fell into ruin. This was reflected in the Season. After the 1870s, many social events became public, and young ladies of commoner or colonial origins began to be presented at court (Ellenberger 1990). It was the death of the Season. Lady Nevill observed that "society, in the old sense of the term, may be said, I think, to have come to an end in the "eighties" of the [nineteenth] century." (Nevill 1910: p. 51). As Turner (1954) concludes, "love laughed at lineage" (p. 184).

1.3 Data sources

I use four data sources, two of which are newly computerized, and one of which is based on hand-collected archival documents. To describe the marriage behavior of the British elite, I use the Hollingsworth genealogical data on the British peerage (1964). I complement this dataset with family seats and landholdings from two published sources: Burke's *Heraldic Dictionary* (1826) and Bateman's *Great Landowners* (1883). Finally, to measure when the Season worked smoothly and when it was disrupted, I construct a new series of attendance at royal parties from the British National Archives.

1.3.1 Peerage records

The participants in the Season were the royals, peers, old landed gentry, and some successful commoners.[18] This well-defined group aroused cu-

[18]British society is divided into classes according to political influence. The head of the society is the Sovereign. The second strand is the peerage, represented in the House of the Lords. In sharp contrast with continental Europe, only the heir inherited the nobility status. This reduced the size of the nobility in Britain. Individuals who were neither peers nor royals were commoners. Again, the term differs from its meaning in

riosity, which eventually led to the publication of their family histories. Arthur Collins published the first peerage record in 1710. Since then, many genealogic studies have updated his work.[19] For the sake of illustration, Figure 1.A1 in the appendix shows the entry for Charles George Lyttelton, brother of Lucy Lyttelton, from Cokayne's *Complete Peerage*.

Hollingsworth (1964) collected this genealogical material for his study of the British peerage. He tracked all peers who died between 1603 and 1938 (primary universe) and their offspring (secondary universe).[20] The data comprises approximately 26,000 individuals. Each entry provides information about spouses' vital events (date of birth, marriage, and death), social status, whether the husband was heir-apparent at age 15, and the status of the highest ranked parent. Status is presented in five categories: (1) duke, earl, or marquis, (2) baron or viscount, (3) baronet, (4) knight, and (5) commoner. Moreover, the entries state whether a particular title belonged to the English, Scottish, or Irish peerage.

Note that the Hollingsworth dataset excludes the landed gentry, who also participated in the Season. The gentry and the peerage, however, did not always attend the same parties; the Season was not a uniform event but consisted of many "layers" (Wilkins 2010: p. 30). In this paper, thus, I focus on the layer for which marriage has the highest stakes — the peerage.

Europe since the landed gentry (baronets and knights) belonged to this class.

[19]Three peerage records stand out: Burke's *Peerage and Baronetage*, Debrett's *The Peerage of the United Kingdom and Ireland*, and Cokayne's *Complete Peerage*. The genealogist John Burke wrote *Landed Gentry*, a similar record for knights and baronets. This last piece tends to be quite mythological, the result of centuries of word-of-mouth information. Oscar Wilde once said, "It is the best thing the English have done in fiction" (Burke's Family et al. 2005).

[20]The primary universe was defined from Cokayne's *Complete Peerage*. The universe of children was found from a variety of sources: Collins' *Peerage of England*, Lodge's *Peerage of Ireland*, Douglas' *Scots Peerage*, Burke's *Extinct Peerage* and modern peerage editions by Burke and Debrett. The remaining gaps were filled from a large list of sources, among which Burke's *Landed Gentry* stands out. See Hollingsworth (1964) for details.

1.3.2 Family seats

The Hollingsworth dataset is a valuable source of information about marriage and the social position of spouses. Unfortunately, no information regarding birthplace or residence is available. To resolve this, I exploit the fact that each titled family was required to build a seat in their estate and to live there for most of the year.[21] Family seats are recorded in heraldic dictionaries. These dictionaries are summarized peerage records that contain additional information at a family level: religious affiliation, motto, coat of arms, and family seats. The most relevant source for my purposes is Burke's *Heraldic Dictionary* (1826). Most of the young aristocrats who married between 1851 and 1875 were recorded as presumptive heirs in this source. Therefore, the family seats in Burke's dictionary correspond in general to the seats where the individuals under analysis grew up and lived most of the year.[22]

After going through each entry in Burke's *Heraldic Dictionary* (1826), I gathered information on 694 country seats for 498 families linked to the peerage. Then, I georeferenced these seats using GeoHack. Figure 1.3 illustrates their geographic distribution, indicating that the nobility was well dispersed all over the British Isles and that seats were quite isolated from each other.

Merging this information with the Hollingsworth dataset gives me 351 couples that marryied between 1851 and 1875 for whom both seats are recorded.[23] For these individuals, I determine the distance between the

[21] On the importance of seats for the British aristocracy, see Stone and Stone (1984). They use ownership of a large house as the criterion for belonging to the elite.

[22] Moreover, country seats were expensive to build and representative of long lasting lineages. Therefore, they generally remained in the hands of the same family generation-after-generation until the 1870s, when the aristocracy started its decline.

[23] Specifically, I merge the entries in Burke's dictionary with the individuals in the Hollingsworth dataset, matching own title for males and parental title for women. When parental (own) title of a female (male) is not available, I try to match it using own (parental) title. Moreover, some entries in the Hollingsworth dataset are labeled with two titles, such as James Richard Stanhope, 7th Earl of Stanhope and 13th Earl of Chesterfield. Stanhope is recorded as having grown up in both the Chesterfield and the Stanhope country seats. With this methodology, all but four titles from Burke's *Heraldic Dictio-*

spouses' seats using Vincenty's algorithm (Vincenty 1975). When one or both spouses have more than one seat — as was the case for Lord Cavendish — I take the minimum distance. Note that, by construction, distance is only defined when both spouses are peers or peers' offspring. Henceforth, I restrict the analysis of geographic endogamy to individuals who married within the peerage.

1.3.3 Bateman's *Great Landowners*

In Jane Austen's *Pride and Prejudice*, Mr. Darcy is described as a wealthy gentleman with an income exceeding £10,000 a year and proprietor of Pemberley, a large estate in Derbyshire. The wealth and estates owned by nonfictional aristocrats were also public knowledge thanks to Bateman's *The Great Landowners of Great Britain and Ireland* (1883). The book consists of a list of all owners of 3,000 acres and upwards by 1876, worth £3,000 a year. Also, 1,300 owners of 2,000 acres and upwards in England, Scotland, Ireland, and Wales are included. Each entry states acreage and gross annual rents. The book also reports the alma mater of the landowner, the clubs to which he belonged, whether he took his seat in Parliament, and other services he provided to the Queen. The years of birth, marriage, and succession are included when known. As an example, the entry for Charles George Lyttelton is shown in the appendix (Figure 1.A2).

For the 558 men who appeared both in Bateman's *Great Landowners* (1883) and in the Hollingsworth dataset, I created a computerized database of all relevant information. Then, I assessed the family landholdings of their wives. Specifically, I included the landholdings of any of hers close relatives. Using this procedure, I matched 355 wives.[24]

nary are matched.

[24]Seventy-two percent of the matched wives are daughters and sisters of great landowners. Family estates and gross annual rents are similar across family relations. The exception is landowners' sisters, who belong to families holding larger estates. Table 1.A1 in the appendix summarizes the acreage and gross annual rents of the matched wives by family relation.

1.3.4 Lord Chamberlain's records

Lord Chamberlain's department at the British National Archives provides data on balls, concerts, and all sorts of parties held at Buckingham or St. James's Palace during the London Season. Individuals invited to these events are listed in hierarchical order. Absentees are also listed or appear with their names crossed off. The period covered is from 1839 to 1902.[25] From Lord Chamberlain's handwritten invitation lists from 1851 to 1875, I recorded the number of invitations issued, the numbers attending and excused, the type of party, and the date of the event. In total, I recorded 121 parties.

Figure 1.4 plots the number of attendees at royal parties over time by type of event. The initial year, 1851, displays unusually high attendance rates, explained by the Crystal Palace Exhibition held in London that year. After that, there seems to be an increasing trend: in the early 1850s balls and concerts were attended by approximately 4,000–5,000 guests. In comparison, on June 24, 1874, a single royal ball brought together almost 2,000 people! The variety of parties also increased, including invitations for breakfast and afternoon parties. Crucially, this evidence reveals a huge disruption to the Season between 1861 and 1863. This was the result of Queen Victoria's mourning for the death of her husband, Prince Albert. In the empirical analysis, I use this large shock to identify the effects of the Season on marriage outcomes.

1.4 Empirical analysis

This section presents the empirical results. First I describe marriage outcomes in 1801–75, when the Season was at its peak. I then identify the extent to which these marriage patterns were shaped by the London Season. To do so, I use exogenous variation in attendance to royal parties coming from changes in the size of the marriageable cohort. Finally, I establish a causal link between search frictions and sorting by analyzing

[25]The exact references are LC 6/31-55 for the period 1839-76, and LC 6/127-156 for 1877-1902. Additional lists are also provided in LC 6/157-164.

marriage behavior during the interruption of the Season after the death of Prince Albert (1861–63).

1.4.1 Data descriptives

From about 1800 to the 1870s, the Season was at its peak (Pullar 1998 and Ellenberger 1990), social parties were crowded, and presentation at court was considered the most important day in a girl's life (Davidoff 1973). What did marriage outcomes look like during the Season's golden years?

Table 1.1 shows marriage outcomes of all 2,570 peers and peers' sons marrying between 1801 and 1875. The row variable is the rank of the husband at age 15.[26] The column variable is the wife's social status, measured as the rank of her father. Each cell contains observed percentages at the top, expected percentages if the two variables were independent in italics, and the difference between the two below. For example, 39.3 percent of duke heirs who married during 1801–75, did so with the daughter of a duke. Under random matching, only 17.9 percent of them would have married such an eligible bride. The difference between the two, thus, is 21.4 percentage points.

The largest discrepancies are concentrated in two areas. First, peer heirs are much more likely to marry peers' daughters than under random matching. Second, commoners at age 15 and barons' sons who are on the lower tail of the social distribution only manage to marry girls of commoner origin. Overall, the relation between the husband and wife's rank is significant, as indicated by the chi-square test. The gamma test and Kendall's tau-b indicate that this relation is positive: husbands with a higher social position married the best-ranked spouses and vice versa. In other words, there was positive assortative matching in social status.

Table 1.2 shows marriage outcomes from the perspective of peers'

[26]Rank at age 15 allows me to proxy how these individuals appeared in the marriage market. This is particularly important for those individuals who were born commoners, remained commoners at the time of their marriage, but ended their lives holding a peerage — either by creation or by inheriting a distant relative's title. This individuals compose the "Commoners at 15" category.

daughters. Between 1801 and 1875, dukes' daughters married significantly better than barons' daughters. Under random matching, the latter would have married duke heirs at a larger rate than they actually did. Again, the aggregate statistics confirm that there was positive assortative matching in terms of social class. This suggests that dukes, earls, and marquises looked down not only on commoners, but also on barons and viscounts.

Discrimination also existed on the basis of family name, with peers from "old" families marrying much better. Table 1.3 shows that men whose families held land at the time of Henry VIII were 10 percentage points less likely to marry a commoner and 7 percentage points more likely to marry the daughter of a duke than men with a less distinguished pedigree.

In nineteenth century Britain, social prestige was not restricted to heraldry. Estate property and gross annual rents from land were also important determinants of one's position in the social elite.[27] Table 1.4 shows marriage outcomes for peers in possession of 2,000 acres and upwards by the 1870s. I cross-tabulate their acreage against the landholdings of their wives' families. Acreage is divided into six classes following Bateman's categorization (Bateman 1883: p. 495). As in Table 1.1, each cell contains observed percentages, percentages under random matching in italics, and the difference between the two below.

The majority of great lords (64.5 percent) married spouses whose families were listed in Bateman's *Great Landowners* (1883). In addition, proprietors of smaller estates (less than 10,000 acres) were more likely to marry outside the circle of great landowners. The aggregate statistics suggest a strong pattern of positive assortative matching in terms of land: hus-

[27]Several great landowners listed in Bateman wrote letters to the author with outrage and demands for the immediate correction of the acres and rents assessed to them. Lord Overstone, for example, complained that "this list is so fearfully incorrect that it is impossible to correct it" (Bateman, p. 348). These complaints might seem unwise in the context of the 1870s, when a the rising public clamor about what was called the "monopoly of land", was encouraged by some members of the press. The complaints of the British nobility, therefore, cannot but subscribe their view of landholdings as a signal of social position.

bands in possession of larger estates married spouses from highly accomplished families, and vice versa. Table 1.5 presents the results in terms of rents from land. Again, marriages were not random; richer landowners were more likely to marry spouses from the most endowed families.

Positive assortative matching in landholdings is not the result of an arbitrary definition of land classes. Figure 1.A3 in the appendix shows the results of a kernel-weighted local polynomial regression of wife's landholdings on husband's landholdings. The advantage of using non-parametric regression is that these techniques allow the data to speak for itself. No assumptions are made about the functional form for the expected value of the wife's landholdings given husband's landholdings. Results suggest that both in terms of acreage (left panel) and in terms of land rents (right panel), wealthier individuals were more likely to marry spouses from well-accomplished families.

All together, this evidence suggests that the children of the nobility sorted in the marriage market on the basis of socio-economic status. Figure 1.5 illustrates the extent to which individuals bonded with similar others. The network diagram shows the connections between peers in possession of 2,000 acres and upwards marrying in 1862 and their spouses. Specifically, a man and a woman are linked if their fathers had the same social status or if the man and any woman's relative were in possession of similar amounts of land[28] or belonged to the same club. Except for Georgiana Marcia, all individuals were well connected; the fashionable world was a complex, dense network. The average man was connected to more than half of the women. However, the number of connections between spouses was on average higher than between men and women who did not marry (see Table 1.A2 in the appendix for details). This suggests that people's choice set was somehow limited to those with whom they were most similar.

The Season, by pulling singles from all over the country, allowed individuals from very distant places to court. Table 1.6 shows that during the golden age of the Season very few spouses came from geographically ad-

[28] To be precise, the link is established if they belonged to the same "Bateman class", as depicted in Table 1.4.

jacent places. Spouses' seats were separated by an average of 140 miles, which was a long distance at the time. Lucy Lyttelton described the journey from Hagley Hall to London (105 miles) as "most smutty," facing "wind, rain, and dirt on the box [of the open britschka]."[29] Further, when distance is broken down by class, I find that higher ranked individuals married spouses from more distant places. In comparison, 30 percent of commoners at age 15 — who were less likely to participate in the Season — married spouses in their same region.[30]

Were ladies pressured to marry quickly as suggested by the anecdotal evidence? Figure 1.6 shows that women's implied market value, measured as the rate of intermarriage with peers and duke heirs, decreased with age (Panel A). The same holds in terms of husbands' landholdings (Panel B). Specifically, the decline starts at age 22. Moreover, it seems that as a woman approached the "Rubicon" of 30 years, her attractiveness fell dramatically in the eyes of her suitors in the Season. Figure 1.6 further suggests that the depreciation of a woman's attractiveness crucially depended on her implicit "quality." For example, the devaluation for duke daughters was much steeper than that of baron daughters (Panel C).

Lucy Lyteltton's marriage mirrors the general marriage patterns in the golden days of the Season. In 1864, Lucy married Lord Frederick Cavendish. She was 22. He was the son of the Duke of Devonshire, one of the greatest landowners in Britain at the time. He was in possession of 198,572 acres scattered throughout his estates in Middlesex, Derbyshire, Yorkshire, and Ireland. His income was said to exceed £180,000 a year. To what extent was the Season responsible for such marriages? Interestingly, Lucy married after a bustling Season in which royal parties brought together approximately 5,000 people. Next, I use attendance rates to the London Season to identify its effects on marriage outcomes.

[29] Diary of Lady Cavendish, May 18, 1859.

[30] Regions are NUTS 1 for England, Scottish Parliament electoral regions, the four provinces of Ireland, and Wales.

1.4.2 Variation in the size of the cohort

The number of attendees to the London Season is a good indicator of how smoothly the marriage market was functioning. As the Season got crowded, announcing who was on the market via court presentations became crucial. Also, a large influx into London implied more balls and concerts to be organized, allowing the children of the nobility to meet and interact more often and more quickly. Thus, the Season worked better the more heavily attended it was, and individuals marrying after largely attended Seasons had greater exposure to this matching technology. Their marriage behavior should therefore reveal the effects of the Season on marriage outcomes.

However, variation in attendance to the Season can be explained by many factors, some of which could be endogenous. It could be argued, for example, that whenever marriage outcomes got worse from the perspective of the nobility, more parties were organized in order to bring back social sorting. In addition the relation between the Season and intermarriage could be driven by underlying economic factors such as land prices. If economic conditions undermined the prosperity of the nobility and the royalty, they might have needed to marry wealthy commoners to alleviate debts.

To tackle these issues, I need a systematic source of exogenous variation in the number of attendees at royal parties. A suitable instrument for this purpose is the size of the female population of marriageable age. To measure it, I compute the number of peers' daughters between ages 18 and 24 each year from the Hollingsworth dataset. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women decreased sharply (see Figure 1.A4 in the appendix).

The size of the cohort is a relevant instrument; whenever a boom cohort entered the marriage market, the number of people attending royal parties increased (see Figure 1.A5 in the appendix). Importantly, variation in cohort size is truly exogenous, since no one plans how many children to have based on projections of marriage market conditions 20 years in the future. Finally, the instrument also satisfies the exclusion restriction, as it only affects marriage outcomes stemming from the London Season.

The size of the cohort does not vary much locally. Only when these changes are aggregated nationwide is the variation in cohort size meaningful.[31] Therefore, marriage behavior would not be affected by changes in the size of the cohort unless the British marriage market was centralized: the effect only goes through the Season. In addition, following Gautier et al. (2010) and Botticini and Siow (2011), I argue that decentralized marriage markets such as the ones set up in the countryside were not subject to increasing returns to scale. In other words, in these alternative markets, changes in the size of the cohort should not affect marriage behavior.[32]

Formally, the number of attendees at royal parties in a given year, A_t, is treated as an endogenous variable and models as

$$A_t = \mathbf{Z}_t'\rho + \mathbf{V}_t'\eta + \nu_t \ , \tag{1.1}$$

where $\mathbf{Z}_t$ is a vector of instruments that includes the number of girls of marriageable age (18–24 years old at year t), a dummy for the 1851 Crystal Palace Exhibition, and an indicator for the interruption of the Season after the death of Prince Albert (1861–1863). $\mathbf{V}_t$ includes alternative predictors for attendance to royal parties such as the sex ratio or the existing railway network at the time. Trend and decade fixed effects are included to account for the time effects described in Figure 1.4.

The magnitude of the effect of the Season on the rate of intermarriage with commoners and on sorting by landholdings is captured by coefficient β in the probit model:

$$Pr\left(y_{i,t} = 1 | \hat{A}_t, \mathbf{V}_{i,t}, \mathbf{X}_{i,t}\right) = \Phi\left(\beta\ \hat{A}_t + \mathbf{V}_{i,t}'\lambda + \mathbf{X}_{i,t}'\delta\right) \ , \tag{1.2}$$

[31]In 1851–75, the standard deviation of my cohort measure in 14.77. Great Britain and Ireland had 118 historical counties. A rough estimate gives an average yearly variation of only 0.125 individuals per county.

[32]One may argue that cohort size variation may affect sex ratios if rigid age preferences exist. Given that men tend to marry younger spouses, if the population is growing, the relative number of men in the marriage market decreases, producing a marriage squeeze (Bhrolchain 2001). To account for that, I include sex ratios as a control variable.

where $y_{i,t}$ indicates whether individual i married outside the peerage at year t in one regression and whether he married a spouse from his same land class in another regression. Land classes are defined in terms of acreage or land rents.[33] ϕ is the cumulative distribution function of the standard normal distribution. $\mathbf{V}_{i,t}$ is the aforementioned vector of time varying controls. $\mathbf{X}_{i,t}$ is a vector of individual controls, including class dummies, age at marriage, peerage of origin, and the relative size of class.[34]

Finally, to quantify the effects of the Season on a continuous measure of socio-economic homogamy and on geographic endogamy, I run

$$Y_{i,t} = \beta\, \hat{A}_t + \mathbf{V}_t'\lambda + \mathbf{X}_{i,t}'\delta + \epsilon_{i,t}\ , \tag{1.3}$$

where $Y_{i,t}$ is the distance between spouses' socio-economic "pizazz"[35] and the distance between family seats, respectively. When one or both spouses have more than one seat, I take the minimum distance. The set of controls is the same as in the previous regressions, except for the inclusion of the density of seats at the region level instead of the relative size of the class.

Note that I am using a triangular IV model in which both the treatment and the instrument only vary at the year level whereas marriage outcomes are measured at the individual level. To fit this model, I estimate the recursive equation system (1.1)–(1.3) by maximum likelihood. Specifically, I use the STATA user-written command cmp and cluster errors at the year level (Roodman 2007).

Panel B of Table 1.7 presents the first-stage results. I find a positive, significant relation between the size of the cohort and attendance at royal

[33] In particular, land classes are defined in two ways: first, using Bateman's *Great Landowners* (1883: p.495) categorization. Second, using deciles.

[34] Here I use the relative number of individuals born within a six-year range (3 years before, 3 years after) belonging to the same class (dukes, earls, and marquises vs. barons and viscounts) to proxy for the relative size of the class. A specification using the relative number of peers aged 15–24 with respect to the total British population aged 15–24 yields similar results.

[35] Socio-economic pizazz combines social status and landholdings in a single index. Section 1.4.2 defines this measure precisely.

parties. A single additional woman of marriageable age attracts 67 people to royal parties. Moreover, both the Crystal Palace Exhibition and the mourning for Prince Albert significantly affected the number of attendees. In 1851, royal parties assembled about 3,000 more people than they would have if the exhibition had not taken place. In contrast, neither the sex ratio nor the length of the railway network, which proxies for the cost of commuting around Britain at the time, seems to play any role. Finally, the F-test is large enough to eliminate any concern about weak instruments.[36]

Panel A presents the probit and IV estimates for the effect of the Season on the rate of intermarriage with commoners. I find that the Season was a key determinant of sorting in this dimension. In particular, increasing the number of attendees by 5 percent (250 more people)[37] would decrease the probability of the average peer daughter marrying a commoner by 1 percent. For peer sons, the effect is slightly lower and not significant in the IV specification, perhaps because men could delay the age at marriage longer than women. Their marriage prospects thus might not have been so affected by annual variation in the number of participants in the Season.

The remaining control variables have expected signs. Consistent with the evidence from Table 1.4, higher ranked individuals were less likely to marry commoners. For example, the probability of marrying outside the peerage was 24 percent higher for a baron's daughter than for a duke's daughter. The relative size of the class did not play any role, indicating that marriages were not randomly set. Older girls were less selective; for the average peer daughter, growing a year older increased the chances of marrying a commoner by 2 percent, reflecting the social pressure to get engaged shortly after coming out (Davidoff 1973: p. 52). The children of families in the Scottish or Irish peerage were more likely to marry commoners. Finally, imbalances in the sex ratio do not seem to play a relevant role in this context.

[36]According to Staiger-Stock's rule of thumb (Staiger and Stock 1997), an F-test over 10 is sufficient to show that the instruments are not weak.

[37]Given that the average number of attendees to royal parties was 4,641.2, 250 guests are 5 percent.

Overall, the model correctly predicts the probability of marrying a commoner in 70 percent of the cases.[38] The IV and probit marginal effects are very similar, indicating that the endogeneity bias might be small. Finally, the Sargan test for overidentifying restrictions implies that I cannot reject the exogeneity of the instruments.

The Season not only affected the rate of intermarriage with commoners; it also helped to strengthen sorting in terms of landholdings. Table 1.8 reports the results from regressing the probability of marrying a spouse from the same land class on attendance to royal parties. Land classes are defined in two ways: using Bateman's categories (Bateman 1883: p. 495)[39] and in terms of deciles.[40] The sample comprises all peers and peers' sons in possession of 2,000 acres and upwards by the 1870s.

Every 150 additional attendees at royal parties would increase by 1 percent the chances of a great lord marrying within the same "Bateman class" in terms of acreage. The effects are slightly smaller when acreage classes are defined in terms of deciles. Results also suggest that the Season had a meaningful, significant impact on sorting in terms of land rents. In this case, the effect is stronger when classes are defined in terms of deciles.[41]

I also find that compared to their English counterparts, Irish and Scottish great lords had more difficulty marrying a spouse in their same land class, no matter if defined with respect to acreage or rents. Being English increased a great lord's chances of marrying assortatively with respect to acreage by more than 10 percent. The length of the railway also seems to have played a role in this context. Every 100 additional miles in the railway network decreases land sorting by between 2 and 3 percent, indicating that an extensive railway infrastructure facilitated courtship outside

[38]The remaining 30 percent might be explained by less observable factors, such as physical preferences or love.

[39]In other words, Table 1.8 reports the results from estimating equation (1.2) with $y_{i,t}$ indicating whether individual i married in the green diagonal in Tables 1.4 and 1.5.

[40]In particular, a marriage is in the land class if both spouses' landholdings are in the same decile or in a contiguous decile of the land distribution.

[41]This might reflect the fact that Bateman's categorization of land rents was not as accurate as his categorization of acreage.

the London Season. Also, railways reflected the power and riches of industrialists. As the railway network expanded, their daughters became more attractive in the marriage market despite their lack of landholdings.

Both models work well in assessing sorting in landholdings. Between 75 and 80 percent of the observations are correctly predicted. Again, probit and IV models produce similar results, and the Sargan tests cannot reject the exogeneity of the instruments.

Since probit regressions allow for nonlinear marginal effects, I can test whether the Season displayed increasing returns to scale. Figure 1.7 plots the number of attendees at royal parties against the marginal effect of 100 additional guests on sorting by acreage.[42] The larger the royal parties were, the greater the effect of bringing in additional guests on sorting by landholdings. This suggests that the matching technology embedded in the Season was subject to increasing returns to scale: as more people participated, the Season worked better. Singles met at a higher speed, and the children of the nobility had to wait a shorter amount of time before a proper proposal came. As a consequence, pickiness increased and marital sorting strengthened.

Tables 1.7 and 1.8 indicate that the Season had a large effect on sorting by social position and landholdings. To more precisely estimate these effects, I combine social status and landholdings in a single "pizazz" index. This index ranks men and women such that the heir to the dukedom of Breadalbane, the greatest landowner in the late 1870s, is at the top of the ranking, and a landless baron's second son is at the bottom. Specifically, the pizazz index orders individuals in a lexicographic manner: the first layer is defined by the percentile of the distribution of land rents. Within these categories, individuals are ranked according to the percentile of the distribution of acreage. Individuals in the same percentile of the distributions of land rents and acreage are ordered hierarchically by social position. For men, I consider status at age 15. Duke heirs are on the top, followed by baron heirs, duke sons, baron sons, baronets, and commoners at age 15 (i.e., who were "pure" commoners at this age, but ended their lives holding a peerage either by creation or by inheriting a distant rela-

[42]For this graph, land classes are defined according to Bateman's categorization.

tive's title). For women, duke daughters are followed by baron daughters and commoner daughters. To make male and female pizazz comparable, I categorize the resulting indices in percentiles. I construct this pizazz rank for all men and women marrying in 1851–75, as well as in five-year cohorts within this period. I then define homogamy as the squared difference between spouses' socio-economic pizazz.

In Table 1.9, I present the regressions of these homogamy indices on (instrumented) attendance to the Season. When socio-economic pizazz is defined over 1851–75, 100 additional attendees at royal parties would match individuals whose ranks are approximately 4.5 positions closer (square root of 20). In other words, a bride would be 4.5 percent closer to her "soul mate" in terms of socio-economic pizazz. The effect is slightly lower when the pizazz index is defined over five-year cohorts.

Compared to their younger brothers, duke heirs marry more homogamously. Landowners in possession of larger estates are also more likely to marry spouses' of similar pizazz. On the other hand, the effect is smaller and the sign is reversed for great lords earning larger rents from land.

Finally, the pattern of geographic endogamy is also consistent with the centralization of the marriage market in London.[43] In Table 1.10 I show that a well-attended Season allowed aristocratic singles from further away to meet, to court and eventually to marry. For every 100 additional attendees, the distance between spouses' seats increased by 1.25 miles.

In addition, duke heirs married spouses from more distant places. On average, their spouses came from 60 miles farther away than the mates of their younger brothers. On the other hand, the sons and daughters of Irish and Scottish peers married spouses from further away than their English

[43]Throughout the paper, I assume that the geographic origin of a partner does not enter the utility function. This assumption is justified by the fact that inheritance was restricted to males according to British nobility customs. Even when a couple did not produce a son, family estates were usually transferred to a distant cousin instead. Therefore, in the nineteenth century, marriage was not an option for estate consolidation, meaning choosing a partner from the immediate vicinity of the family's estate was not necessarily advantageous. Consequently, when the Season worked better and pooled singles from all over the country, matched couples were, on average, likely to come from areas further apart.

counterparts. Neither age nor the density of seats seems to explain the geographic endogamy.

Results in Table 1.10 are not as strong as the ones obtained when sorting by social status and landholdings because the sample is smaller. The OLS coefficients for attendance to royal parties are not significant. Once attendance is instrumented, the magnitude of the coefficient increases, indicating that the endogeneity bias may be more important for geographic sorting.

Altogether, these results indicate that the Season played a crucial role in determining who married whom. Following a "boom" cohort, the Season was well-attended, and the children of the nobility sorted more in the marriage market in terms of socio-economic status. Also, they married spouses from more distant places. One of the potential weaknesses of the cohort size instrument, however, is that it is not subject to much variation. The estimated effects, thus, might be underestimated. Next, I provide strong evidence suggesting that without the London Season, marriage behavior would have been dramatically different. To do so, I examine marriage outcomes during the three years when the Season was interrupted by a major, unanticipated, and exogenous shock: the death of Prince Albert.

1.4.3 The interruption of the Season, 1861–63

On March 16, 1861, Queen Victoria's mother died. Victoria was grief-stricken, and her husband, Prince Albert, took over most of her duties despite being ill already (Hobhouse 1983). This was the start to a disastrous year that would end with Albert's unexpected death on December 14.[44] Victoria plunged into deep grief. She wore black for the rest of her

[44]Prince Albert's death was unexpected. He was only 42 when he died. Albert 's doctors diagnosed typhoid fever as the cause of his death. Only recently it has been discovered that Albert suffered a chronic disease and that he had been ill for the last two years of his life (Hobhouse 1983: pp. 150-151). In addition, Albert took on important government duties until one month before his death. For example, on November 8, 1861, Union forces intercepted the British RMS Trent and removed two Confederate envoys, James Mason and John Slidell. The initial reaction of the British government was to

life and avoided public appearances as much as she could. The London Season was no exception: from 1861 to 1863, most royal parties were cancelled. In addition, in 1862, the Queen suspended all court presentations (Ellenberger 1990). This long mourning was not always well understood by the nobility, who complained that "after the lamented death of the Prince Consort, the Queen came less and less to London, and the palace was more and more deserted, except at the intervals of the proverbial three days visit" (Ellis et al. 1904: p. 361).

The death of Prince Albert provides the perfect natural experiment to identify the effects of the Season on marital sorting. Noble children marrying in 1861–63 were essentially identical to those marrying in the years before and after the mourning period. Table 1.11 shows that among peers' daughters, age at first marriage, the proportion of duke daughters, and the origins of the peerage did not vary significantly across periods. In addition, the table suggests that Queen Victoria's mourning was the only disruption to the marriage market between 1861 and 1863. Neither the size of the cohort [45] nor the sex ratio[46] was distorted during this period.

The only difference between ladies marrying in 1861–63 and ladies marrying before and after is that the former could not fully benefit from the matching technology embedded in the Season: young ladies were not announced at court; poor and insignificant suitors were not fully screened out; singles from all over the country were not pooled in London; and because royal parties were cancelled, encounters became more costly. In other words, search frictions increased.[47]

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demand an apology and the release of the prisoners. Meanwhile, Britain took steps to mobilize its military forces in Canada and the Atlantic. Albert intervened to soften the British diplomatic response, lowering the threat that a war would break out (Hobhouse 1983: pp. 154-155).

[45]The size of the cohort is measured as the number of girls aged 18–24. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women decreases sharply (see Figure 1.A4 in the appendix).

[46]The sex ratio is the ratio of men aged 19–25 to women aged 18–24. The year lag accounts for the fact that men married later.

[47]The London Season was not restricted to royal parties and court presentations. Thus, it would be an exaggeration to state that during the mourning, the Season was fully shut

The interruption of the Season can thus be used to estimate the average treatment effect on the treated (ATT), that is, the effect of the London Season (treatment) on the marriage behavior of the children of the nobility (treated). Formally, I seek to estimate

$$ATT = E\left[y_{i,T=1}|T=1\right] - E\left[y_{i,T=0}|T=1\right] \ , \tag{1.4}$$

where $y_{i,t}$ is a marriage outcome, depending on (1) whether individual i married outside the peerage, (2) whether she married assortatively according to landholdings, or (3) the distance between spouses' seats. The mourning for Prince Albert gives me the appropriate counterfactual for $E\left[y_{i,T=0}\,|T=1\right]$. Individuals marrying during the mourning, in general, would normally have participated in the Season but, for exogenous reasons, were less exposed to its matching technology. Thus, T indicates the treatment: $T=0$ if an individual married when the Season was disrupted (1861–63), and $T=1$ if she married when the Season worked smoothly.

Figure 1.8 summarizes the effect of Queen Victoria's mourning period on the rate of intermarriage between peers and commoners. The chart plots the number of attendees at royal parties between 1859 and 1867, along with the percentage of peers' daughters marrying commoners for two different age groups. The diamond line shows women who were under 22 in 1861. As I stressed in the introduction, one would not expect their marriage outcomes to be severely affected by the interruption of the Season, since they could just delay their choice of husband until everything went back to normal. This option, however, was not possible for women aged 22 or more in 1861. If they wanted to avoid being written off as failures according to social norms at the time (Davidoff 1973: p. 52), they had to marry soon. Figure 1.A4 in the appendix shows marital hazard rates for the cohort marrying the decade before Prince Albert's death. Hazard rates peak at ages 22 and 25, sharply decreasing thereafter. Women aged 22 or more in 1861 would be 25 or more in 1864, when

down. However, these events were central, giving "a stamp of authority to the whole fabric of society" (Davidoff 1973: p. 25). While the Season might have taken place from 1861 to 1863, it must have worked poorly.

the Season resumed. Thus, these ladies were forced to marry during the mourning period.

Before Albert's death[48] and after the Season resumed, both women over 22 in 1861 and women below this cutoff seem to be equally likely to marry a commoner, controlling for age differences (that is, considering that at any point in time the latter were younger). However, a great gap between the two groups opens after 1861. In 1861, the differences are not stark, perhaps because at the time the Queen was mourning her mother and there was not the expectation that the Season would be disrupted for so long. However, after 1862, the older cohort performed much more poorly in the marriage market. In 1863, 80 percent of them married outside the peerage.[49] In contrast, younger ladies who could postpone their marriage plans raised their reservation match and only married if they secured a suitable husband. That explains the drop in their likelihood of marrying a commoner during the disruption.

Figure 1.9 confirms that younger ladies followed a deferred marriage strategy. On average, they married older; hazard rates are unusually high between ages 28 and 30. Also, their likelihood of marrying during the three years when the Season was interrupted was lower. The cumulative hazard rate during the mourning was around 24 percent for older women versus 18 percent for younger ladies.[50]

Women matched when the Season was interrupted also married markedly poorer spouses. Figure 1.10 plots, for all peers' daughters marrying in the peerage or the gentry between 1859 and 1867, the distribution of acreage of their husbands' families.[51] To ease the comparison of husbands' landholdings, the distribution of land is presented in percentiles. The dashed line represents the distribution for women who married in the years of the

[48]The years before 1858 are excluded because women aged below 22 were only 17 or 18 years old by then and thus too young to marry.

[49]The marriage outcomes of these ladies resembled those of the 30-year-old spinsters in the golden days of the Season even though they were younger (see Figure 1.6).

[50]Specifically, I define older women as those aged 22 to 26 in 1861; younger women are aged 17 to 21 in 1861.

[51]Commoner husbands are excluded because land does not accurately proxy their wealth.

mourning; the solid line depicts the distribution for those marrying the years before and after. Women marrying during the mourning tended to wed a husband in the 30th percentile of the land distribution. In "normal" years, instead, the mode is in the 80th percentile. In other words, peers' daughters married better-endowed spouses when the Season was not disrupted.

Sorting in landholdings was also distorted during Queen Victoria's mourning period. Figure 1.11 plots the distribution for the difference between husband and wife's acreage, in absolute value. Between 1861 and 1863 — when the Season did not take place, spouses' were more different in terms of landholdings, i.e., mismatch increased. Consider couples matched when the Season worked smoothly. In a matrimony on the 75th percentile of the mismatch distribution, one spouse held around 20,000 more acres than the other. Between 1861 and 1863 — without the Season, the difference between spouses' landholdings at the 75th percentile was around 35,000 acres. Similarly, in "normal" years the upper adjacent mismatch is of 30,000 acres. The corresponding value in the absence of the Season increases to 55,000 acres. On aggregate, the standard deviation of the difference between husband and wife's landholdings was 8,800 in "normal" years and 18,347 when the Season was interrupted. This evidence powerfully suggests that the Season — by reducing search frictions, induced the children of the nobility to sort more in the marriage market.

Women aged above and below 22 at the beginning of the interruption married similar husbands in terms of landholdings.[52] Thus, deferred marriage strategies seem to have worked well in preventing intermarriage with commoners but were not so effective at securing highly accomplished husbands. To understand this discrepancy, note that in the market there were plenty of earls and barons willing to propose to one of these younger ladies, even if they had to wait for the Season to resume. Instead it was very hard to eventually encounter the son of a great

[52]A t-test comparing the mean acreage of husbands in the two groups yields non-significant results: the difference in means is 152 acres with a standard deviation of 6,438.

landowner, even in typical years. Thus, while the disruption of the Season might not have constrained the set of well-positioned grooms for younger ladies much, without this institution it became nearly impossible to meet a great lord.

The disruption of the Season is likely to have also affected geographic endogamy. By centralizing the marriage decisions in London, the Season allowed singles from all over the country to meet and to court. Does this pattern reverse during the mourning period? Do peers turn back to the area around their country seats to search for a spouse? Figure 1.10 suggests the answer is yes. The chart plots the number of attendees at royal parties each year along with the average distance between spouses' family seats.[53] In 1862 and 1863, spouses came from much closer places than in years when the Season worked smoothly. For example, those marrying in 1859 came from seats separated by an average of 200 miles, but in 1863 the average distance between spouses' seats was only 100 miles.

The case study of Queen Victoria's mourning suggests that the Season was a highly effective "matching technology" — by announcing who was on the market, creating multiple settings for the opposite sexes to meet, and segregating the rich and powerful from the poor and insignificant, it reduced search costs for partners and strengthened the degree of marital sorting. In contrast, when the Season was interrupted after Prince Albert's death, local marriage markets became a more important marriage medium. These markets were more shallow, reducing the degree to which the children of the nobility could sort in the marriage market.

1.5 Robustness

In this section, I stratify my dataset by observables in order to identify the segments of the peerage for which the effects of the Season are more pronounced. I also examine the robustness of my results to using alter-

[53]The smaller sample size for the country seat data does not allow me to differentiate the younger and older ladies as in Figures 1.8 and 1.9.

native measures of the London Season. I then show that the effect of Queen Victoria's mourning period on the rate of intermarriage between peers and commoners is robust to relaxing the 22-year-old threshold. In addition, I explore the validity of the cohort size instrument. First, I gauge the potential effect of unobserved variables in a raw correlation between the Season and marriage outcomes. Second, I assess the bias of the estimates in case the cohort size instrument is "plausibly" exogenous, i.e., it has some correlation with unobservables that are influencing marriage outcomes. Third, I inspect the robustness of my results to alternative definitions of the size of the marriageable cohort.

1.5.1 Sample stratification

In Table 1.12, I compare the effects of the Season across different segments of the peerage, using the size of the cohort as a source of identifying variation. I subdivide individuals into heirs versus non-heirs, landowners in possession of acreage above versus below the median, great lords earning incomes from land above versus below the median, and individuals with socio-economic pizazz above versus below the median. I find stronger and more tightly identified effects for individuals of higher socio-economic position. When the Season was (exogenously) well attended, sorting by acreage increased more for peer heirs and for landowners in possession of larger estates. Homogamy, as defined in Table 1.9, is also more sensitive to the Season for individuals with more socio-economic pizazz. For regression on sorting by land rents, the coefficients for landowners above and below the mean are similar, although significance is lost for the former.

In contrast, the effect of the Season on geographic endogamy seems to come from individuals of lower status. Non-heirs, lesser landowners, and individuals with lower socio-economic pizazz marry spouses from further away when the Season works smoothly. Whereas in the baseline specification 100 additional attendees at royal parties increase the distance between spouses seats by 1.24 miles, the corresponding values for these subsamples are 3.48, 8.17, 7.46, and 2.56 miles, respectively.

This suggests that although the London Season allowed heirs from highly accomplished families to marry better, their younger brothers were not reduced to staying at their country seats. They also participated in the string of social events embedded in the Season, and consequently, they courted and married ladies from all over Britain and Ireland.

1.5.2 Alternative measures of the Season

Table 1.13 examines the robustness of my IV results to using alternative measures of the London Season. Column (1) reports the effects of the Season on marriage outcomes using the number of attendees at all royal parties. Alternatively, column (2) uses the number of attendees at balls and concerts, the quintessence of the Season. The reported marginal effects and standard errors do not vary much with respect to the baseline specification.

A potential weakness of my analysis is that noblemen who were hard-pressed to marry into well-positioned families could have also been more eager to attend the Season. If this happened more when the size of the marriageable cohort was larger, my baseline estimates would be biased. To account for this possibility, columns (3) and (4) use invitations issued to royal parties instead of the actual number of attendees. Again, marginal effects and standard errors are robust to this alternative measure of the Season. In years when Lord Chamberlain issued more invitations for royal parties, peer daughters were less likely to marry a commoner, great landowners married into families with similar landholdings, and spouses were more similar in terms of socio-economic pizazz. For geographic endogamy, the marginal effect of the Season vanishes when I restrict the number of invitations to royal balls and concerts.

1.5.3 The 22-year-old threshold

In examining the effect of Queen Victoria's mourning period on peer-commoner intermarriage, I use the ratio of the rate of intermarriage for women older than 22 in 1861, relative to women below this cutoff age. I separate these two groups because one would not expect younger ladies to be severely affected by the interruption of the Season; they could simply delay their choice of husband until everything went back to normal. The threshold is set at at age 22 based on social norms at the time; if a young lady was not engaged to a suitable partner two or three Season after being presented at court, she was written off as a failure (Davidoff 1973). The most eligible girls "came out" between ages 18 and 19, so by age 22 they were already hard-pressed to marry. Further, around 1861 most ladies married at age 22–25. Since women aged 22 or more in 1861 would be 25 or more when the Season resumed in 1864, waiting was not an option for them (see Figure 1.A4 in the appendix).

However, it could be that given the exceptional circumstances in 1861, the pressure to marry quickly was relaxed. Do my results depend on the choice of the age threshold? Figure 1.13 suggests the answer is no. The chart plots the number of people attending royal parties in the Seasons between 1859 and 1867, along with the percentage of marriages outside the peerage. The latter is presented as a ratio of the rate for older women relative to a younger cohort. Each panel considers a different age threshold: the baseline threshold at age 22, an earlier threshold at 21, and a later one at ages 23 and 24. Clearly, the effect of Queen Victoria's mourning does not vanish in any case. Even if the pressure to marry soon was loosened and ladies around 22 could afford to wait longer, the interruption of the Season had a meaningful impact on the rate of intermarriage of older ladies relative to their younger counterparts.

1.5.4 Assessing selection on unobservables

Queen Victoria's mourning was clearly an exogenous disruption to the Season. The exogeneity of the cohort size instrument, on the other hand, is not clear cut. Before examining the validity of this instrument, I first evaluate how much do we actually need it. The IV and raw marginal effects reported in Tables 1.7 to 1.9 are quite similar, suggesting that the endogeneity bias is in fact small. Only when it comes to geographical endogamy does the need for an instrument stand out.

Can raw regressions be used to identify the effects of the Season? One of the potential weaknesses of this strategy is the scarcity of control variables. To assess the potential effect of unobserved variables, I use the insight from Altonji et al. (2005) that selection on observables can be used to gauge the potential bias from unobservables. The strategy involves examining how much the coefficient of interest changes as control variables are added and then inferring how strong the effect of unobservables has to be to explain away the estimated effect. Formally, consider two individual regressions of the form $Y_{i,t} = \beta \ A_t + \mathbf{X}'_{i,t}\lambda + \mathbf{V}'_t\delta + \epsilon_{i,t}$. In one regression, $\mathbf{X}_{i,t}$ and $\mathbf{V}_t$ only include a subset of control variables. Call the coefficient of interest in this "restricted" regression β^R. In the other regression, covariates include the "full set" of controls. The corresponding coefficient is β^F. The ratio $\beta^F/(\beta^R - \beta^F)$ reflects how large the selection on unobservables needs to be (relative to observables) for results to become insignificant.

Table 1.14 presents the results. Of the 16 ratios reported,[54] none is less than one. The ratios range from 1.1 to 10.2, with a mean ratio higher than 3.0. For example, consider the baseline specification and a restricted regression that only includes time effects and cohort controls.[55] The effect of unobservables would have to be 10 times larger than the effect of the covariates to explain away the impact of the Season on the probability of peers' daughters marrying commoners. For regressions on sorting in terms of acreage, land rents,[56] and homogamy, the ratios are 4, 7, and 3, respectively.

[54]Ratios for the distance between spouses' seats are not reported because Table 1.10 already makes clear that the endogeneity bias is strong in this dimension.

[55]Time effects stand for a linear trend and decade fixed effects. Cohort controls are the sex ratio and the relative size of class — social class in column (1), land classes in columns (2) and (3), and both in column (4).

[56]Defined as marrying in your same "Bateman class" in terms of acreage, or marrying in the same decile or a contiguous decile of the land rents' distribution.

1.5.5 Plausibly exogenous instrument

I assume that no one decides how many children to have by looking at marriage market conditions 20 years ahead and that local marriage markets are not likely to display increasing returns to scale (Botticini and Siow 2011). I therefore argue that the exclusion restriction in my specification is a good approximation, i.e., that the cohort size instrument is plausibly exogenous. The Sargan tests reported in Tables 1.7 to 1.10 cannot reject exogeneity of the set of instruments. The test is based on the assumption that at least one instrument is valid with certainty.[57] Since Queen Victoria's mourning period is arguably an exogenous, excludable shock to the Season, the Sargan test is very informative about the validity of the cohort size instrument.

However, one cannot fully rule out the possibility that changes in the size of the marriageable cohort are correlated with unobservables affecting marriage outcomes. In this subsection, I gauge the extent to which my results are sensitive to such hypothetical correlation. Formally, I rewrite equations (1.1)–(1.3) to estimate the system in a two-stage least-squares framework:

$$\begin{array}{ll} \text{First stage} & A_t = \rho \, Cohort\ size_t + \mathbf{Z}_t' P_2 + \mathbf{V}_t' \eta + \mathbf{X}_{i,t}' \delta + \nu_t \\ \text{Second stage} & y_{i,t} = \beta \, \hat{A}_t + \mathbf{V}_t' \lambda + \mathbf{X}_{i,t}' \delta + \gamma \, Cohort\ size_t + \epsilon_{i,t} \, , \end{array}$$

where $y_{i,t}$ is the marriage outcome: marrying outside the peerage, marrying assortatively with respect to acreage and land rents, homogamy, and distance between spouses' seats. $\mathbf{Z}_t$ includes dummies for the years of the mourning (1861–63) and the Crystal Palace Exhibition (1851). $\mathbf{V}_t$ and $\mathbf{X}_{i,t}$ include the set of covariates described in section 1.4.2. Note that for this robustness check, I consider a linear probability model for the dichotomous outcomes. Finally, γ is the direct effect of the size of the cohort on marriage outcomes — the effect that does not go through attendance to royal parties (ρ).

[57]Formally, the assumption is that as many instruments as endogenous regressors — one in my specification — are truly exogenous.

In this simple case, $\beta(\gamma) = \beta(\gamma = 0) + \frac{\gamma}{\rho}$, where $\frac{\gamma}{\rho}$ is the bias from violating the exclusion restriction. Table 1.15 reports the effects of the Season on marriage outcomes for different values of γ. It seems unlikely that the direct effect of the size of the cohort could be more than 75 percent of the direct effect of the number of attendees of the Season. Point estimates for the effect of the Season do not vary much when $\gamma < 0.5 \cdot \beta$ (when the direct effect of the cohort in less than half the direct effect of the Season). The estimated standard errors are also fairly stable across this range of γ values. The estimation bias is meaningful only under a large violation of the exclusion restriction — when the direct effect of the cohort is almost the same as the effect of the Season. Although these results do not allow me to make inference about my estimates, they suggest that for plausible small violations of the exclusion restriction, the cohort size instrument would still be valid.

1.6 Discussion

In this section, I discuss the role of preferences as an important determinant of marital sorting. My results indicate that search frictions have a direct impact on marital sorting. In particular, although a preference to marry higher ranked individuals existed, when the matching technology embedded in the Season was distorted, sorting by socio-economic status was loosened. Does this mean that homophily — a preference for others who are like ourselves — did not play an active role in pairing? Was there any dimension of preferences driving sorting independent of the matching technology? In many settings, marital preferences are the sole determinant of sorting. For example, Hitsch et al. (2010) find that preferences alone explain all the observed sorting in online dating. Similarly, Banerjee et al. (2009) and Fisman et al. (2008) conclude that preferences are the main determinant of caste-endogamy in India and racial sorting in the United States.

I next turn to a specific dimension of preferences: political ideology. British peers were political animals. According to Douglas Allen,

> It is hard to exaggerate the extent to which the aristocracy ruled Britain through its control over what we now call public offices. Both houses of Parliament were controlled by them until the turn of the twentieth century. The King's household, which evolved into the executive arm of the government, was the domain of the aristocracy, as were the great offices and tenures of state. (Allen 2009: p. 301)

Political ideology was not limited to the House of the Lords. It was also reflected in social life. Most peers belonged to political clubs: Brook's, Reform, and Devonshire were liberal clubs, and Carlton, Jr. Carlton, Conservative, and St. Stephen's were tory clubs (Bateman 1883: p. 497).

Club membership mattered for marriage. Table 1.16 cross-tabulates the political ideology of spouses who married before the decline of the Season in the 1870s (Ellenberger 1990). To measure the political preferences of husbands, I use the ideology of the clubs they belonged to. For wives, I use the clubs in which any close relative was a member. Each cell shows the observed percentage of marriages in each category, the expected percentage if marriages were randomly set, and the difference between the two below. I find that 39.5 percent of liberal husbands married liberal wives, but under a random assignment, only 29.5 percent of them would marry women with the same ideology. For tory husbands, the difference between observed and randomized percentages is 4.3 points. Aggregate statistics confirm that husband and wife ideology are related variables. In most cases, fathers and sons-in-law shared the same political views.[58]

In contrast to sorting by socio-economic status, sorting by political ideology is not explained by the London Season. Figure 1.14 shows that political endogamy was stable over time. It was independent of the number of attendees to royal parties, and it was not affected by the interruption of the Season during Queen Victoria's mourning.

[58]Of course, within the groups of tories and liberals there is plenty of heterogeneity that escapes this simple dichotomous definition of political ideology. A more precise analysis, left for future research, would be to use the voting patterns of these individuals on the Reform Act of 1867 to more precisely identify their political preferences.

This evidence suggests that sorting by political ideology was mainly driven by preferences, independent of the matching technology. Why does sorting by social status and sorting by ideology behave differently? The reason is that there were very few duke heirs in the marriage market relative to individuals with the same ideology. When the matching technology did not work smoothly, young ladies had more difficulty meeting well-positioned grooms. As a consequence, sorting in this dimension was affected. In contrast, even when the Season was disrupted, it was relatively easy to meet a like-minded partner. Thus, regardless of the matching technology, political endogamy remained stable.

This finding is in line with Banerjee et al. (2009). They estimate the equilibrium price of caste in the Indian arranged marriage market. Though individuals seem to be willing to disregard beauty and education to marry within their caste, they do not have to do so in equilibrium because the market is sufficiently deep, meaning there is a high probability of eventually encountering someone within your caste who is highly educated and/or handsome. This implies that caste is not a significant constraint on marriage. Likewise, since the marriage market for the British upper classes was crowded with liberals and tories, a debutante looking for a like-minded groom was not constrained by disruptions to the Season.

1.7 Economic implications in the long-run

This section examines the implications of marital assortative matching for social mobility and economic inequality. Next, I discuss how inequality affected the provision of public schooling in England.

1.7.1 Sorting and inequality

Over the last 50 years, marital sorting (Costa and Kahn 2000, Chen et al. 2013) and inequality (Piketty and Saez 2006) have increased hand-in-hand in the United States. Given the enormous concerns over inequality as a policy issue (Persson and Tabellini 1994), understanding this relation becomes crucial. Fernandez et al. (2005) show both theoretically and empirically that sorting and inequality potentially reinforce one another. However, modern-day data can hardly speak to the long-run consequences of marital assortative matching. Because this paper deals with a historical setting, I can shed light on this issue. Next, I gauge the effects of the Season — and its implied sorting patterns — on social and economic inequality.

Using the estimated coefficients in Table 1.7, I predict how marriage patterns would have looked in the absence of the Season — that is, I set the number of attendees to zero.[59] Figure 1.15 compares observed and counterfactual marriage outcomes. Between 1851 and 1875, the rate of intermarriage between peers' daughters and commoners would have been 30 percent higher without this institution. Given that the observed rate of intermarriage was already around 60 percent, it could be said that almost all the marital segregation between peers and commoners can be explained by the London Season. In other words, many newcomers would have married into the nobility without the Season; England would have looked much more like continental countries with large and not very rich aristocracies.

In addition, in a cross-section of English and Welsh counties, I document a strong and significant correlation between sorting and inequality over the very long-run. In particular, I focus my attention on inequality in regard to the distribution of land. To do so, I assign each noble family to the county in which their principal estates were located. Then I compute the dynastic intermarriage rate: the percentage of members of a dynasty[60] that first married a commoner, from the origins of the dynasty to the 1870s. Figure 1.16 plots this rate of dynastic intermarriage against the Gini index for the distribution of land (computed from Bateman 1883). I find that in counties where noble dynasties intermarried less

[59]To calculate the counterfactual number of marriages outside the peerage, I assume the number of marriages per year to be fixed.

[60]Heirs are excluded from this calculation to avoid the endogeneity that may arise if they married strategically to consolidate their estates. This practice was common in the late seventeenth century (Mingay 1963).

with commoners over time, land was more unequally distributed by the late nineteenth century (Panel A). The correlation is even stronger when I only consider dynastic intermarriage during the nineteenth century, when the Season was at its peak (Panel B).

This evidence does not allow for causal inference. However, given the importance of marriage for the intergenerational transmission of wealth, the mechanism behind this correlation seems obvious. By segregating the rich and powerful from the poor and insignificant, the Season prevented wealth from trickling down. To illustrate this point, consider the following example. Society is divided into two groups. In the initial period, members of the first group possess all the wealth in the economy. Wealth is fixed and bequeathed from generation to generation. In this simple case, the only way in which society will become more equitable is if at some point individuals from the two classes intermarry. Any institution that prevents this from happening will perpetuate inequality.[61]

In Britain, this trickle-down mechanism was not fully eliminated by the custom of primogeniture. Although male heirs received all the land, their younger brothers and sisters were not completely excluded from inheritance. On the day of their marriage, heirs typically signed a marriage settlement, agreeing to provide for their younger brothers and sisters (Habakkuk 1940). They were to receive an annual "salary" from the family estate. Therefore, the larger the rate of intermarriage between these rentiers and commoners, the more wealth would trickle down. This might have had important consequences over the distribution of land, especially in the eighteenth century. At that time, the land market was as active as ever. However, credit constraints on smaller landowners generated "a drift in property ... in favor of the large estate and the great lord" (Habakkuk 1940: pp. 2, 4). These constraints might have been relaxed if

[61] In this simple example, I assume that wealth can be accumulated but that there is no technology generating new wealth. While this assumption might be good for the case of landed property, it is by no means reasonable for other forms of wealth. If wealth can be generated, society may become more equitable (even under perfect segregation) if poorer individuals generate wealth at a higher rate. In Britain, the Industrial Revolution might have played this role.

noble dynasties had intermarried more with commoners.

Although I am focusing on landed property, other forms of wealth became important, especially after the Industrial Revolution. Great lords may have been able to maintain their economic status by allowing wealthy commoners in, but Figure 1.16 shows that they did not. This means that in addition to economic inequality, the British aristocracy was also protecting social structure. Clark (2010) and Clark and Cummins (2012) document high aggregate levels of social mobility between 1200–2009 in England. However, they also note that some families remained at the top of the income distribution for more than 30 generations. "Their success over 900 years implies that at least at the very top of traditional English society there must be some limitation on regression to the mean" (p. 28). The London Season might well account for this limitation, helping to sustain the English nobility's role as an unusually small and exclusive elite.

1.7.2 Provision of public schooling

Was inequality harmful to Britain? Despite being the cradle of the Industrial Revolution, the provision of education in England lagged behind Prussia and the United States, nations that eventually became the world's industrial leaders (McCloskey and Sandberg 1971). Contemporaries were well aware of this. In 1850, Joseph Kay, a Victorian educationalist, returned from his European tour puzzled by the apparent contradiction that in England, "where the aristocracy is richer and more powerful than that of any other country in the world, the poor are ... very much worse educated than the poor of any other [western] European country."[62]

Sokoloff and Engerman (2000) and Galor et al. (2009) famously suggest that landownership concentration might slow the implementation of public schooling. The idea is that while emerging capitalists might be willing to support and subsidize education because they are eager for an educated workforce, entrenched landowners oppose educational reforms due to the lack of complementarity between human capital and agrarian work, and to reduce the mobility of the rural labor force (Galor and Moav

[62]Quoted in Stone (1969): p. 129.

2006). Where entrenched landowners are more powerful (i.e., landownership is concentrated in their hands), the provision of public schooling is delayed.

This explanation seems particularly suited to explaining England's delay in introducing public education. Its aristocracy held the lion's share of land, wealth, and political power for most of the nineteenth century (Cannadine 1990). Goñi (2014b) examines these issues further exploiting evidence from School Boards. School Boards were introduced in England and Wales in 1870 after Forster's Education Act. In response to a growing concern about Britain's loss of industrial leadership, the Act recognized for the first time that it was the role of the state to provide elementary education (Stephens 1998). In particular, School Boards were created in the districts and boroughs where little education was available. Each Board could (1) raise funds from a rate, (2) build and run public schools[63] if existing Voluntary schools, which were run by the church, were scarce, (3) subsidize these Voluntary schools, (4) pay the fees of the poorest children, and (5) create by-laws making attendance compulsory. School Boards had the power to decide how much money to collect and how to spend it. This made them a good target for the local landed elites unwilling to subsidize the provision of public education (Stephens 1998). Were these elites successful in taking over School Boards?

Figure 1.17 suggests that, in fact, landownership concentration had a negative impact on the provision of public education. The chart shows the kernel density function of investment in education between 1870 and 1895 in pence per capita. The distributions are plotted for two different sets of counties: counties where land concentration was large versus counties where it was not (i.e., above vs. below the median). Land concentration is measured as the share of a county in the hands of landowners in possession of 3,000 acres or more. Clearly, the estimated distributions are different. Between 1870 and 1895, School Boards in counties with

[63]These schools were commonly known as Board schools. To be precise, Public schools were fee-charging exclusive secondary schools with Eton, Rugby, or Harrow being the most well-known. Henceforth, for ease of exposition, I will refer to Board schools as public schools.

low levels of land concentration raised more funds for public education. The distribution is concentrated at 80 pence per capita. Where landownership was more concentrated, investment in education ranged between 0 and 40 pence per capita.[64]

Altogether, this suggests that England and Wales fell behind in terms of educating the workforce because its aristocratic landed elite, after generations of marriage endogamy, accumulated the lion's share of land. This gave them sufficient economic power and influence to oppose subsidizing the provision of public education with taxes on their properties.

1.8 Model

This section presents a two-sided search model that formalizes the search and matching problem of the British upper classes during the London Season. The main objectives of the model are to highlight the central role played by search frictions in assignment theory and to provide theoretical foundations underlying the results I obtain in this paper. The model also incorporates nonstandard features like endogenous market segmentation and discusses their implications on marital sorting.

1.8.1 Standard two-sided search model

The market is populated with a continuum of ex-ante heterogeneous men and women who wish to form long-term partnerships. Agents are characterized by their socio-economic status: x for men and y for women. Let x and y be distributed according to $F(x)$ and $G(y)$ over $[0, 1]$. The corresponding density functions are $f(x)$ and $g(y)$. All agents agree on how to rank one another. When a type x man matches with a type y woman, the former receives utility y and the latter receives utility x. Formally,

[64] Figure 1.17 is extracted from Goñi (2014b). Evidence on investment in public schooling is from the reports of the Committee of Council on Education. They contain information on funds raised from rates and other sources of School Board incomes, as well as its expenditures, and various educational outcomes beyond literacy or enrollment rates.

$u_x(y) = y$ for all $x \in [0, 1]$, and $u_y(x) = x$ for all $y \in [0, 1]$. Therefore, I follow Collin and McNamara (1990), Smith (1995), Bloch and Ryder (2000), Burdett and Coles (1997), and Eeckhout (1999) and assume utility to be nontransferable.[65]

Time is discrete. All men and women start their lives as singles, a state that yields no payoff. Because of search frictions, it takes time for agents to meet. The rate at which contacts are made is determined by a matching function. Given the measures of men (λ^m) and women (λ^w), the number of encounters is given by $\alpha M(\lambda^m, \lambda^w)$, where α is the efficiency of the matching function and M is increasing in both its arguments. I define $\mu_w(\lambda^m, \lambda^w, \alpha) = \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w}$ as the encounter rate for single women (analogous for single men).

When two singles meet, they decide whether to propose or not. A match is formed when both propose to each other. These agents then leave the pool of singles but are automatically replaced by two clones. This guarantees that the distributions G and F are time invariant.[66]

Although being single is undesirable, it does not necessarily mean that an agent will match with the first person he/she meets. It might be wise to wait until a proper proposal comes. The discounted lifetime utility of single women thus depends on the probability of eventually encountering "acceptable" agents. Patience is determined by a discount factor $\beta > 0$.

[65]Edward Cave's *Gentleman's Magazine* (1731–1922) published a monthly column of marriages, which gave the amount of dowry, sometimes invented, and any gossip that could capture the reader's attention (Cannon 1984: p. 73). However, the dowries of noble marriages were never published, and from 1775 onwards, not even the dowries of commoners were published, suggesting that the practice was not that widespread at the eve of the nineteenth century. Moreover, the assumption of nontransferability is justified as long as rank and land actually reflected social prestige, which is not as transferable as wealth.

[66]In the context of the Season, this assumption is justified by the fact that when the daughter of a noblemen gets married, her younger sister replaces her by coming out in the Season.

Formally,

$$(1-\beta)V(y) = \beta \, \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} \, \Omega(y) \int_0^1 max \, \langle W(x,y) - V(y), 0 \rangle \, dF(x|y) \; , \tag{1.5}$$

where Ω stands for the proportion of males who propose to her; $F(x|y)$ is the distribution of their socio-economic status; and $W(x,y) = x + \beta W(x,y)$ is the value function for a woman of type y married to a man of type x.

Singles follow utility-maximizing strategies when deciding which offers to accept. Formally, the optimal strategy for a woman y is to set a reservation match threshold $r(y)$ such that all proposers yielding a utility above it are accepted. This threshold $r(y)$ is set such that marrying the reservation candidate yields a utility level equal to the value of search: $W(r(y), y) = V(y)$.

Of course, this reservation strategy depends on the behavior of the other singles. Consider the problem faced by the woman with the highest socio-economic status ($y = 1$). Note that all men will propose to her, so $\Omega(1) = 1$ and $F(x|1) = F(x) \; \forall x$. Hence, I can rewrite (1.5) for this woman as

$$(1-\beta)V(1) = \beta \, \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} \int_0^1 max \, \langle W(x,1) - V(1), 0 \rangle \, dF(x) \; .$$

Plugging $W(x,y) = x + \beta W(x,y)$ into this equation, I find that the optimal reservation match for the most attractive woman is

$$r(1) = \frac{\beta}{1-\beta} \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} \int_{r(1)}^1 [x - r(1)] f(x) dx \; . \tag{1.6}$$

The reservation strategy for the most attractive man, $\rho(1)$, is derived analogously. Note that as the most attractive man is willing to propose to all woman with $y \geq \rho(1)$, they will be desired by all men as if they were the most charming woman themselves. Therefore, they will be equally selective and use the reservation strategy of the most attractive woman. Similarly, all men with $x \geq r(1)$ will use the same strategy as the most attractive man. So, $[r(1), 1] \times [\rho(1), 1]$ constitutes the first marriage class, which behaves in an endogamic way. Agents in this class only marry members of the same class. I rewrite $a^1 \equiv r(1)$ as the reservation strategies of class 1 women ($b^1 \equiv \rho(1)$ for class 1 men).

Consider now the worthiest woman not belonging to class 1. The problem she faces has the same structure as before, with all men not in class 1 willing to marry her. Therefore, a second endogamic marriage class $[a^2, a^1) \times [b^2, b^1)$ will be formed. We could extend this argument and find a marriage equilibrium in which agents maximize their utilities given their beliefs. This is summarized in the following proposition from Burdett and Coles (1997):

Proposition 1 *(Class Partition Equilibrium.) The marriage equilibrium consists of a sequence of reservation strategies,* $\{a^n\}_{n=0}^{N^w}$ *for women and* $\{b^n\}_{n=0}^{N^m}$ *such that*

- $a^0 = b^0 = 1$
- $a^n = \frac{\beta}{1-\beta} \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} \int_{a^n}^{a^{n-1}} [x - a^n] f(x) dx$; and
  $b^n = \frac{\beta}{1-\beta} \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^m} \int_{b^n}^{b^{n-1}} [x - b^n] g(x) dx$
- $a^n,\ b^n\ > 0\ \forall n$
- *Men in class n* $x \in [a^n, a^{n-1}]$ *only marry women in class n* $y \in [b^n, b^{n-1}]$

See appendix B for the formal proof, which follows the intuition described above.

Under this simple preference specification in which one's type affects her payoff only through whom she can match with, positive assortative matching arises naturally.[67] The highest ranked men and women form endogamic marriage classes, while individuals in the lower tail of the

[67]The fact that I ruled out narcissism, that is, that agents enjoy their own socio-economic attractiveness, is not necessary for the results. A utility specification in which single men enjoy their socio-economic status x and married agents enjoy the sum of the souses' types $u_x(x, y) = x + y$ would yield the same results (Burdett

socio-economic distribution, although preferring to marry top partners, are "forced" together.

Note that the degree of sorting will be stronger in equilibria with a larger number of smaller classes. To illustrate this, consider two extreme cases. If there is only one marriage class, all agents marry the first person they meet. Marriages are randomly set, so the characteristics of your spouse are completely independent of your own. That is, there is no sorting at all. Instead, consider an equilibrium in which people only marry those who look exactly like themselves. In this case, there are an infinite number of "singleton" marriage classes, leading to perfect positive assortative matching.

Definition 1 *(Sorting) A marriage equilibrium* $\{a^n\}_{n=0}^{N^w}$, $\{b^n\}_{n=0}^{N^m}$ *displays a larger degree of sorting than an equilibrium* $\{\hat{a}^n\}_{n=0}^{\hat{N}^w}$, $\{\hat{b}^n\}_{n=0}^{\hat{N}^m}$ *if* $a^n \geq \hat{a}^n$ *and* $b^n \geq \hat{b}^n$ *for all* n*, holding with inequality for some* n*, and* $N^i \geq \hat{N}^i$ *for* $i = m, w$*.*

In the following subsections, I explore how the equilibrium degree of sorting depends on two features of the London Season: the efficiency and the increasing returns to scale of the matching technology, and the segregation of poor and insignificant suitors.

1.8.2 Matching technology

The London Season not only pulled noble singles together, it also facilitated their courtship. When working smoothly, the Season created multiple settings for the opposite sexes to meet and court. In a single night, each girl could dance with dozens of eligible suitors. Local marriage markets, in comparison, were more shallow. To meet as many suitors as in

and Coles 1999). Other utility specifications in which agents' attractiveness interacts $u_x(x, y) = f_1(x) \cdot f_2(y)$ guarantee positive assortative matching as long as they are log supermodular (Shimer and Smith 2000). However, they do not display the partition equilibrium (Burdett and Coles 1997) that will be used here unless preferences are multiplicatively separable (Eeckhout 1999).

the Season, one would have to travel all over Britain and Ireland, visiting each suitors' family seat. The matching technology embedded in the Season, thus, can be characterized as highly efficient, i.e., as having large α.

Furthermore, the fact that noble families from all over the country moved to London to get their offspring married hints at the existence of some sort of increasing returns to scale. In Seasons in which a lot of girls came out to the marriage market, public information was crucial. Presentations at court helped to centralize information and coordinate the nobility. Also, as the Season got crowded, more balls and concerts were organized, allowing the children of the nobility to encounter one another even more quickly. Hence, I model the encounter function in the Season as having increasing returns to scale, i.e., $\frac{\partial M(\lambda^m,\lambda^w)/\lambda^i}{\partial \lambda^i} > 0$ for $i = m, w$.[68]

How would this matching technology affect marital sorting? The main trade-off that agents face in this model is between marrying sooner to enjoy marriage flow utility and waiting to get a proper match. The value of waiting depends on the rate at which you meet proper types. Thus, when the Season worked smoothly (i.e., the matching technology was efficient) and was largely attended (i.e., increasing returns to scale), the speed of encounters between singles increased. As a consequence, singles were more likely to wait, rejecting more offers and forming a larger number of smaller classes in equilibrium. In other words, sorting increased. This leads to Proposition 2.

Proposition 2 *As the matching technology becomes more efficient (larger α) and as the measure of men and women increases (larger λ^m, λ^w), the degree of sorting in equilibrium increases.*

Appendix B provides a formal proof based on Bloch and Ryder (2000).

[68]The clone replacement assumption (i.e., the fact that matched agents are automatically replaced by two clones in the pool of singles) is crucial in order to avoid multiple equilibria once I introduce increasing returns to scale. Although this assumption is well-suited for the London Season (see footnote 63) it may not apply to other settings. Therefore, the comparative statics with respect to the mass of participants should be taken with caution.

Figure 1.18 gives an example of how the class equilibrium changes as the matching technology becomes more efficient and as participation rates increase. The model is calibrated for the case of symmetric populations ($\lambda^m = \lambda^w = 1$ and $F(x) = G(x)\ \forall x \in [0,1]$) with uniform distributions and a discount rate of $\beta = 0.8$. The matching technology is $\alpha M(\lambda) = \lambda^2$, which displays increasing returns to scale. The efficiency of the matching technology rises from α =0.5 to α =1 (left panel), and the increase in participation rates goes from $\lambda = 1$ to $\lambda = 1.5$. In both cases, an additional class is created, and all classes are of smaller size than in the benchmark case.

If the increase in the encounter rate is large enough, the equilibrium might reach perfect assortative matching, i.e., the n$^{\text{th}}$ ranked woman marries the n$^{\text{th}}$ ranked man.

Proposition 3 *(Adachi 2003) As search costs become negligible, the set of equilibria converges to the set of stable matches derived under the deferred acceptance algorithm (Gale and Shapley 1962), with perfect assortative matching.*

See appendix B for a formal proof.

Propositions 2 and 3 formalize why individuals less exposed to the Season, such as the cohort of women affected by Queen Victoria's mourning period, married less assortatively with respect to class and land (Figures 1.1 and 1.8). It also explains why the children of the nobility sorted less into marriages after Seasons in which attendance was smaller due to a smaller cohort size (Tables 1.7 and 1.8).

1.8.3 Market segregation

Apart from an efficient matching technology and from increasing returns to scale, the London Season was also characterized by its segregative nature. Only royals, peers, landed gentry, and some successful commoners attended. This segregation was serious, to the extreme that masked balls, easily gate-crashed by commoners, were abandoned (Ellenberger 1990). Moreover, renting a house in Grosvenor Square or organizing a ball for hundreds of guests was not affordable by everyone. The high costs involved in participating in the Season excluded impoverished aristocrats who, after generations of gambling or mismanagement, were hard-pressed for money. In this section, I introduce endogenous segregation in the model and evaluate its effects on marital sorting.

Henceforth, for ease of exposition, I assume that the male and female populations are symmetric, i.e., that $\lambda^m = \lambda^w = 1$ and $F(x) = G(x)\ \forall x \in [0,1]$. I introduce a market maker to the economy who proposes excluding the least desirable suitors from the marriage market by charging a participation fee p. Each agent can then decide whether to go to the exclusive marketplace and avoid meeting these suitors at a cost p or to remain in the unrestricted marriage market. I call an equilibrium in which the least desirable suitors are excluded a segregation equilibrium.

Definition 2 *A segregation equilibrium is a measurable subset $(z, 1]$ such that for all $x \in (z, 1]$, $\tilde{V}(x) - p \geq V(x)$, where $\tilde{V}$ and V are the corresponding values of searching in the exclusive and the unrestricted marriage markets, respectively.*

Since the matching technology has increasing returns to scale, this model is subject to multiple equilibria. Here I show that a segregation equilibrium exists, and I do so by constructing one. I first define the marriage equilibria in the unrestricted and exclusive markets under segregation. After that, I calculate the equilibrium fee p^*. Finally, I show that under segregation no agent has an individual incentive to switch from the exclusive to the unrestricted market, or vice versa.

Provided that the segregation equilibrium exists, the unrestricted marriage market is characterized by a mass $F(z)$ of individuals distributed according to $\frac{f(x)}{F(z)}$. The equilibrium takes the form of a class partition $\{a^n\}_{n=0}^{N}$ in which the cluster's bounds a^n are defined according to Proposition 1. Similarly, the exclusive marriage market would be populated with $1 - F(z)$ individuals distributed over $\frac{f(x)}{1-F(z)}$. The equilibrium will also take the form of a class partition $\{\tilde{a}\}_{n=0}^{\tilde{N}}$.

The participation fee p has to be such that agents of type z do not want to switch to the exclusive marriage market. Note that a type z agent would be the most desirable individual in the unrestricted market. Thus, her value of search there would correspond to the value of search in the top class $[a^1, z]$

$$V(z) = \frac{\beta}{1-\beta} \frac{\alpha M(F(z))}{F(z)} \int_{V(z)}^{z} (x - V(z)) \frac{f(x)}{F(z)} dx \, . \tag{1.7}$$

In contrast, in the exclusive marriage market, z would be on the lowest class $[z, \tilde{a}^{\tilde{N}}]$, with a value of search of

$$\tilde{V}(z) = \frac{\beta}{1-\beta} \frac{\alpha M(1 - F(z))}{1 - F(z)} \int_{z}^{\tilde{a}^{\tilde{N}}} (x - z) \frac{f(x)}{1 - F(z)} dx \, . \tag{1.8}$$

Therefore, for the segregation equilibrium to exist, the participation fee has to be such that $p^* = V(z) - \tilde{V}(z)$, that is:

$$p^* = \frac{\beta}{1-\beta} \alpha \left[\frac{M(F(z))}{F(z)} \int_{V(z)}^{z} (x - V(z)) \frac{f(x)}{F(z)} dx - \frac{M(1 - F(z))}{1 - F(z)} \int_{z}^{\tilde{a}^{\tilde{N}}} (x - z) \frac{f(x)}{1 - F(z)} dx \right] \, .$$

Now I show that with this p^* and under the belief that types above z participate in the exclusive marriage market, all agents of type $x < z$ have an individual incentive to remain in the unrestricted market. First, consider all agents in $[a^1, z)$. Following the intuition in Proposition 1, they will behave in the same way as z in the unrestricted marriage market, since there they are desired by the highest type of the opposite sex. So, the value of searching for a mate in the unrestricted market is such that $V(x) = V(z) = a^1$ for all $x \in [a^1, z)$. Alternatively, if agents in $[a^1, z)$ switched to the exclusive marriage market, they would at most be included in the last marriage class, as agent z. It could even be the case that $\tilde{a}^{\tilde{N}} > x$ for some $x \in [a^1, z)$, which means that nobody in the exclusive marriage market would marry them. In such a case, she would only marry agents of type $x < z$ who also had switched markets and therefore have a value of search $\tilde{V}(x) \leq \tilde{V}(z)$. Altogether, this implies that for all $x \in [a^1, z)$, $V(x) \geq \tilde{V}(x) - p^*$, and thus they prefer the unrestricted market.

This result is not so clear for men and women in the second class of the unrestricted market, i.e., $x \in [a^2, a^1)$. If, for example, the exclusive marriage market is such that $\tilde{a}^{\tilde{N}} < z$, it might be that some of these individuals of type $x \in [a^2, a^1)$ are $x > \tilde{a}^{\tilde{N}}$. In that case, they would be accepted by the lowest class within the exclusive marriage market, implying $V(x) < V(z) = \tilde{V}(z) - p^* = \tilde{V}(x) - p^*$. Therefore, in order to have a segregation equilibrium, it must be that $z = \tilde{a}^{\tilde{N}}$. If this assumption holds, then $\tilde{V}(x) < \tilde{V}(z)$, implying that $V(x) > \tilde{V}(x) - p*$ for all $x < a^1$. In other words, individuals of type $x < a^1$ also prefer to remain in the unrestricted market.

Finally, I show that no type with $x > z$ has an incentive to switch markets. Consider first the individuals of type $x \in [z, \tilde{a}^{\tilde{N}-1})$, that is, in the lowest marriage class of the exclusive market. For them, $\tilde{V}(x) = \tilde{a}^{\tilde{N}-1} = \tilde{V}(z)$. If they instead switch to the unrestricted marriage market, they will be the most attractive types there, in the top class. Thus, $V(x) = V(z)$. It then follows that $\tilde{V}(x) - p = V(x)$. Since the equilibrium cluster's bounds $\tilde{a}^n$ are nondecreasing in x, for all $x > \tilde{a}^{\tilde{N}-1}$, the value of searching in the exclusive market is such that $\tilde{V}(x) > \tilde{a}^{\tilde{N}-1} = \tilde{V}(z)$. Then, $\tilde{V}(x) - p > \tilde{V}(z) - p = V(z) = V(x)$; that is, all types with $x > z$ prefer to pay the fee p^* and attend the exclusive market. This concludes the construction of the segregation equilibrium.

How would the marriage equilibrium in the exclusive marriage market be affected by an increase in segregation? Segregation softens the congestion externality imposed by agents who meet but will never match. This, in turn, increases the rate at which agents meet proper types, making them more prone to wait longer. As a consequence, sorting will increase.

To produce clear-cut comparative statics, I need to impose more structure on the matching technology. Consider a technology where the increasing returns to scale are such that the fraction of the population that is matched increases too fast with respect to the measure of agents. In such a case, segregation will have two effects: First, it will reduce the number of participants and consequently the speed of encounters between remaining singles. Second, segregation will soften the congestion externality and thus will decrease the rate at which one meets undesirable suitors. Since

I am interested in understanding the second effect, I impose a limit on the degree of increasing returns to scale:

$$2\alpha\frac{M(\lambda)}{\lambda} \geq \alpha M_{\lambda}(\lambda) > \alpha\frac{M(\lambda)}{\lambda}\,. \tag{1.9}$$

I assume that the matching technology is less than quadratic: the number of matches increases by a factor less than 4 when the number of participants in the market doubles (Jacquet and Tan 2007).

The effects of an increase in segregation in the equilibrium degree of sorting are summarized in the following proposition:

Proposition 4 *As segregation increases (larger z), the degree of sorting in equilibrium increases.*

See appendix B for a formal proof.

Proposition 4 shows formally that the London Season, by segregating the rich and powerful from the poor and insignificant, induced a strong degree of marital sorting among the upper classes. For example, during Queen Victoria's mourning period, the marriage market lost exclusivity; eligible ladies were not presented at court, and royal parties did not give a stamp of authority to the Season. Consequently sorting in terms of class and landholdings decreased, as shown in Figures 1.1 and 1.8.

Figure 1.19 gives an example of how the class equilibrium changes as segregation increases. The model is calibrated for the case of symmetric populations ($\lambda^m = \lambda^w = 1$ and $F(x) = G(x)\ \forall x \in [0,1]$) with uniform distributions and a discount rate of $\beta = 0.8$. The matching technology is $\alpha M(\lambda) = \alpha\lambda^{1.1}$, which satisfies condition (1.9). The increase in segregation is from $z = 0$ to $z = 0.24$. Clearly, the degree of sorting increases because the choice set is restricted to more similar individuals. However, the fact that class bounds increase indicates that segregation also affects sorting by reducing the congestion externality.

The theoretical formalization of the search and matching process embedded in the Season yields several insights. First, the standard search and matching framework is able to accurately reproduce key features of the marital behavior of the British aristocracy. In particular, the comparative statics with respect to the efficiency of the matching technology mimic the empirical results. However, marriage behavior cannot be fully explained without incorporating two nonstandard inputs into the matching technology: increasing returns to scale[69] and, especially, endogenous market segregation. While the work of Bloch and Ryder (2000) and Jacquet and Tan (2007) is a step in the right direction, my findings call for further theoretical research on endogenous market segmentation.

1.9 Conclusion

A classic insight from the assignment literature is that search frictions in the matching process affect the degree of sorting (Burdett and Coles 1997, Eeckhout 1999, Bloch and Ryder 2000, Shimer and Smith 2000, Adachi 2003, Atakan 2006). This well-founded theoretical result, however, lacks strong empirical support (Fisman et al. 2008, Banerjee et al. 2009, Hitsch et al. 2010). In this paper, I establish a causal link between search frictions and marital sorting by analyzing the congregation of high society during the London Season. From Easter to August every year, the children of the nobility engaged in a whirl of social events. From presentations at court to royal parties, the objective was to pull together the right sort of suitors and to aid its introduction and courtship. When the Season worked smoothly, it effectively reduced search costs for partners. As a consequence, the children of the nobility sorted more in the marriage market on the basis of social status and landholdings.

To establish causality, I focus on three years when the Season was disrupted by the death of Prince Albert (1861–63). Marriage behavior changed dramatically. The generation of ladies affected by the disruption were more likely to marry a commoner and married spouses with smaller landholdings. Moreover, geographical distance between spouses' family seats shrunk, indicating that the partner selection problem shifted to the

[69]The marital matching function is usually modeled as a constant returns to scale technology. Notable exceptions include Mortensen (1988), Chiappori and Weiss (2000), Aderberg and Mongrain (2001), and Gautier et al. (2010).

local marriage markets temporarily. To quantify the magnitude of these effects, I use changes in the size of the marriageable cohort as a source of identifying variation. I find that when the marriageable cohort was large, the Season was well attended. As a result, marital sorting strengthened. Every 250 additional attendees at royal parties reduced by 1 percent the probability of marrying a commoner for the average peer daughter. For great lords, these additional attendees increased by 1.5 percent the probability of marrying endogamously in terms of acreage and annual rents from land.[70]

I also discuss the broader economic implications of these sorting patterns. In particular, I focus on the Season's effects on social mobility, inequality, and the provision of public education. Using a counterfactual analysis I find that between 1851 and 1875, the rate of intermarriage between peers' daughters and commoners would have been 30 percent higher in the absence of this institution. Interestingly, there is a strong and significant correlation between sorting and inequality over the very long-run. In counties where noble dynasties intermarried more with commoners over the centuries, land became more unequally distributed. This huge inequality harmed economic performance. Counties where land was more concentrated systematically underinvested in public schooling.

In sum, this paper suggests that if bustling Seasons like the one of 1864 had not been in place, ladies like Lucy Lyteltton probably would not have met such wealthy and powerful grooms as Lord Frederick Cavendish. However, Lucy's respectable and lasting marriage came at the cost of an increased inequality for the British society as a whole.

The Season is clearly an institution from another age, but today's marriage market is not free of segregation. Laumann et al. (1994), Table 6.1, document that 60 percent of all married couples in the United States met in school, at work, at a private party, in church, or at a gym/ social club. All of these are, to some extent, segregative marriage markets where entry

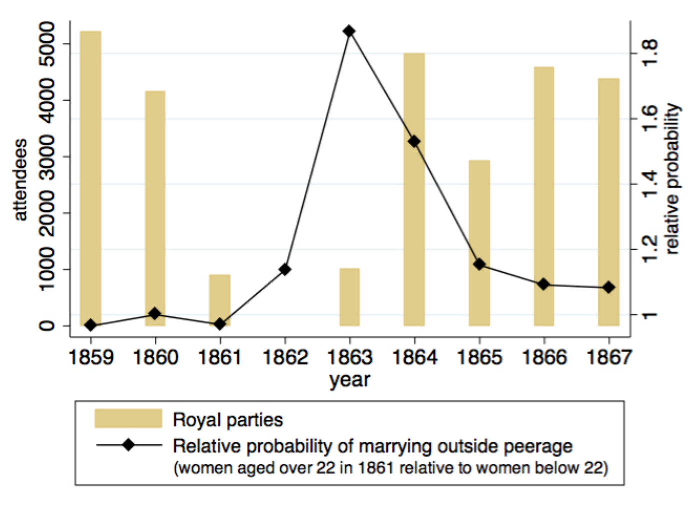
[70]Specifically, an endogamous marriage is defined as one in which the husband and the wife's families belong to the same land class. Land classes are defined according to Bateman's categorization (Bateman 1883: p. 495) and in terms of deciles (marrying within your same or a contiguous decile of the distribution).

is restricted to similar others. In addition, several matchmaking services not only guarantee you will find love, but also that you will not waste time meeting people with whom you would never match.[71] Such services do not have to be used by a large fraction of the population to have implications for broader economic outcomes. Piketty and Saez (2006) show that over the last 50 years, inequality has risen and that this trend is mainly driven by only the top 0.1 percent of the population. My findings suggest that if the very rich, this top 0.1 percent are somehow involved in segregative matchmaking, the effects on the degree of marital sorting will be dramatic. Over the long-run, this may reinforce social and economic inequality, with important implications for broader political and economic outcomes, including the provision of public goods, taxation, or ultimately, economic growth. This is how it was in the past and it is likely to happen again.

[71]Gray and Farrar, for example, an exclusivist matchmaker operating in London for the last 23 years, only accepts "the most eligible singles." The cheapest fee is of 15,000 pounds. As their motto says, "this service is not right for everybody" (grayandfarrar.com). Across the pond, Kelleher International, a long-running, high-end matchmaking service, is targeting Silicon Valley with particular vigor (see D. Crane's *New York Times* article on October 11, 2013).

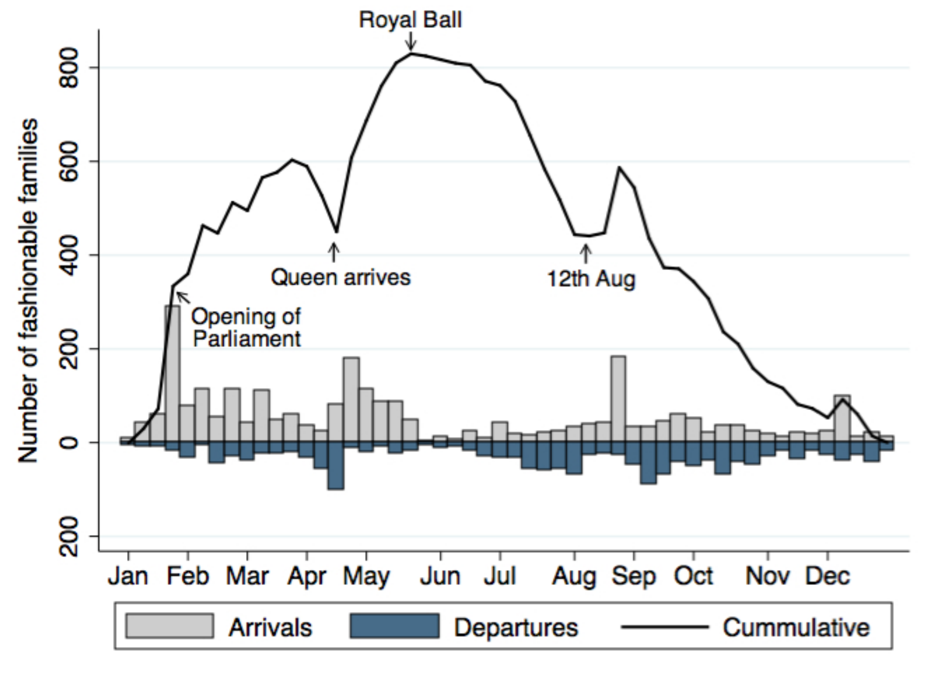
1.10 Figures and tables

Figure 1.1: The effects of the interruption of the Season on the relative probability of marrying outside the peerage



Note: Shaded bars show the number of attendees at royal parties per year (left axis). Royal parties were interrupted from 1861 to 1863 due to Queen Victoria's mourning. For the connected line, the sample are all 276 peers' daughters first marrying in 1859–67. Diamonds display the rate of intermarriage for women older than 22 on January 1, 1861, relative to women below this cutoff age (right axis). Younger ladies are not expected to be severely affected by the interruption of the Season, since they could delay their choice of husband until everything went back to normal. However, ladies aged 22 or more in 1861 could not wait long: otherwise, they would be written off as failures according to social norms at the time. Further, around 1861 most ladies married around ages 22 to 25 (Figure 1.A4). Since women aged 22 or more in 1861 would be 25 or more when the Season resumed in 1864, waiting was not an option for them. Finally, the years before 1858 are excluded from the analysis because women aged below 22 were only 17 or 18 years old by then and thus too young to marry.

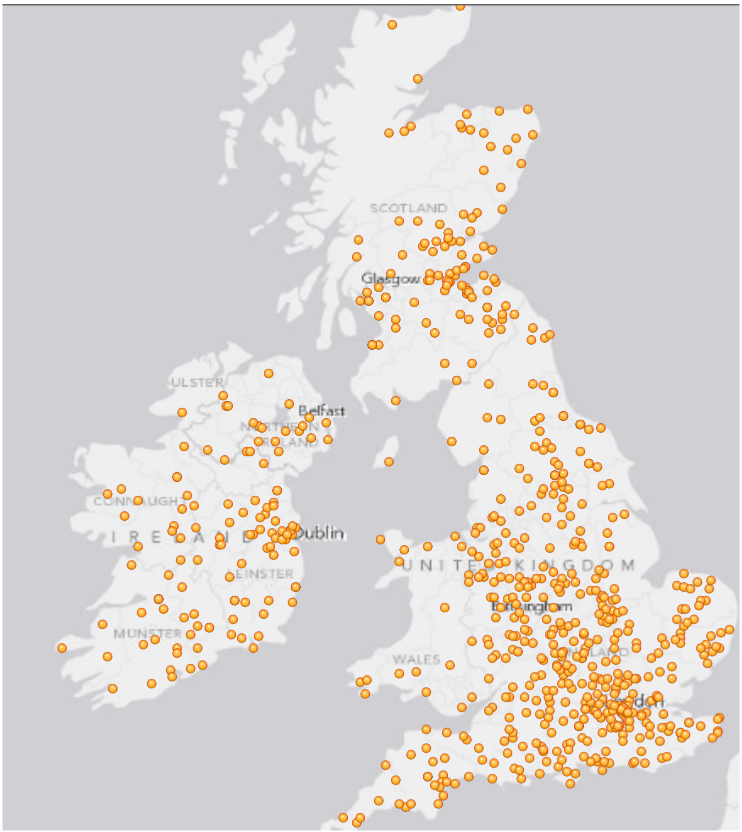
Figure 1.2: Seasonable Migrations of the “Fashionable World”, 1841



Source: Sheppard (1977).

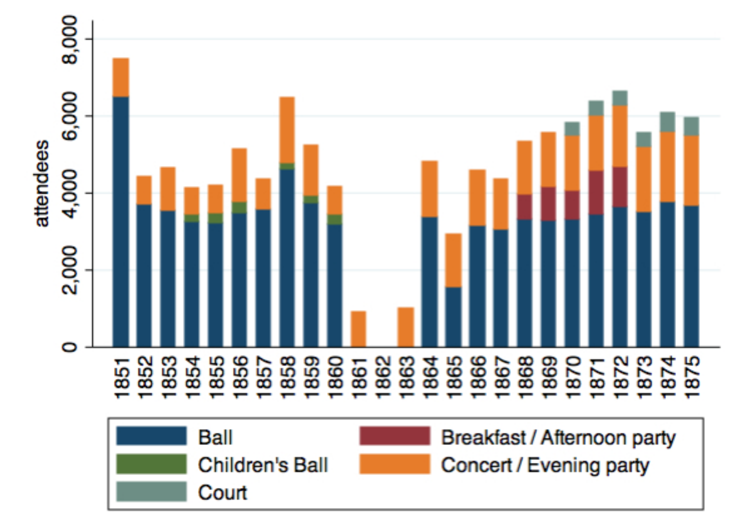
Note: “This figure plots over 4,000 movements into and out of London of members of the “Fashionable World”, as resorted in The Morning Post in 1841. Movements of single individuals or of married couples or of whole families are all expressed as one movement. Thus the total number of persons arriving and departing was in reality much larger than that given here. The hatched columns show the total number of arrivals and departures reported in each week. Sometimes there was a time lag of up to ten days between the date of a movement and its publication. The heavy black line shows the cumulative total of arrivals after subtraction of departures. The departures were not so fully reported as the arrivals, and to correct this shortfall the departures have been multiplied by a factor of 1.6” Sheppard (1977).

Figure 1.3: Country seats



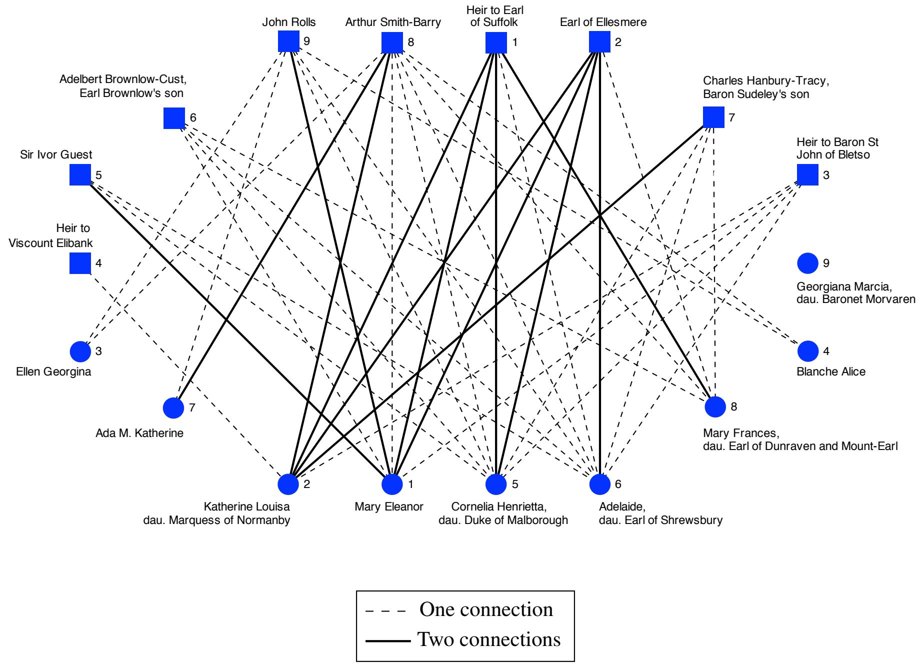
Note: This figure shows the location of the country seats computerized and geocoded from Burke's *Heraldic Dictionary* (1826). The sample includes 694 country seats from 498 families holding a peerage.

Figure 1.4: Number of attendees at royal parties, by type of event



Note: The sample comprises all 126 parties held at Buckingham, St. James' Palace, and Windsor during the London Season from 1851 to 1875. The number of attendees was collected from the invitation lists written by the Lord Chamberlain (British National Archives, LC 6/31–55). Balls include state balls and costume balls at Buckingham. Court refers to the Queen's diplomatic and official court at Buckingham. The initial year, 1851, displays unusually high attendance rates, explained by the Crystal Palace Exhibition. Between 1861 and 1863, most royal parties were cancelled due to Queen Victoria's mourning for her mother (died March 16, 1861), and her husband (died December 14, 1861).

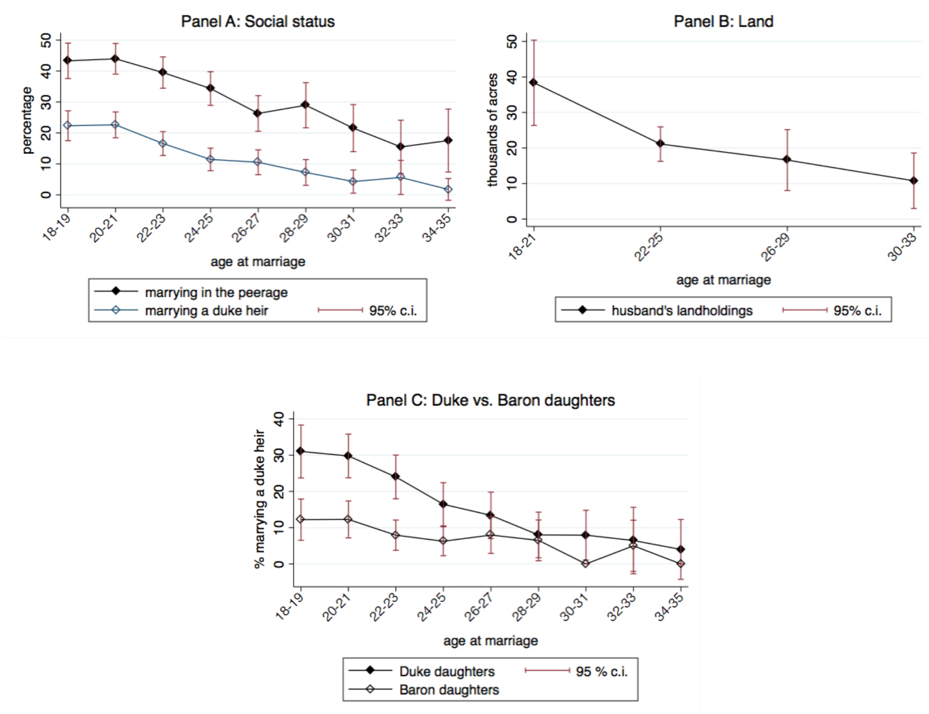
Figure 1.5: Network of peer landowners and their spouses, 1868.



	Spouses	All
Average links per node	0.867	0.654
Average distance	1.5	1.861
Network density	0.667	0.506

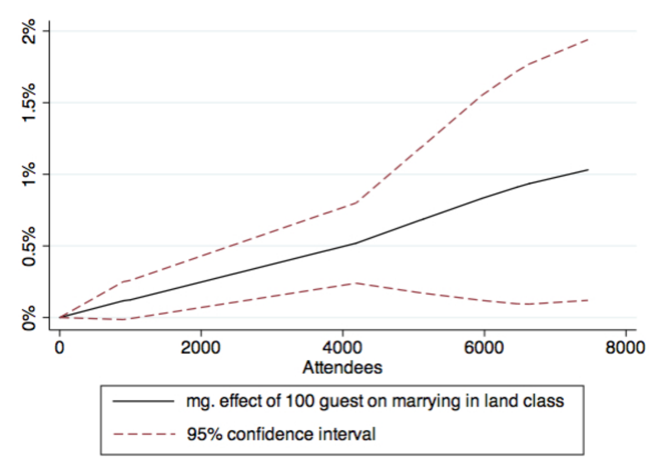
Note: The sample is all peers and peers' sons who married in 1868, together with their wives. Square nodes stand for men, circles for women. Lines between individuals of the opposite sex are established if: the man and the woman's father have the same social status, if their families are in possession of estates of similar size (Bateman 1883: p. 497), or if the man and any relative of the woman are in the same club. Matched spouses are labeled with the same number. Distance is the number of links on the shortest path connecting two nodes. Network density is the number of actual connections relative to the number of potential connections. To calculate it, I assume that the maximum number of links between two individuals is one (e.g., a man and a woman who hold the same social status and belong to the same clubs are considered to be linked only once).

Figure 1.6: Implied market value of women by age group, 1801–75.



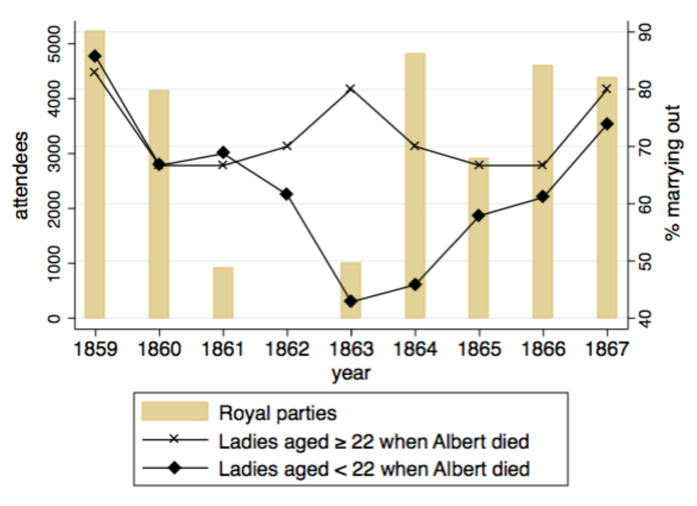
Note: The sample for Panel A is all 1,963 women first marrying in 1801–75. Women younger than 18 or older than 35 are excluded. Diamonds indicate the percentage of women marrying a peer or a peer son. Hollow diamonds indicates the percentage of women marrying a duke heir. The sample for Panel B is all 178 women first marrying a peer great landowner in 1801–75. Women younger than 18 or older than 33 are excluded. Age groups are larger than in Panel A because the sample is smaller. Finally, the sample for Panel C is the same as for Panel A. However, here women are split in two groups: duke daughters and baron daughters. The corresponding diamonds indicate the percentage of marriages with a duke heir.

Figure 1.7: Increasing returns to scale in the London Season.



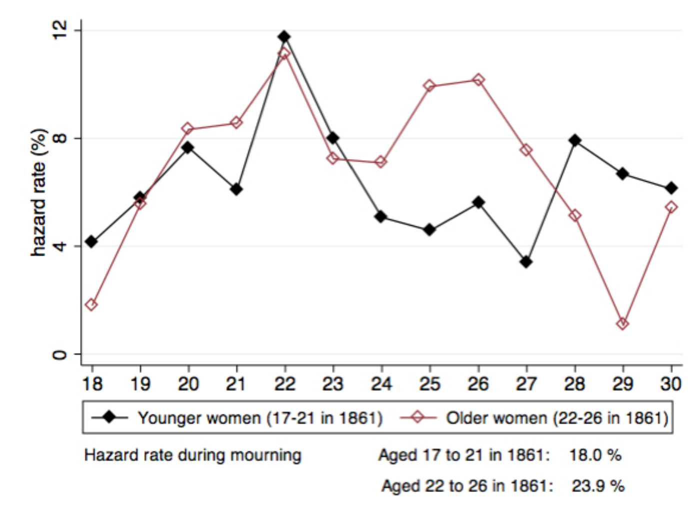
Note: This figure plots the marginal effect of 100 additional attendees to royal parties on the probability of marrying in your same acreage class. Classes are defined as in Bateman's *Great Landowners* (1883: p. 495): 2,000–6,000 acres, 6,000–10,000 acres, 10,000–20,000 acres, 20,000–50,000 acres, 50,000–100,000 acres, and 100,000 or more acres. To estimate the marginal effects, I use the probit IV model in Table 1.7, top panel, column (2). This marginal effect is evaluated at different values of attendance (x-axis) and at the means of all other variables.

Figure 1.8: The effects of the interruption of the Season on peer-commoner intermarriage



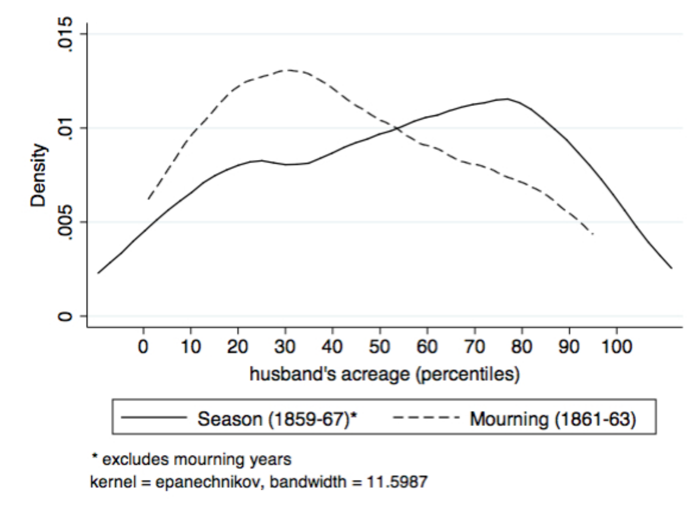
Note: Shaded bars show the number of attendees at royal parties per year (left axis). Royal parties were interrupted in 1861–63 due to Queen Victoria's mourning. The sample for the diamond line are all 143 peers' daughters who first married between 1859 and 1867, and were under 22 on January 1, 1861. For the x-line, the sample comprises all 133 peers' daughters who first married between 1859 and 1867, but were 22 or more on January 1, 1861. The latter were more hard-pressed to marry soon, even if they had to do so under a disrupted Season. Diamonds and x's display the percentage of marriages outside the peerage for women in each age group.

Figure 1.9: Deferred marriage decision of ladies aged below 22 in 1861



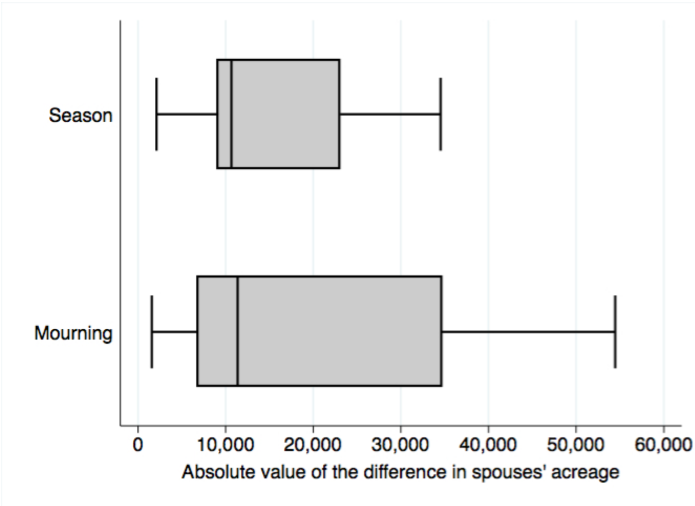
Note: The sample for the filled diamond line is all 254 peers' daughters aged 17 to 21 on January 1, 1861. For the hollow diamond line, the sample comprises all 262 peers' daughters who were 22 to 26 as of this date. Diamonds represent the marriage hazard rate the percentage of single women who get married at each age. Since women aged below 22 in 1861 could delay their choice of partner until the Season resumed in 1864, their marriage hazard rates should be relatively high at older ages. Finally, the "hazard rate during mourning" is the percentage of single women marrying during the whole 1861–63 period in each of the two groups.

Figure 1.10: The effects of the interruption of the Season on husbands' landholdings



Note: The sample includes all peers' daughters first marrying in 1859–67. Those for which Bateman's *Great Landowners* (1883) did not provide information on the landholdings of the husband's family are excluded. Women marrying commoner husbands are also excluded because land does not accurately proxy their husbands' wealth. Thus, the final sample includes 105 women. The figure plots the kernel densities for the husband's family acreage for two subsamples: women marrying during the interruption of the Season (1861–63) versus those marrying when it worked smoothly (1859–60 and 1864–67). The distribution of landholdings is presented in percentiles. To calculate the kernel density estimate, I use the Epanechnikov kernel with a 11.5987 width.

Figure 1.11: The effects of the interruption of the Season on sorting in acreage

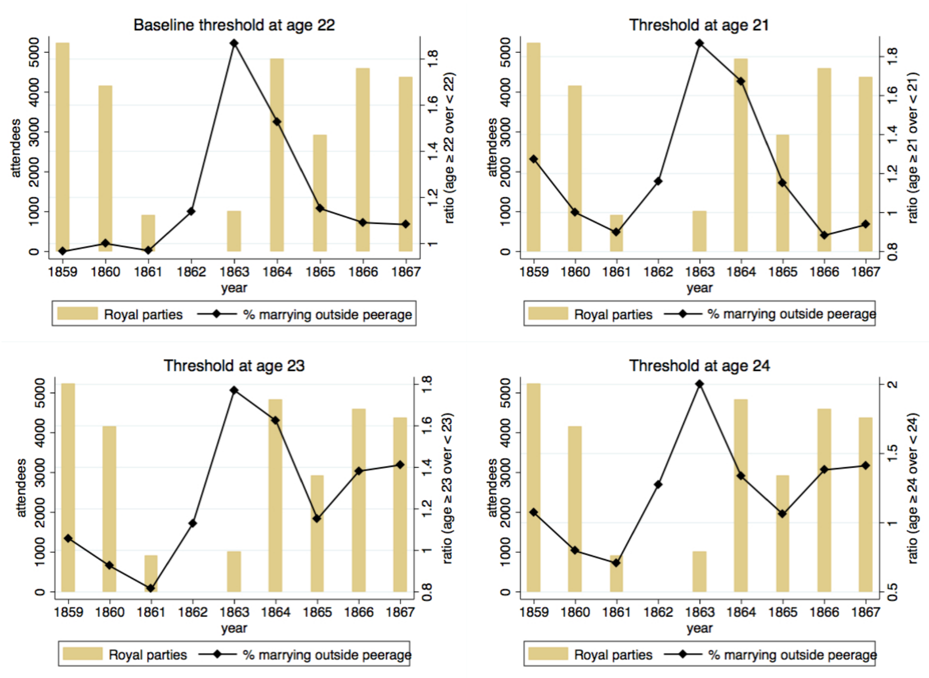


Note: The sample is all peers in possession of 2,000 acres and upwards first marrying in 1859–67. The first box is for those marrying when the Season worked smoothly (1859–60 and 1864–67); the second box is for those marrying when the Season was interrupted (1861–63). Individuals marrying commoner wives are excluded because land does not accurately proxy their families' wealth. Boxes display the distribution of the difference between husband and wife acreage, in absolute value. Larger differences represent higher miss-match, and thus a lower degree of marital sorting in landholdings. The first adjacent line is the lower adjacent value of the distribution. The bottom and top of the box stand for the 25th and 75th percentile, respectively. The central line is the median. The upper adjacent value is indicated by the second adjacent line. Outside values are excluded.

Figure 1.12: The effects of the interruption of the Season on the distance between spouses' seats

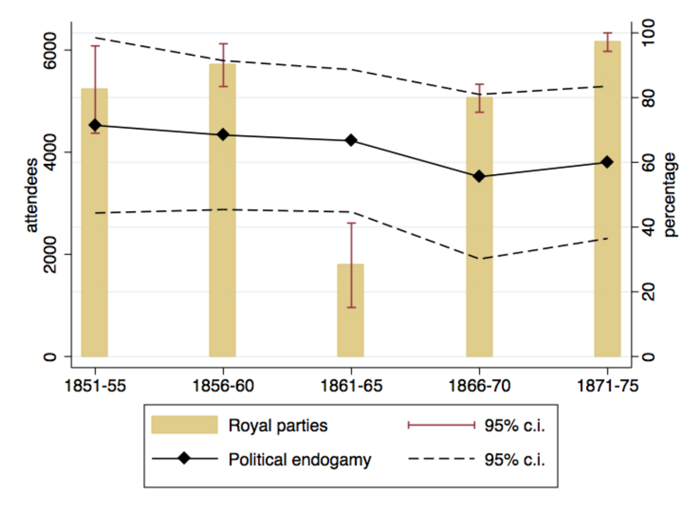
Note: Shaded bars show the number of attendees at royal parties per year (left axis). Royal parties were interrupted in 1861–63 due to Queen Victoria's mourning. The sample for the connected line are all 57 marriages in 1859–66 for which I could locate the family seats of both spouses. By construction, only marriages in which both spouses were peers or peers' offspring are included. The year 1867 is excluded because the distance between spouses' seats could only be calculated for 4 marriages and thus was not representative.

Figure 1.13: Relaxing the 22-year threshold



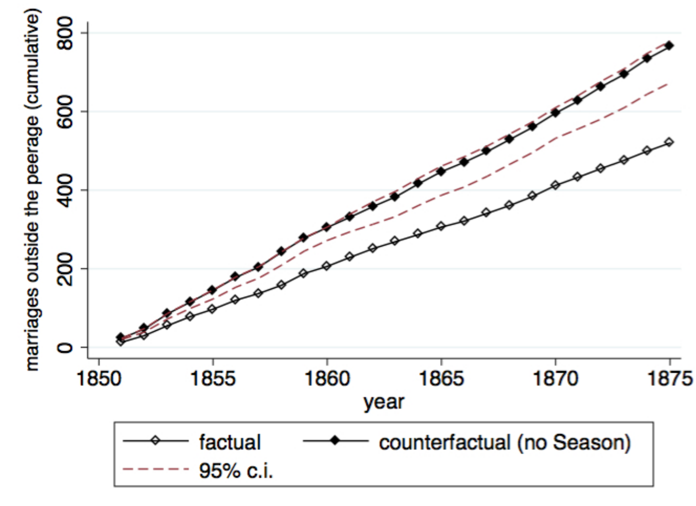
Note: Shaded bars show the number of attendees at royal parties per year (left axis). Royal parties were interrupted from 1861 to 1863 due to Queen Victoria's mourning. For the connected line, the sample is all 276 peers' daughters first marrying in 1859–67. Diamonds display the rate of intermarriage with commoners for women above an age threshold relative to women below the cutoff (right axis). Each panel considers a different age threshold.

Figure 1.14: Political endogamy and the London Season



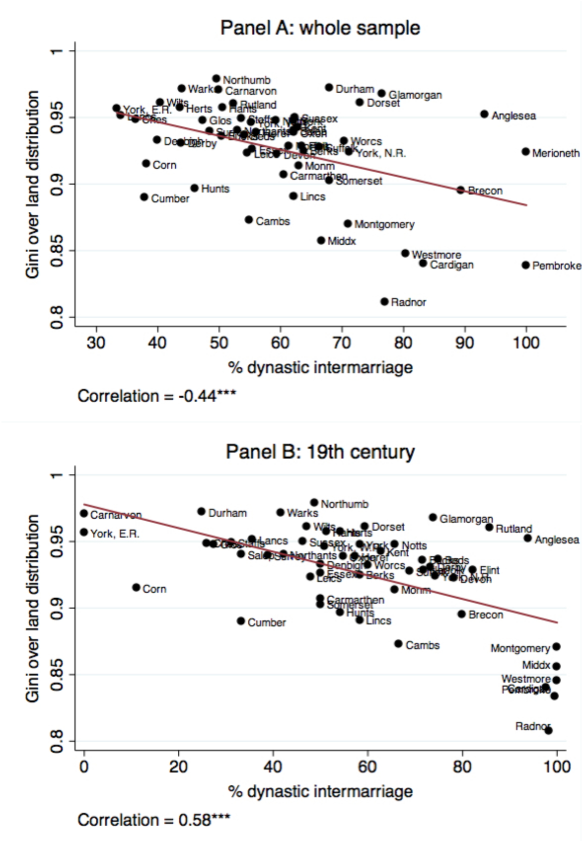
Note: Shaded bars show the number of attendees at royal parties over 5-year intervals (left axis). For the connected line, the sample is all 92 peers who (1) married in 1851–75, (2) were listed by Bateman (1883) as great landowners, (3) belonged to a political club, and (4) married a wife who had a relative in a political club. Diamonds display the percentage of them who married a wife from a family with a similar political ideology (right axis). Political preferences are based on club membership: individuals belonging to Brook's, Reform, or Devonshire are labeled liberals; those in Carlton, Junior Carlton, Conservative, or St. Stephen's are considered tories. This categorization is taken from Bateman's *Great Landowners* (1883: p. 497).

Figure 1.15: Marrying outside the peerage without the Season



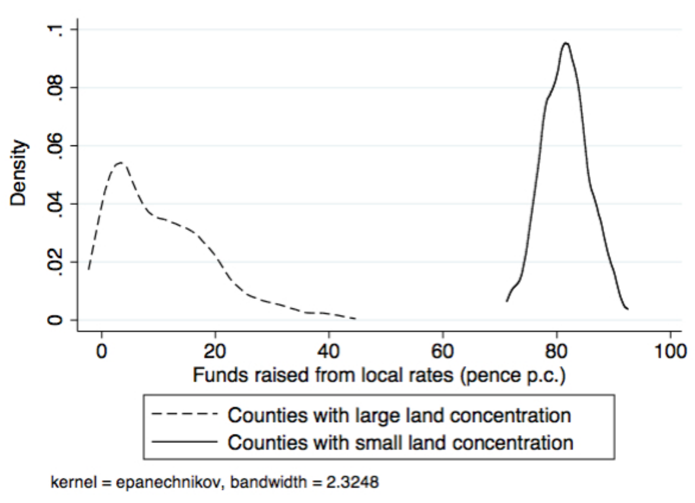
Note: The diamond line plots the cumulative number of peers' daughters who would have married commoners if the Season had not existed in 1851–75. The counterfactual probability of marrying outside the peerage is predicted using the estimated coefficients from Table 1.7, Panel A (IV probit for women). I set the number of attendees to royal parties to zero and the values of the remaining variables at their yearly means. This probability is then multiplied by the number of marriages per year, which is assumed to be fixed. This gives me the counterfactual number of marriages outside the peerage. The 95 percent confidence intervals are calculated analogously. Finally, the hollow diamond line displays the actual number of peers' daughters marrying commoners.

Figure 1.16: Sorting and inequality



Note: The sample comprises all counties in England and Wales. Dynastic intermarriage is the percentage of members of a dynasty that first married a commoner. In Panel A, this percentage is computed from the origins of the dynasty to the date of the marriage of the dynasty member listed in Bateman (1883). In Panel B, only nineteenth-century marriages are considered. In both cases heirs are excluded to avoid the endogeneity that might arise if they marry strategically to consolidate estates (Mingay 1963). Each dynasty is assigned to the county in which it held the most land. Dynasties in Yorkshire are assigned to East, West, and North Riding when possible. The Gini coefficient is defined as the distribution of land at the county level. This comes from Bateman (1883): p. 501-14, which for each county presents the number of acres owned by seven groups of landowners: peer and commoner large landowners, squires, greater yeomen, lesser yeomen, small proprietors, and cottagers. Waste and land owned by public bodies is excluded; *** p<0.01, ** p<0.05, * p<0.1

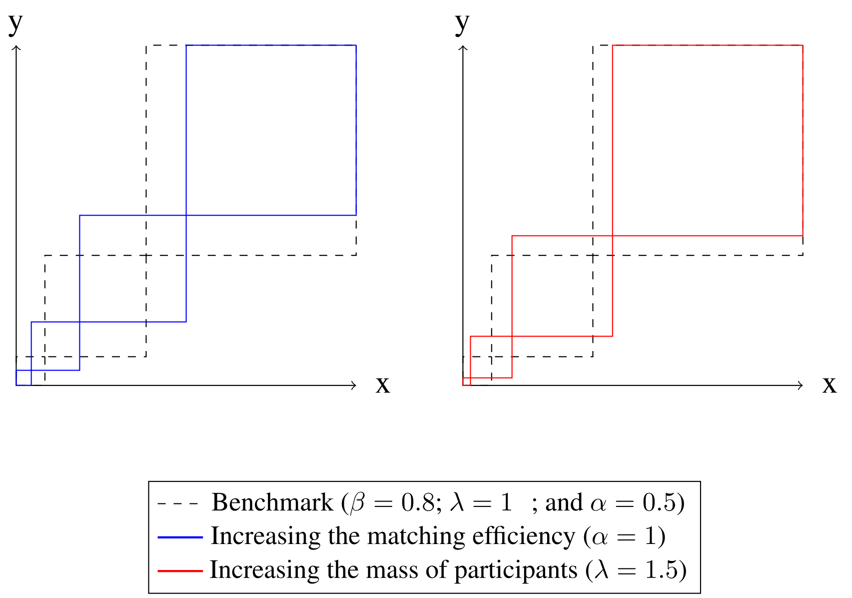
Figure 1.17: Kernel density for investments in education, 1873-94



Source: Goñi (2014b)

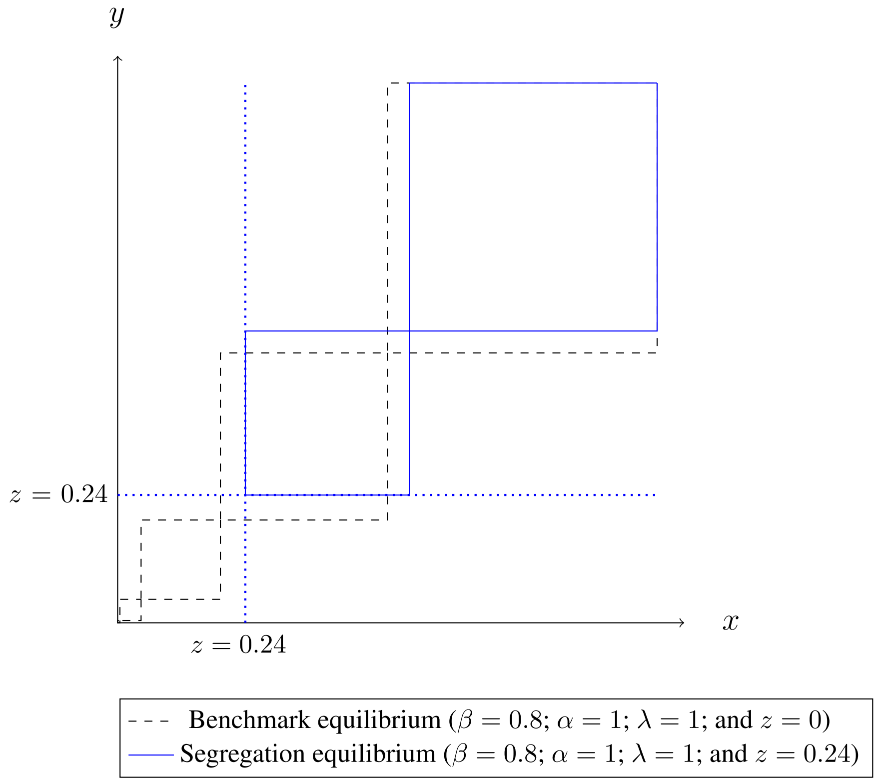
Note: The sample is all counties in England and Wales over 1871–72 and 1894–95 (excluding 1878–79, 1887–88, 1889–90, and 1892–93, for which I do not have any report from the Committee of Council on Education). Counties are divided into two groups: those with high (above median) and low (below median) land concentration. Land concentration is measured as the share of a county that is owned by large landowners, defined as those owning at least 3,000 acres. The chart plots the kernel density function of funds raised from rates, the major source of income for School Boards, for the two sets of counties. To calculate the kernel density estimate, I use the Epanechnikov kernel with a 2.3248 width.

Figure 1.18: Increasing efficiency of the matching technology



Note: Simulation of the search equilibrium defined in Proposition 1. In this simple example, populations are symmetric $\lambda^m = \lambda^w = \lambda$ and socio-economic status is uniformly distributed on $[0, 1]$, i.e., $F(x) = G(x) = x$. The matching function is defined by $M(\lambda) = \lambda^2$ such that the encounter probability $\frac{\alpha M(\lambda)}{\lambda} = \alpha\lambda$ displays increasing returns to scale. The resulting equilibrium classes are defined by $a^0 = 1$, $a^n = a^{n-1} - \frac{\sqrt{1-\beta}}{\beta\alpha\lambda}\left(\sqrt{1-\beta+2\beta\alpha\lambda a^{n-1}} - \sqrt{1-\beta}\right)$. In the left panel, the class partition equilibrium is simulated for some benchmark parameters ($\beta = 0.8$, $\alpha = 0.5$, and $\lambda = 1$) and for an increased matching efficiency ($\beta = 0.8$, $\alpha = 1$, and $\lambda = 1$). The right panel simulates the benchmark equilibrium against an equilibrium with a larger mass of participants ($\beta = 0.8$, $\alpha = 0.5$, and $\lambda = 1.5$).

Figure 1.19: Segregation in the marriage market



Note: Simulation of the equilibrium in the exclusive marriage market when a matchmaker induces segregation with a participation fee p. In this example, populations are symmetric $\lambda^m = \lambda^w = \lambda = 1$, and socio-economic status is uniformly distributed on $[0, 1]$, i.e., $F(x) = G(x) = x$. The matching function is $M(\lambda) = \lambda^{1.1}$. It displays increasing returns to scale, but matches do not increase too fast with respect to the measure of agents, i.e., $2\alpha\frac{M(\lambda)}{\lambda} \geq \alpha M'(\lambda) > \alpha\frac{M(\lambda)}{\lambda}$. The resulting equilibrium classes in the exclusive marriage market are defined by $\tilde{a}^0 = 1$ and $\tilde{a}^n = \tilde{a}^{n-1} - \frac{(1-z)^2\sqrt{1-\beta}}{\beta\alpha M(1-z)}\left(\sqrt{1-\beta+2\frac{\beta\alpha M(1-z)}{(1-z)^2}\tilde{a}^{n-1}} - \sqrt{1-\beta}\right)$. The equilibrium is simulated for benchmark parameters ($z = 0$) and for a segregation equilibrium in which singles at the bottom quartile are excluded ($z = 0.24$).

Table 1.1: Marriage outcomes for peers and peers' sons, 1801–1875

	Wife parental rank						
Husband rank at age 15	*Foreign*	*Commoner*	*Knight*	*Baronet*	*Baron*	*Duke*	N
Commoner	4.7	64.8	2.7	5.2	9.2	13.4	403
	4.5	*57.3*	*3.0*	*8.4*	*8.9*	*17.9*	
	0.2	7.4***	-0.3	-3.2**	0.3	-4.5**	
Baron son†	5.2	66.0	2.2	9.5	7.8	9.4	758
	4.5	*57.3*	*3.0*	*8.4*	*8.9*	*17.9*	
	0.6	8.6***	-0.8	1.1	-1.1	-8.5***	
Duke son†	4.8	57.7	3.6	9.0	7.3	17.6	752
	4.5	*57.4*	*3.0*	*8.4*	*8.9*	*17.9*	
	0.3	0.4	0.6	0.7	-1.6*	-0.3	
Baron heir	2.9	49.0	3.3	10.1	13.7	20.9	306
	4.5	*57.4*	*3.0*	*8.4*	*8.9*	*17.9*	
	-1.6	-8.3***	0.3	1.8	4.8***	3.0	
Duke heir	3.7	36.8	3.4	6.6	10.3	39.3	351
	4.5	*57.4*	*3.0*	*8.4*	*8.9*	*17.9*	
	-0.8	-20.6 ***	0.4	-1.8	1.3	21.4***	
N	116	1,474	77	215	229	459	2570
Cross tabulation statistics				Pearson Chi squared (20)	197.119	Pr=0.00	
				Cramer's V	0.1385		
				Gamma test	0.2457	ASE=0.024	
				Kendall's tau-b	0.1724	ASE=0.017	

Note: The sample is all 2,570 peers and peers' sons marrying for the first time in 1801–75. The raw variable is the husband's rank at age 15. Since the sample only considers peers and peer sons, "Commoners at 15" were "pure" commoners at this age but ended their lives holding a peerage (either by creation or by inheriting a distant relative's title). "Baron" stands for baronies and viscountcies, and "Duke" for dukedoms, earldoms, and marquisates. The column variable is the rank of the wife's father. Each cell contains observed percentages, expected percentages if matching was random in italics, and the difference below. The Pearson's chi-squared statistic tests the hypothesis that rows and columns are independent. Cramer's V evaluates the strength of the relation on a 0–1 scale. Kendall's tau-b and the Gamma test assess the direction of the relationship.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
†excludes heirs

Table 1.2: Marriage outcomes for peers' daughters, 1801–1875

	Husband's rank at age 15								
Wife rank	*Foreign*	*Commoner*	*Baron son*	*Duke son*	*Knight*	*Baronet*	*Baron heir*	*Duke heir*	N
Baron daughter	3.3	59.5	2.9	3.7	4.4	8.3	10.2	7.7	1037
	3.2	*50.8*	*2.7*	*5.6*	*3.5*	*8.6*	*11.4*	14.2	
	0.0	8.7***	0.1	-1.9***	0.9**	-0.3	-1.1	-6.5***	
Duke daughter	3.2	42.9	2.6	7.3	2.7	8.8	12.4	20.1	1148
	3.2	*50.8*	*2.7*	*5.6*	*3.5*	*8.6*	*11.4*	14.2	
	0.0	-7.9***	-0.1	1.7***	-0.8**	0.2	1.0	5.9***	
N	71	1,109	60	122	77	187	248	311	2185

Cross tabulation statistics			
Pearson Chi squared (20)	108.869	Pr=0.00	
Cramer's V	0.2232		
Gamma test	0.2768	ASE=0.031	
Kendall's tau-b	0.1649	ASE=0.019	

Note: The sample is all 2,185 peers' daughters who married for the first time in 1801–75. The raw variable is the wife's parental rank. The column variable is the husband's rank at age 15. In contrast to Table 1.1, the "Commoner" category includes both pure commoners and individuals who were commoners at age 15 but ended their lives holding a peerage. "Baron" stands for baronies and viscountcies, and "Duke" for dukedoms, earldoms, and marquisates. Each cell contains observed percentages, expected percentages if matching was random in italics, and the difference below. The Pearson's chi-squared statistic tests the hypothesis that rows and columns are independent. Cramer's V evaluates the strength of the relation on a 0–1 scale. Kendall's tau-b and the Gamma test assess the direction of the relationship.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 1.3: Marriage outcomes by family pedigree, 1814–75†.

	Old family No	Old family Yes	difference
% marrying outside the peerage	59.3	49.5	9.8**
	(2.7)	(4.8)	(5.4)
% marrying a duke daughter	26.9	33.9	-7.0*
	(2.4)	(4.6)	(4.9)
N	334	109	

Note: The sample includes all 443 peers and peers' offspring marring in 1801–75 who were also listed by Bateman (1883) as great landowners. The sample is split according to how old the family name is. A name is "old" if the family (or a junior branch of it) held land in England since the time of Henry VIIl (from Shirley's *Noble and Gentle Men of England*).
*** p<0.01, ** p<0.05, * p<0.1
†For this sample, the earliest marriage recorded was in 1814.

Table 1.4: Sorting by acreage for great landowners, 1838–75†

Husband	Wife's family acres: *Not great landowner*	*2000-6000*	*6000-10000*	*10000-20000*	*20000-50000*	*50000-100000*	*100000 or more*	N
2000-6000	45.4	16.5	9.3	8.3	15.5	4.1	1.0	97
	35.5	*12.1*	*7.1*	*15.7*	*19.8*	*7.3*	*2.6*	
	9.9**	4.4	2.2	-7.4**	-4.3	-3.2	-1.5	
6000-10000	44.3	14.3	4.3	17.1	14.3	2.9	2.9	70
	35.4	*12.0*	*7.1*	*15.7*	*19.7*	*7.3*	*2.6*	
	8.9*	2.3	-2.9	1.4	-5.4	-4.4	0.3	
10000-20000	29.4	12.7	8.7	19.1	19.1	7.1	4.0	126
	35.5	*12.1*	*7.1*	*15.7*	*19.8*	*7.3*	*2.6*	
	-6.1*	0.6	1.7	3.3	-0.7	-0.2	1.4	
20000-50000	35.6	8.5	6.8	17.0	22.9	8.5	0.9	118
	35.5	*12.0*	*7.1*	*15.7*	*19.7*	*7.3*	*2.5*	
	0.1	-3.6	-0.3	1.3	3.1	1.2	-1.7	
50000-100000	19.4	9.7	3.2	9.7	41.9	12.9	3.2	31
	35.5	*11.9*	*7.1*	*15.8*	*19.7*	*7.4*	*2.6*	
	-16.1*	-2.3	-3.9	-6.1	22.3***	5.5	0.6	
over 100000	21.7	4.4	4.4	26.1	13.0	21.7	8.7	23
	35.7	*12.2*	*7.0*	*15.7*	*20.0*	*7.4*	*2.6*	
	-13.9	-7.8	-2.6	10.4	-7.0	14.3***	6.1*	
N	165	56	33	73	92	34	12	465

Cross tabulation statistics		
	Pearson Chi squared (30) = 51.91	Pr=.008
	Gamma test = 0.21	ASE=.046
	Kendall's tau-b = 0.17	ASE=.037

Note: The sample is all 465 peers and peers' sons who first married in 1838–75 and were listed in Bateman (1883) as great landowners, i.e., they were in possession of more than 2,000 acres, worth £3,000 a year by 1876. The row variable is its acreage, divided into six classes according to Bateman's categorization (Bateman 1883: p. 495). The column variable stands for the landholdings of any wife's relative. "Not a great landowner" includes landless families as well as those in possession of less than 2,000 acres and thus not reported by Bateman. The diagonal representing perfect assortative matching is highlighted in green. Each cell contains observed percentages at the top, expected percentages if matching was random in italics, and the difference between the two below. Boxes are drawn around significant deviations. The Pearson's chi-squared statistic tests the hypothesis that rows and columns are independent. Cramer's V evaluates the strength of the relation on a 0–1 scale. Kendall's tau-b and the Gamma test assess the direction of the relationship.
*** p<0.01, ** p<0.05, * p<0.1
†The earliest marriage recorded in Bateman's *Great Landowners* took place in 1838.

Table 1.5: Sorting by land rents for great landowners, 1838–75†

Husband (£)	*Not great landowner*	*2000-6000*	*6000-10000*	*10000-20000*	*20000-50000*	*50000-100000*	*100000 or more*	N
	Wife's family land rents (£)							
2000-6000	45.4	16.5	9.3	8.3	15.5	4.1	1.0	65
	35.5	*7.7*	*8.8*	*16.2*	*22.3*	*6.5*	*3.1*	
	9.8***	8.8	0.5	-7.9**	-6.8	-2.3	-2.0	
6000-10000	44.3	14.3	4.3	17.1	14.3	2.9	2.9	82
	35.5	*7.7*	*8.8*	*16.1*	*22.3*	*6.5*	*3.0*	
	8.8	6.6***	-4.5	1.0	-8.0*	-3.6*	-0.2	
10000-20000	29.4	12.7	8.7	19.1	19.1	7.1	4.0	141
	35.5	*7.7*	*8.8*	*16.1*	*22.3*	*6.5*	*3.0*	
	-6.1	5.0	-0.1	3.0	-3.3**	0.7	1.0	
20000-50000	35.6	8.5	6.8	17.0	22.9	8.5	0.9	132
	35.5	*7.7*	*8.8*	*16.1*	*22.3*	*6.4*	*3.0*	
	0.1**	0.7**	-2.0	0.8	0.5**	2.0	-2.2	
50000-100000	19.4	9.7	3.2	9.7	41.9	12.9	3.2	33
	35.5	*7.9*	*8.8*	*16.1*	*22.4*	*6.4*	*3.0*	
	-16.1**	1.8	-5.6	-6.4	19.5***	6.5	0.2**	
over 100000	21.7	4.4	4.4	26.1	13.0	21.7	8.7	12
	35.8	*7.5*	*9.2*	*15.8*	*22.5*	*6.7*	*3.3*	
	-14.1	-3.2	-4.8	10.3	-9.5	15.1	5.4	
N	165	36	41	75	104	30	14	465

Cross tabulation statistics		
	Pearson Chi squared (30) = 61.93	Pr=.001
	Gamma test = 0.28	ASE=.046
	Kendall's tau-b = 0.22	ASE=.036

Note: The sample is all 465 peers who first married in 1838–75 and were listed by Bateman (1883) as great landowners, i.e., they were in possession of more than 2,000 acres, worth £3,000 a year by 1876. The row variable is their gross annual rents from land, divided into six classes according to Bateman's categorization (Bateman 1883: p. 495). The column variable stands for the land rents of any wife's relative. "Not a great landowner" includes landless families as well as those in possession of less than 2,000 acres and thus not reported by Bateman. The diagonal representing perfect assortative matching is highlighted in green. Each cell contains observed percentages at the top, expected percentages if matching was random in italics, and the difference between the two below. The Pearson's chi-squared statistic tests the hypothesis that rows and columns are independent. Cramer's V evaluates the strength of the relation on a 0–1 scale. Kendall's tau-b and the Gamma test assess the direction of the relationship.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
†The earliest marriage recorded in Bateman's *Great Landowners* took place in 1838.

Table 1.6: Geographic endogamy by social group, 1801–75

	Men		Women	
	Marrying in the same region [%]	Distance btw. seats [mi.]	Marrying in the same region [%]	Distance btw. seats [mi.]
Commoner at age 15	30	146.7 (130.6)		
Baron's son / daughter	16.2	140.8 (109.2)	28.7	125.2 (104.1)
Duke's son / daughter	28.1	129.1 (109.3)	21	147.1 (115.2)
Baron heir	22.8	135.1 (100.3)		
Duke heir	16.8	157.4 (114.5)		
Total	22.13	142 (111.5)	23	141.4 (112.6)

Note: The sample includes all peers' and peer offspring first marrying in 1801–75 for whom I could locate both spouses' family seats using Burke's *Heraldic Dictionary*. Only marriages where both spouses' families are in the peerage are included. The sample is broken down by social status at age 15. Since the sample only considers peers and peer offspring, "Commoners at 15" are individuals who were "pure" commoners at this age but ended their lives holding a peerage. "Baron" stands for baronies and viscountcies, and "Duke" for dukedoms, earldoms, and marquisates. Distance between spouses' seats is calculated using Vincenty's algorithm. When one or both spouses have more than one seat, I take the minimum distance. Regions are NUTS 1 divisions for England, Scottish Parliament electoral regions, the four provinces of Ireland, and Wales. Standard deviations are in parentheses.

Table 1.7: The Season and sorting by social position

Panel A: Regressions of % marrying outside the peerage				
	Women		Men	
	(1) probit	(2) IV probit	(3) probit	(4) IV probit
Attendees at royal parties (100's)	-0.0035***	-0.0040***	-0.0023*	-0.0020
	(0.0013)	(0.0015)	(0.0014)	(0.0020)
Commoner at age 15			0.03	0.03
			(0.10)	(0.10)
Baron son			0.29***	0.29***
			(0.03)	(0.03)
Duke son			0.22***	0.22***
			(0.03)	(0.03)
Baron heir / daughter	0.23***	0.23***	0.13***	0.13***
	(0.03)	(0.03)	(0.03)	(0.03)
Duke heir / daughter	ref.		ref.	
Relative size of class	-0.93	-0.93	-0.81***	-0.81***
	(0.68)	(0.68)	(0.28)	(0.28)
Age at marriage	0.02***	0.02***	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Peerage of England & Wales	-0.09**	-0.09**	-0.08***	-0.08***
	(0.04)	(0.04)	(0.03)	(0.03)
Peerage of Ireland / Scotland	ref.		ref.	
Sex ratio (men / women)	-0.52	-0.57	-0.22	-0.19
	(0.33)	(0.35)	(0.20)	(0.24)
Railway length (100 mi.)	0.00	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Decade fixed effects and trend	yes	yes	yes	yes
Observations	796	796	993	993
% correctly predicted	68.8	69.3	75.0	70.0
Sargan test	1.33 (p = 0.51)		3.01 (p = 0.22)	

Panel B: First stage for attendees at royal parties (100's)				
Marriageable cohort size	-	67.36**	-	67.36**
		(28.05)		(28.05)
Queen Victoria's mourning (1861–63)	-	-3,117***	-	-3,117***
		(906.71)		(906.71)
Crystal Palace fair (1851)	-	3,168***	-	3,168***
		(803.50)		(803.50)
Sex ratio (men/women)	-	131.1	-	131.1
		(4,237)		(4,237)
Railway length (100 mi.)	-	1.253	-	1.253
		(1.06)		(1.06)
Decade fixed effects and trend	-	yes	-	yes
Observations	-	25	-	25
F-test	-	20.89	-	20.89

Note: The sample for Panel A is all peers and peers' offspring first marrying in 1851–75. The columns report marginal effects at the mean. The variable capturing the effect of the Season is the number of attendees at royal parties. "Commoners at 15" were commoners at 15 but ended their lives holding a peerage. "Baron" stands for baron and viscounts; and "Duke" for duke, earl, and marquis. For each individual, the relative size of class is the percentage of people of the opposite sex aged $\pm$ 2 years her own age who belong to the same class. Sex ratio is the ratio of peers and peer sons aged 19–25 to peers' daughters aged 18–24. For years when the latter is underreported, I estimate the number of girls to be $0.95\times$ men. The length of the railway network is from Mitchell (1988, Ch.10, Table 5). Standard errors clustered by year are in parentheses. For Panel B, the sample is the years 1851–75. Constants not reported. Standard errors are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 1.8: The Season and sorting by landholdings

Regressions of % marrying in the same class in terms of acreage

	same "Bateman class"		same decile, ± one decile	
	(1)	(2)	(3)	(4)
	probit	IVprobit	probit	IVprobit
Attendees at royal parties (100's)	0.005***	0.007***	0.004**	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)
Acres (1000's)	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Relative size of land class	0.335	0.331	0.110	0.116
	(0.366)	(0.364)	(0.398)	(0.396)
Age at marriage	0.003	0.003	-0.002	-0.002
	(0.003)	(0.003)	(0.005)	(0.005)
Peerage of England & Wales	0.128***	0.129***	0.078*	0.077*
	(0.042)	(0.042)	(0.041)	(0.041)
Peerage of Ireland / Scotland	ref.		ref.	
Sex ratio (men / women)	0.162	0.348	-0.150	-0.228
	(0.489)	(0.518)	(0.512)	(0.531)
Railway length (100 mi.)	-0.034***	-0.039***	-0.025*	-0.023*
	(0.013)	(0.015)	(0.014)	(0.013)
Decade fixed effects and trend	yes	yes	yes	yes
Observations	257	257	257	257
% Correctly predicted	82.1	82.1	75.9	75.9
Sargan test		1.13 (p = 0.30)		0.39 (p = 0.54)

Regressions of % marrying in the same class in terms of land rents

	same "Bateman class"		same decile, ± one decile	
	(1)	(2)	(3)	(4)
	probit	IVprobit	probit	IVprobit
Attendees at royal parties (100's)	0.003*	0.003	0.005***	0.006***
	(0.002)	(0.003)	(0.002)	(0.002)
Land rents (1000's)	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Relative size of land class	0.788***	0.783***	0.690*	0.691*
	(0.238)	(0.238)	(0.362)	(0.359)
Age at marriage	-0.006	-0.006	-0.006	-0.007
	(0.005)	(0.005)	(0.004)	(0.004)
Peerage of England & Wales	0.143***	0.142***	0.027	0.028
	(0.052)	(0.052)	(0.052)	(0.052)
Peerage of Ireland / Scotland	ref.		ref.	
Sex ratio (men / women)	-0.637	-0.639	0.734	0.896*
	(0.401)	(0.415)	(0.488)	(0.539)
Railway length (100 mi.)	-0.029**	-0.029*	-0.022**	-0.027***
	(0.013)	(0.015)	(0.011)	(0.010)
Decade fixed effects and trend	yes	yes	yes	yes
Observations	257	257	257	257
% Correctly predicted	80.5	80.9	76.7	76.7
Sargan test		0.11 (p = 0.74)		2.45 (p = 0.13)

Note: The sample comprises all peers and peers' sons first marrying in 1851–75, in possession of over 2,000 acres, worth £3,000 a year by 1876. Columns reports marginal effects at the mean. The percentage marrying in the same "Bateman class" corresponds to the highlighted diagonal in Tables 1.4 and 1.5. Land classes are defined in terms of deciles. For each great lord, the "relative size of land class" is the percentage of women aged 18–24 belonging to his same land class. Sex ratio is estimated as peers and peer sons aged 19–25 to peers' daughters aged 18–24. For years when the latter is underreported, I estimate the number of girls to be $0.95\times$ men. The length of the railway network is from Mitchell (1988, Ch.10, Table 5). IV probit uses the first stage reported in Table 1.7, Panel B. Standard errors clustered by year in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 1.9: The Season and socio-economic homogamy

	SES pizazz calculated over 1851–75		SES pizazz calculated over 5-year cohorts	
	(1) OLS	(2) IV	(3) OLS	(4) IV
Attendees at royal parties (100's)	-21.2**	-21.8**	-17.1**	-17.9*
	(8.4)	(10.9)	(8.1)	(10.3)
Commoner at age 15	-859.7	-861.7	-837.3	-839.5
	(876.4)	(844.2)	(859.2)	(828.0)
Baron son	719.8	718.3	652.1	650.3
	(487.6)	(468.7)	(476.3)	(458.1)
Duke son	1,148.8*	1,149.9**	1,141.2*	1,142.5**
	(607.5)	(585.9)	(586.3)	(565.1)
Baron heir	157.7	159.6	130.8	133.0
	(396.9)	(388.4)	(392.8)	(383.6)
Duke heir	ref.	ref.	ref.	ref.
Acreage	-9.8**	-9.8**	-9.7**	-9.7**
	(4.1)	(4.0)	(3.9)	(3.9)
Land rents	1.9	1.9	2.1	2.0
	(9.7)	(9.3)	(9.5)	(9.2)
Relative size of social class	-4,292.4*	-4,291.7*	-4,253.9*	-4,253.0*
	(2,393.2)	(2,313.7)	(2,350.4)	(2,272.4)
Relative size of acreage class	422.1	422.4	603.7	604.1
	(1,987.9)	(1,921.2)	(1,952.3)	(1,887.2)
Relative size of rents class	-471.3	-473.7	-499.1	-501.9
	(1,452.1)	(1,398.3)	(1,453.5)	(1,398.6)
Age at marriage	-10.0	-9.9	-7.1	-6.9
	(24.9)	(23.7)	(24.6)	(23.4)
Peerage of England & Wales	-649.0	-649.6	-687.1	-687.8*
	(421.3)	(406.3)	(411.6)	(397.0)
Peerage of Ireland / Scotland	ref.	ref.	ref.	ref.
Sex ratio (men / women)	4,336.6	4,255.9	5,270.3	5,176.4
	(3,860.6)	(3,922.3)	(3,835.5)	(3,909.6)
Railway length (100 mi.)	172.1*	173.9**	157.1*	159.2*
	(89.1)	(87.7)	(86.1)	(84.1)
Constant	181,567	183,494*	165,222.6	167,464.5
	(110,891)	(108,522)	(107,351.0)	(104,427.9)
Decade fixed effects and trend	yes	yes	yes	yes
Observations	993	993	993	993
Sargan test		0.463		0.638
		(p = 0.79)		(p = 0.73)

Notes: The sample includes all peers and peers' sons first marrying in 1851–75. To measures the distance between the spouses' socio-economic pizazz, I first rank individuals lexicographically according to land rents (percentile), acreage (percentile), and social position. This ranking is calculated over the whole sample (1851–75), and over 5-year cohorts (1850–55 to 1870–75). Homogamy is then defined as the squared difference between spouses' indexes. Smaller values stand for spouses who are closer in terms of socio-economic pizazz. The variable capturing the effect of the Season on homogamy is the number of attendees at royal parties (in hundreds of guests). The remaining independent variables are described in Table 1.7 and Table 1.8, columns (1) and (2). IV probit uses the first stage reported in Table 1.7 Panel B. Standard errors clustered by year are in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 1.10: The Season and geographic endogamy

Regressions of distance (mi.) between spouses' seats	(1) OLS	(2) IV
Attendees at royal parties (100's)	0.70	1.24*
	(0.59)	(0.74)
Commoner at age 15	35.35	38.75
	(43.22)	(41.70)
Baron son	-6.44	-3.95
	(37.59)	(36.31)
Duke son	-62.29***	-63.07***
	(18.09)	(17.92)
Baron heir / daughter	-39.04***	-39.44***
	(13.49)	(13.50)
Duke heir / daughter	ref.	ref.
Seat density	0.91	0.89
	(1.31)	(1.30)
Age at marriage	2.00	1.79
	(1.40)	(1.39)
Woman	-2.74	-3.52
	(10.98)	(10.97)
Peerage of England & Wales	-40.66***	-41.49***
	(9.92)	(10.02)
Peerage of Ireland / Scotland	ref.	ref.
Sex ratio (men / women)	190.35	245.58
	(223.41)	(236.96)
Railway length (100 mi.)	-2.73	-4.09
	(6.47)	(6.52)
Constant	-3,374.11	-4,759.39
	(8,057.72)	(8,108.59)
Decade fixed effects and trend	yes	yes
Observations	351	351
Sargan test		1.35 (p = 0.51)

Note: The sample is all peers and peers' offspring first marrying in 1801–75, for whom I could locate both spouses' family seats using Burke's *Heraldic Dictionary*. Only marriages in which both spouses' families are in the peerage are included. Distance between spouses' seats is calculated using Vincenty's algorithm. When one or both spouses have more than one seat, I take the minimum distance. The variable capturing the effect of the Season on geographic endogamy is the number of attendees at royal parties (in hundreds of guests). "Commoners at 15" were commoners at this age but ended their lives holding a peerage. "Baron" stands for baron and viscount, and "Duke" for duke, earl, and marquis. For each individual, "seat density" is the percentage of people of the opposite sex aged $\pm$ 2 years her age whose family seat is in the same region. Regions are NUTS 1 divisions for England, Scottish Parliament electoral regions, the four provinces of Ireland, and Wales. Sex ratio is estimated as peers and peers' sons aged 19–25 to peers' daughters aged 18–24. For years when the latter is underreported, I estimate the number of girls to be $0.95 \times men$. The length of the railway network comes from Mitchell (1988, Ch.10, Table 5). IV probit uses the first stage reported in Table 1.7, Panel B. Standard errors clustered by year are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 1.11: Balanced cohorts: Interruption of the Season vs. normal years

	Mourning 1861–63	Normal years 1859–67†	Difference
Demographic characteristics at marriage (women)			
Age at first marriage	24.73	24.36	0.37
	(0.59)	(0.43)	(0.74)
Duke daughters	0.51	0.52	-0.01
	(0.05)	(0.04)	(0.06)
Baron daughters	ref.	ref.	
Peerage of England	0.65	0.59	0.06
	(0.05)	(0.04)	(0.06)
Peerage of Scotland and Ireland	ref.	ref.	
Cohort characteristics			
Female cohort size (18–24)	264	261	3
	(1.93)	(3.06)	(3.46)
Sex ratio (men/women)	1.111	1.107	0.005
	(0.010)	(0.024)	(0.021)

Note: The demographic characteristics are for all 276 peers' daughters first marrying in 1859–67. The sample is then divided into women marrying during Queen Victoria's mourning period (1861–63) and women marrying the years before and after. Age at first marriage is presented in years, "duke daughters" and "peerage of England" in proportions. Cohort characteristics are yearly averages. Female cohort size is the number of peers' daughters aged 18–24. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women sharply decreases (see Figure 1.A4 in the appendix). Sex ratio is computed as the number of peers and peer sons aged 19–25 to peers' daughters aged 18–24. For years when the latter is underreported, I estimate the number of girls to be $0.95 \times men$. Standard errors are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† 1859–67 excludes the years of the mourning.

Table 1.12: Sample stratification

		Social status		Acreage		Land rents		SES pizazz	
	Baseline (1)	Heirs (2)	Non-heirs (3)	Above median (4)	Below median (5)	Above median (6)	Below median (7)	Above median (8)	Below median (9)
Sorting by acreage	0.007***	0.018***	0.0015	0.010***	0.0035	-	-	-	-
	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	-	-	-	-
Sorting by land rents	0.005***	0.007	0.003	-	-	0.005	0.006**	-	-
	(0.002)	(0.006)	(0.002)	-	-	(0.004)	(0.003)	-	-
Homogamy	-5.7**	-38.02**	-17.21	-	-	-	-	-22.04**	-1.66
	(2.8)	(19.31)	(15.99)	-	-	-	-	(11.03)	(5.44)
Distance	1.24*	0.41	3.48***	1.13	8.17***	0.79	7.46***	1.08	2.56**
	(0.74)	(0.70)	(1.25)	(0.79)	(2.12)	(0.74)	(1.98)	0.72	(1.00)

Note: This table reports the marginal effects of 100 additional attendees at royal parties on the corresponding marriage outcomes. Each column divides the sample by social status, acreage, gross annual rents from land, and socio-economic pizazz. "Sorting by acreage" is defined as the probability of marrying a spouse in your same land class, as defined by Bateman (1883: p.495). "Sorting by land rents" is the probability of marrying in your same or a contiguous decile of the land rents distribution. "Homogamy" is defined as in Table 1.9, columns (1) and (2). "Distance" is the miles between spouses' family seats. The sample for each regression is defined in Tables 1.7–1.10. Each regression includes the full set of controls reported in Tables 1.7–1.10 and uses the first stage reported in Table 1.7, Panel B. Standard errors clustered by year are in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 1.13: Alternative measures of attendance to the Season

	Number of attendees at		Number of invitations issued for	
	All royal parties (1)	Balls and concerts (2)	All royal parties (3)	Balls and concerts (4)
Marrying outside the peerage (wom)	-0.004***	-0.005***	-0.004***	-0.004***
	(0.002)	(0.001)	(0.002)	(0.002)
Sorting by acreage	0.007***	0.006**	0.006***	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
Sorting by land rents	0.005***	0.005***	0.006***	0.005**
	(0.002)	(0.0022)	-0.0019	(0.0021)
Homogamy	-21.8**	-22.0**	-20.9**	-21.1**
	(10.9)	(11.0)	(10.1)	(10.2)
Distance between spouses' seats	1.24*	1.04*	1.15*	0.96
	(0.74)	(0.62)	(0.70)	(0.59)
F-stat from first-stage	20.89	40.99	27.88	46.38

Note: This table reports the marginal effects of 100 additional guests at the Season on the corresponding marriage outcomes. "Marrying outside the peerage" is the probability of peers' daughters marrying a commoner. "Sorting by acreage" is defined as the probability of marrying a spouse in your same land class, as defined by Bateman (1883: p.495). "Sorting by land rents" is the probability of marrying in your same or a contiguous decile of the land rents distribution. "Homogamy" is defined as in Table 1.9, columns (1) and (2). "Distance" is the miles between spouses' family seats. Each column defines participation in the Season in a different manner. Column (1) reports the results for the baseline definition: number of attendees at royal parties. Column (2) restricts attendance to balls and concerts held at Buckingham or St. James' Palace. Columns (3) and (4) show the corresponding numbers of invitations issued. Regression samples and covariates are reported in Tables 1.7–1.10. Standard errors clustered by year are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 1.14: Using selection from observables to assess the selection on unobservables

		Sorting by			
		Marrying a commoner	Acreage	Land rents	Homogamy
Controls in the restricted set	Controls in the full set	(1)	(2)	(3)	(4)
None	All	1.20	1.16	4.14	1.11
Time effects	All	1.95	1.48	3.55	1.24
Time effects + cohort controls	All	10.24	3.88	7.56	3.14
Time effects + class controls	All	2.21	3.41	4.14	2.05

Note: Each cell reports ratios based on the coefficients for $Y_{i,t} = \beta\ A_t + \mathbf{X}'_{i,t}\lambda + \mathbf{V}'_t\delta + \epsilon_{i,t}$ from two individual-level linear regressions. $Y_{i,t}$ is the marriage outcome. "Marrying outside the peerage" is the probability of peers' daughters marrying a commoner. "Sorting by acreage" is defined as the probability of marrying a spouse in your same land class, as defined by Bateman (1883: p.495). "Sorting by land rents" is the probability of marrying in your same or a contiguous decile of the land rents distribution. "Homogamy" is defined as in Table 1.9, columns (1) and (2). A_t is the number of attendees at royal parties (in 100s of guests). In one regression, the covariates $\mathbf{X}_{i,t}$ and $\mathbf{V}_{i,t}$ include the "restricted set" of control variables. Call the coefficient of interest in this "restricted" regression β^R. In the other regression, covariates include the full set of controls. Call the coefficient of interest in this full regressions β^F. The reported ratio is the absolute value of $\beta^F/(\beta^R - \beta^F)$ (Altonji et al. 2005).

Controls and sample: Time effects stand for a linear trend and decade fixed effects. Cohort controls are the sex ratio and the relative size of class as defined in Tables 1.7–1.9. Class controls include relative size of class, dummies for social class in columns (1) and (4), total acreage in column (2), land rents in column (3), and both in column (4). The full set of controls and the sample are described in Table 1.7, column (1), and in Tables 1.8 and 1.9.

Table 1.15: IV estimates for plausibly exogenous cohort size instrument

	γ=0 (1)	$\gamma = 0.1 \cdot \beta$ (2)	$\gamma = 0.25 \cdot \beta$ (3)	$\gamma = 0.5 \cdot \beta$ (4)	$\gamma = 0.75 \cdot \beta$ (5)
$\hat{\beta}(\gamma)$ for marrying out (wom)	-0.011***	-0.013***	-0.015***	-0.019***	-0.023***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
$\hat{\beta}(\gamma)$ for acreage sorting	0.027***	0.031***	0.037***	0.046***	0.056***
	(0.01)	(0.01)	(0.01)	(0.011)	(0.013)
$\hat{\beta}(\gamma)$ for rents sorting	0.023***	0.026***	0.031***	0.039***	0.047***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.01)
$\hat{\beta}(\gamma)$ for homogamy	-21.8**	-24.92**	-29.5**	-37.2***	-44.9***
	(10.9)	(10.9)	(11.1)	(11.9)	(13.1)
$\hat{\beta}(\gamma)$ for distance	1.225*	1.4*	1.662**	2.01***	2.537***
	(0.725)	(0.736)	(0.758)	(0.81)	(0.878)

Note: This table reports point estimates $\hat{\beta}(\gamma)$ and robust standard errors for the effects of the number of attendees at royal parties on various marriage outcomes. Each column assumes different values for γ, the direct effect of the cohort size instrument on marriage outcomes, i.e., $Y_{i,t} = \beta \hat{A}_t + \mathbf{X}'_{i,t}\lambda + \mathbf{V}'_t\delta + \gamma\, Cohort_t + \epsilon_{i,t}$ in the second stage described in section 1.5.5. The sample and set of covariates for each regression are as described in Tables 1.7–1.10. "Marrying out" is the percentage probability of a peer daughter marrying outside the peerage. "Sorting by acreage" is the percentage probability of marrying in your same land class (defined as in Bateman 1883: p. 495). "Sorting by rents" is the percentage probability of marrying in your same decile or a contiguous decile of the distribution of land rents. Homogamy is the distance between spouses' socio-economic pizazz, as defined in Table 1.10, columns (3) and (4). Distance is the number of miles between spouses' seats.
*** p<0.01, ** p<0.05, * p<0.1

Table 1.16: Marriage and political preferences, 1817–1875†

	Wife's family		
Husband	*Liberal club*	*Tory club*	N
Liberal club	39.5	60.5	43
	29.5	70.5	
	10*	-10*	
Tory club	25.3	74.7	99
	29.6	70.4	
	-4.3*	4.3*	
N	42	100	142
Cross tabulation statistics			
Person Chi squared (1)	2.9359	Pr = 0.087	
Cramer's V	0.1438		
Gamma test	0.3187	ASE = 0.174	
Kendall's tau-b	0.1438	ASE = 0.087	

Note: The sample comprises all 142 peers and peers' sons who (1) first married in 1817–75, (2) are listed in Bateman (1883) as great landowners, (3) belonged to a political club, and (4) married a wife who had a relative in a political club. The row variable indicates the husbands' political preferences. The column variable is the political preferences of any wife's relative listed in Bateman (1883). Political preferences are based on club membership. *Liberals* are those belonging to Brook's, Reform, or Devonshire; *Tories* are in Carlton, Junior Carlton, Conservative, or St. Stephen's. The categorization of political clubs is taken from Bateman's *Great Landowners* (1883: p. 497). Each cell contains observed percentages at the top, expected percentages if matching was random in italics, and the difference between the two below. The Pearson's chi-squared statistic tests the hypothesis that rows and columns are independent. Cramer's V evaluates the strength of the relation on a 0–1 scale. Kendall's tau-b and the Gamma test assess the direction of the relationship.

*** p<0.01, ** p<0.05, * p<0.1

†For this sample, the earliest marriage recorded in Bateman's *Great Landowners* took place in 1817.

1.11 Appendix A: Supplemental figures and tables

Figure 1.A1: Charles, 5th Baron Lyttelton, Cockayne's *Complete Peerage*

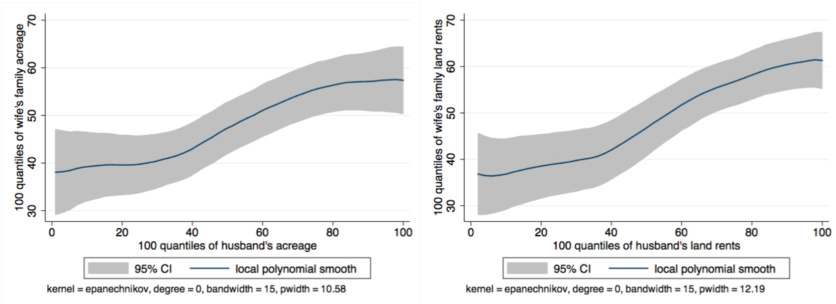
VII. 1876. 5. CHARLES GEORGE (LYTTELTON), LORD LYTTELTON, BARON OF FRANKLEY [1794] also BARON WESTCOTE OF BALLYMORE in the peerage of Ireland [1776] also *a Baronet* [1618], s. and h., by 1st wife, *b.* 27 Oct. 1842; ed. at Eton and at Trin. Coll., Cambridge; M.P. for East Worcestershire, 1868-74: *suc. to the peerage,* 18 April 1876; Land Commr., 1881-89; *suc.* as VISCOUNT COBHAM AND BARON COBHAM, on the death, 26 March 1889, of his distant cousin (the Duke of Buckingham and Chandos, Viscount Cobham, &c.), under the *spec. rem.* in the creation of that dignity, 23 May 1718. He *m.* 19 Oct. 1878, Mary Susan Caroline, 2d da. of William George (CAVENDISH), 2d BARON CHESHAM, by Henrietta Frances, da. of the Rt. Hon. William Saunders Sebright LASCELLES. She was *b.* 19 March 1853.

Figure 1.A2: Charles, 5th Baron Lyttelton, Bateman's *Great Landowners*

*** LYTTELTON, LORD, Hagley Hall, Stourbridge. S.

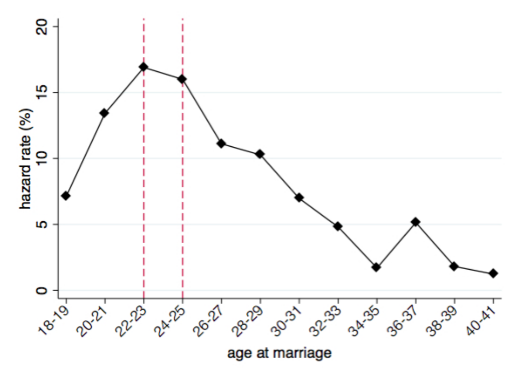
Coll. Eton, Trin. Cam.	Worcester . .	5,907 .	9,170
Club. Brooks's.	Hereford . .	1,032 .	1,093
b. 1842, s. 1876, m. 1878.			
Sat for E. Worcestershire.		6,939 .	10,263

Figure 1.A3: Kernel-weighted local polynomial smoothing: Husband's landholdings on wife's landholdings, 1851–75



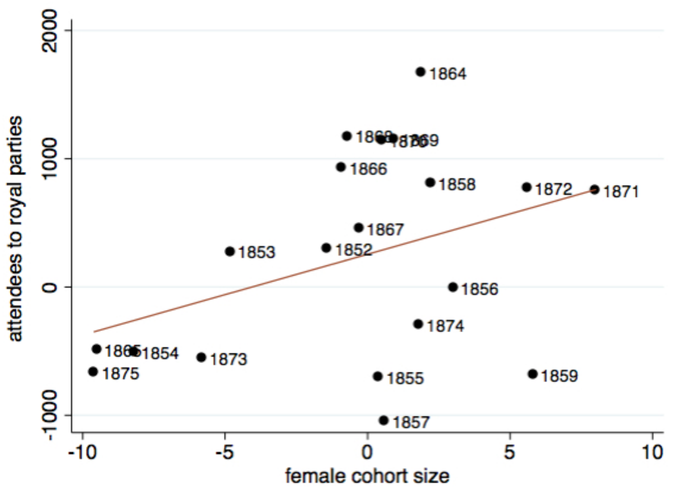
Note: The sample comprises all peers in possession of 2,000 acres and upwards first marrying in 1851–75. The solid line plots a kernel-weighted local polynomial regression of y on x. In the left panel, y and x are wife and husband acreage. In the right panel, y and x stand for land rents. Both are in percentiles.

Figure 1.A4: Hazard rates for the cohort marrying in 1850–59



Note: The sample is all 466 peers' daughters first marrying in 1850–59. The diamonds show the hazard rates, i.e., the percentage of single women who got married at each age. The 1850–59 cohort is meant to represent the customary marriage patterns before Prince Albert's dead in 1861. I use this evidence to show that in 1861, women younger than 22 could defer their choice of partner but women aged 22 or more (and, thus, 25 or more when the Season resumed in 1864) would be more hard-pressed to marry. The dashed lines indicate that, in fact, for ages 22–23 and 24–25 hazard rates peak and sharply decreasing afterwards.

Figure 1.A5: Relation between cohort size and royal parties



Note: The female cohort size is the number of peers' daughters aged 18–24 each year. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women sharply decreases (see Figure 1.A4 in the appendix). Both female cohort size and attendance to royal parties are detrended. The years of Queen Victoria's mourning (1861–63), the Crystal Palace Exhibition (1851), and outliers (1860) are excluded.

Table 1.A1: Relation to landowner of matched wives

	Number	Percent	Acreage	Gross annual rents (£)
Panel A: Matched wives				
Sister	154	43.4	62.0	28.0
			(214.9)	(29.5)
Daughter	101	28.5	41.6	25.1
			(141.1)	(28.5)
Aunt	35	9.9	28.9	40.2
			(19.9)	(34.8)
Cousin (second†)	22	6.2	22.4	21.5
			(38.8)	(20.6)
Cousin	18	5.1	24.6	25.4
			(17.8)	(16.9)
Niece	12	3.4	24.9	16.0
			(16.2)	(8.4)
Granddaughter	7	2.0	30.7	23.4
			(28.8)	(18.3)
Aunt (second)	3	0.8	96.7	88.1
			(37.7)	(67.8)
Other	3	0.8	20.2	27.7
			(11.3)	(16.8)
Total	355	100	46,7	27,9
			(161,3)	(29,2)
Panel B: All wives				
Matched	355	42.8		
Not matched	203	57.2		
Total	558	100		

Note: The sample for Panel A is all 355 first wives of peer great landowners who could be matched to Bateman's list of great landowners, i.e., they had a close relative who was recorded as a great landowner. The sample is broken down by family relation. Acreage and gross annual rents from land are in thousands. Standard deviations are in parentheses. For Panel B, the sample includes all first wives of peers and peers' sons in possession of 2,000 acres and upwards by the 1870s.

*** p<0.01, ** p<0.05, * p<0.1

† "Second" indicates two generations to the closest common ancestor.

Table 1.A2: Marital network connections, 1862

	Number of links		
	with spouse	av.	max.
Panel A: Husbands			
Heir to Earl of Suffolk	2	1	2
Earl of Ellesmere	2	1	2
Sir Ivor Guest	1	0.44	2
Earl Brownlow's son	1	0.44	1
Arthur Smith-Barry	1	1.11	2
Heir to Baron St. John of Bletso	0	0.44	1
Heir to Viscount Elibank	0	0.11	1
Baron Sudeley's son	0	0.56	2
John Rolls	0	0.78	2
Panel B: Wives			
Mary Eleanor	2	1.22	2
Dau, Marquess of Normanby	2	1.11	2
Ellen Georgiana	1	0.22	1
Blanche Alice	1	0.22	1
Dau. Duke of Malborough	1	1.11	2
Dau. Earl Shrewsbury	0	1.00	2
Ada M. Kateherine	0	0.33	2
Dau. Earl of Dunraven and Mount-Earl	0	0.67	2
Dau. Baronet Morvaren	0	0.00	0
Total average	0.78	0.65	1.61

Note: The sample is the 9 peers and peers' sons who married in 1862, together with their spouses. A link is established if the man and the woman's father have the same social status (dukes vs. barons vs. commoners), if their families are in possession of estates of similar size (defined according to Bateman's categorization, p. 497), or if the man and any relative of the woman belong to the same club.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

1.12 Appendix B: Proofs

This Appendix presents the proofs omitted in the paper.

Proof of Proposition 1.

This proof follows Burdett and Coles (1997) and goes by induction. For the basis step, note that (1.6) implies $r(1) < 1$. Similarly, $\rho(1) < 1$. Note also that (1.6) equals to a^1 as defined in Proposition 1. All together, this establishes that the most desirable woman ($y = 1$) will propose to any man of type $x \geq r(1)$. As $r(y)$ is nondecreasing, this implies that all women will propose to such men.

Note also that if the most desirable woman ($y = 1$) or man ($x = 1$) is willing to accept an individual, then that individual shares the same reservation strategy as the most desirable of her sex. Consider a man of type $x \in [r(1), 1]$. Since the most desirable woman is willing to marry him, all women will be willing to marry him, and hence $\Omega(1) = 1$ and $G(y|x) = G(y)\ \forall y$. This implies that $\rho(x) = \rho(1)$, as defined in (1.6). The same is true for women of type $y \in [\rho(1), 1]$. Redefine $a^1 \equiv r(1)$ and $b^1 \equiv \rho(1)$. It follows clearly that men with $x \in [a^1, 1]$ and women with $y \in [b^1, 1]$ form an endogamic marriage class (class 1), in that agents in this class only marry members of this same class and reject all others.

Assume that for $n-1$, men with $x \in [a^{n-1}, a^{n-2}]$ and women with $y \in [b^{n-1}, b^{n-2}]$ form an endogamic marriage class (class $n-1$), in that agents in this class only marry members of this same class, reject individuals of lower type, and are rejected by those in class $n-2$.

For the inductive step, consider the most desirable women not in class $n-1$, $y' + \epsilon = b^{n-1}$ for an arbitrarily small $\epsilon > 0$. By the inductive assumption, she is rejected by class $n-1$ men. However, for all the men with $x < a^{n-1}$, she is the best available suitor. Thus, they all will propose to her. That is, $\Omega(y') = F(a^{n-1})$. The density function of these men under class $n-1$ is given by $\frac{f(x)}{F(a^{n-1})}$ for $x \leq a^{n-1}$. Substituting this into (1.5) yields:

$$r(y') = \frac{\beta}{1-\beta}\frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w}\int_{r(y')}^{a^{n-1}}(x - r(y'))f(x)dx\ .$$

Similarly, for men $x' + \epsilon = a^{n-1}$, $\Omega(x') = G(b^{n-1})$ and $\frac{g(y)}{G(b^{n-1})}$ for $y \leq b^{n-1}$. Thus,

$$\rho(x') = \frac{\beta}{1-\beta}\frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^m}\int_{\rho(x')}^{b^{n-1}}(y - \rho(x'))g(y)dy\ .$$

Again, redefine $r(y') \equiv a^n$ ($\rho(x') \equiv b^n$), which denotes the lowest type man (woman) acceptable to the most desired women (man) not in class $n-1$. Since $r(\cdot)$ ($\rho(\cdot)$) is nondecreasing, all women (men) not in class $n-1$ will propose to a man (woman) with $x \geq a^n$ ($y \geq b^n$). Men satisfying $x \in [a^n, a^{n-1}]$ and women with $y \in [b^n, b^{n-1}]$ form marriage class n: they only accept each other, reject those of lower type, and are rejected by those in class $n-1$. ■

Proof of Proposition 2.
This proof follows Bloch and Ryder (2000). According to Proposition 1, class bounds are such that

$$a^n - \frac{\beta}{1-\beta}\frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w}\int_{a^n}^{a^{n-1}}(x - a^n)f(x)dx = 0\ .$$

Using the implicit function theorem, the Leibniz integral rule, and some rearrangement, I find that

$$\frac{\partial a^n}{\partial \alpha} = \frac{\frac{\beta}{1-\beta}\frac{M(\lambda^m, \lambda^w)}{\lambda^w}\int_{a^n}^{a^{n-1}}(x - a^n)f(x)dx}{1 + \frac{\beta}{1-\beta}\frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w}[F(a^{n-1}) - F(a^n)]} \geq 0\ .$$

Similarly, if the matching technology is subject to increasing returns to scale, i.e., $\frac{\partial M(\lambda^m,\lambda^w)/\lambda^w}{\partial \lambda^w} > 0$ then

$$\frac{\partial a^n}{\partial \lambda^w} = \frac{\frac{\beta}{1-\beta}\alpha\frac{\partial M(\lambda^m, \lambda^w)/\lambda^w}{\partial \lambda^w}\int_{a^n}^{a^{n-1}}(x - a^n)f(x)dx}{1 + \frac{\beta}{1-\beta}\frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w}[F(a^{n-1}) - F(a^n)]} \geq 0\ .$$

The proof now goes by induction. For the basis step ($n = 1$), note that $\frac{\partial a^1}{\partial \alpha} > 0$ and $\frac{\partial a^1}{\partial \lambda^w} > 0$. Assume that for $n-1$, $\frac{\partial a^{n-1}}{\partial \alpha} \geq 0$ and $\frac{\partial a^{n-1}}{\partial \lambda^w} \geq 0$. For the inductive step note that

$$\frac{da^n}{d\alpha} = \frac{\partial a^n}{\partial \alpha} + \frac{\partial a^n}{\partial a^{n-1}} \frac{\partial a^{n-1}}{\partial \alpha}$$

and

$$\frac{da^n}{d\lambda^w} = \frac{\partial a^n}{\partial \lambda^w} + \frac{\partial a^n}{\partial a^{n-1}} \frac{\partial a^{n-1}}{\partial \lambda^w} .$$

By the inductive hypothesis, $\frac{\partial a^{n-1}}{\partial \alpha} \geq 0$ and $\frac{\partial a^{n-1}}{\partial \lambda^w} \geq 0$. Also, using the implicit function theorem, Leibniz integral rule, and some rearrangement, it can be shown that

$$\frac{\partial a^n}{\partial a^{n-1}} = \frac{\frac{\beta}{1-\beta} \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} (a^{n-1} - a^n) f(a^{n-1})}{1 + \frac{\beta}{1-\beta} \frac{\alpha M(\lambda^m, \lambda^w)}{\lambda^w} [F(a^{n-1}) - F(a^n)]} \geq 0 .$$

Therefore, $\frac{da^n}{d\alpha} \geq 0$ and $\frac{da^n}{d\lambda^w} \geq 0$. A similar argument shows that $\frac{db^n}{d\alpha} \geq 0$ and $\frac{db^n}{d\lambda^m} \geq 0$ for all $n = 1, ..., N^m$. ■

Proof of Proposition 3.

This proof follows Bloch and Ryder (2000). For ease of exposition, assume men and women are symmetric, i.e., $\lambda \equiv \lambda^m = \lambda^w$, and $F(x) = G(y)\ \forall x = y \in [0, 1]$. I start by defining the set of stable matches under the deferred acceptance algorithm (Gale and Shapley 1962).

Definition B1 *A matching is a one-to-one measure-preserving mapping from the set of men to the set of women. A matching is optimal if it maximizes total utility. A matching σ is unstable if there exists a blocking couple (x,y) in which both x and y are individually better off together than with the agent to which they are matched under σ, i.e., $y > \sigma(x)$ and $x > \sigma^{-1}(y)$. The Gale-Shapley deferred acceptance algorithm yields a stable and optimal matching ν.*

Lemma B1 *Under the assumption than men and women are symmetric, the Gale-Shapley deferred acceptance algorithm yields a unique stable and optimal matching ν such that $\nu(x) = x$.*

Proof. First, it follows that under symmetric populations and since one's type does not affects her payoff, any measure-preserving mapping is optimal. Formally, $\mathcal{U}_\nu = \int_0^1 xf(x)dx = \mathcal{U}_\sigma = \int_0^1 \sigma(x)f(x)dx$ for any measure-preserving matching σ, where $\mathcal{U}$ is the total utility.

Consider any measure-preserving matching $\sigma : [0,1] \to [0,1]$ such that $\sigma(x) \neq \nu(x)$. To show that such mapping σ is not stable, I partition the set of men into three disjoint sets: those who are better or under σ, those who are assigned to the same women under σ and ν, and those that prefer their ν assignment.

$$X = \{x \in [0,1] : \sigma(x) > \nu(x)\}$$

$$Y = \{x \in [0,1] : \sigma(x) = \nu(x)\}$$

$$Z = \{x \in [0,1] : \sigma(x) < \nu(x)\}$$

Since σ and ν are measure preserving and $\sigma(x) \neq \nu(x)$, X and Z have a positive measure. Now note that $\sigma^{-1}(x_0) = \sigma^{-1}(\nu(x_0)) = x_1$ can be interpreted as a mapping assigning to any man x_0 the man x_1 whom, under σ, is matched to x_0's partner under ν.

Clearly, $\sigma^{-1}(Y) = Y$, since these are the men whose assigned women do no change under σ and ν. Hence, $\sigma^{-1}(X \cup Z) = X \cup Z$. I now show that $\sigma^{-1}(X) \neq X$. Suppose $x_1 = \sigma^{-1}(x_0) \in X \; \forall x_0 \in X$. Then $\sigma(x_1) = \nu(x_0) > \nu(x_1)$. Since $\nu(x) = x \; \forall x$, $x_o > x_1$. Hence, σ^{-1} would map X into a proper subset of X. Therefore, for σ^{-1} to be measure preserving, there must be a full measure $x \in Z : \sigma^{-1}(x) \in X$. But if $\sigma^{-1}(x) \in X$, then $x > \sigma^{-1}(x)$ so that woman $\nu(x) = x$ prefers x to her match according to σ. Further, since $x \in Z$, $\sigma(x) < \nu(x)$ so man x prefers woman $\nu(x) = x$ to his current match $\sigma(x)$. This couple (x, x) is indeed a blocking couple, implying that $\sigma \neq \nu$ is unstable.

Finally, to show that $\nu(x) = x$ is stable, consider any blocking couple $(x, y) : y \neq x$. If $y > x$, then the women prefers $\nu^{-1}(y) = y$ to x. If

$y < x$, it is the man who prefers $\nu(x) = x$ to y. This implies that the set of blocking couples for $\nu(x) = x$ is empty. ■

Once equipped with Lemma 1, it is straightforward to show that as search frictions disappear, the marriage equilibrium converges to $\nu(x) = x$. According to Proposition 2, as α increases, marriage classes in equilibrium become smaller. Formally,

$$a^n = \frac{\beta}{1-\beta} \frac{\alpha M(\lambda)}{\lambda} \int_{a^n}^{a^{n-1}} (x - a^n) f(x) dx$$

is such that $\frac{\partial a^n}{\partial \alpha} \geq 0$. Similarly, using the implicit function theorem, the Leibniz integral rule, and some rearrangement,

$$\frac{\partial a^n}{\partial \beta} = \frac{\frac{\beta}{(1-\beta)^2} \frac{\alpha M(\lambda)}{\lambda} \int_{a^n}^{a^{n-1}} (x - a^n) f(x) dx}{1 + \frac{\beta}{1-\beta} \frac{\alpha M(\lambda)}{\lambda} [F(a^{n-1} - F(a^n)]} \geq 0 \; .$$

Now I show that $\frac{da^n}{d\beta} \geq 0$ by induction. Clearly, for a^1, $\frac{\partial a^1}{\partial \beta} > 0$. For any $n > 2$, $\frac{da^n}{d\beta} = \frac{\partial a^n}{\partial \beta} + \frac{\partial a^n}{\partial a^{n-1}} \frac{\partial a^{n-1}}{\partial \beta} \geq 0$ since $\frac{\partial a^n}{\partial \beta} \geq 0$, $\frac{\partial a^n}{\partial a^{n-1}} \geq 0$ as shown in the proof of Proposition 2, and $\frac{\partial a^{n-1}}{\partial \beta} \geq 0$ by the inductive hypothesis.

As search frictions disappear, that is, as the matching efficiency α and the discount factor β increase, the class bounds a^n collapse to two sequences $\{x\}_{x \in [0,1]}$. The highest type men and women $x = 1$ consequently adopt a threshold strategy such that they only match with agents of type $x = 1$. The highest ranked men and women not in class 1 again adopt a threshold strategy such that they only match with the highest ranked agents not in class 1. Iteration of this argument gives rise to $\nu(x) = x$, the unique stable and optimal matching derived by the Gale-Shapley deferred acceptance algorithm (Lemma A1). ■

Proof of Proposition 4.
From Proposition 1, it is clear that marriage classes in the exclusive market are defined such that:

$$\tilde{a}^n - \frac{\beta}{1-\beta}\alpha\frac{M(1-F(z))}{[1-F(z)]^2}\int_{\tilde{a}^n}^{\tilde{a}^{n-1}}(x-\tilde{a}^n)f(x)dx = 0\ .$$

Using the implicit function theorem, Leibniz integral rule, and some rearrangement, I find that

$$\frac{\partial\tilde{a}^n}{\partial z} = \frac{f(z)\frac{\beta}{1-\beta}\frac{1}{[1-F(z)]^2}\left[\frac{2\alpha M(1-F(z))}{1-F(z)} - \alpha M_\lambda(1-F(z))\right]\int_{\tilde{a}^n}^{\tilde{a}^{n-1}}(x-\tilde{a}^n)f(x)dx}{1+\alpha\frac{\beta}{1-\beta}\frac{M(1-F(z))}{[1-F(z)]^2}\int_{\tilde{a}^n}^{\tilde{a}^{n-1}}(x-\tilde{a}^n)f(x)dx}\ .$$

Since, by assumption $\frac{2\alpha M(1-F(z))}{1-F(z)} \geq \alpha M_\lambda(1-F(z))$, it follows that $\frac{\partial\tilde{a}^n}{\partial z} \geq 0$. The proof now goes by induction. For the basis step ($n=1$), note that $\frac{\partial\tilde{a}^1}{\partial z} \geq 0$. Assume that for $n-1$, $\frac{\partial\tilde{a}^{n-1}}{\partial z} \geq 0$. For the inductive step note that

$$\frac{d\tilde{a}^n}{dz} = \frac{\partial\tilde{a}^n}{\partial z} + \frac{\partial\tilde{a}^n}{\partial\tilde{a}^{n-1}}\frac{\partial\tilde{a}^{n-1}}{\partial z}\ .$$

By the inductive hypothesis, $\frac{\partial\tilde{a}^{n-1}}{\partial z}$. Also, as shown in the proof of Proposition 2,

$$\frac{\partial\tilde{a}^n}{\partial\tilde{a}^{n-1}} = \frac{\frac{\beta}{1-\beta}\frac{\alpha M(1-F(z))}{1-F(z)}(\tilde{a}^{n-1}-\tilde{a}^n)f(\tilde{a}^{n-1})}{1+\frac{\beta}{1-\beta}\frac{\alpha M(1-F(z))}{1-F(z)}[F(\tilde{a}^{n-1})-F(\tilde{a}^n)]} \geq 0\ .$$

Therefore, $\frac{d\tilde{a}^n}{dz} \geq 0$. ■

Chapter 2

Landed Elites and Public Education in England and Wales: Evidence from School Boards, 1870-99

2.1 Introduction

In 2000, the UN set itself the target of universal primary education as one of its Millennium Development Goals. Amongst economists, human capital is widely recognized as a key determinant of economic growth. However, the provision of public schooling is not always straightforward, especially in developing economies. Sokoloff and Engerman (2000) and Galor et al. (2009) famously suggested that an unequal distribution of land might slow down the implementation of public schooling. The idea is that entrenched landowners oppose educational reforms and are not willing to fund the provision of public education. This opposition is explained by the lack of complementarity between human capital and agrarian work and to reduce the mobility of the rural labor force (Galor and Moav 2006).

In this paper, I examine the relation between land inequality and education provision in the cradle of the industrial revolution, England.

In the nineteenth century, England was the first industrial country and the world's workshop. However, the provision of education lagged behind Prussia and the United States, nations that eventually overtook England as world's industrial leaders (McCloskey and Sandberg 1971). Contemporaries were well aware of this. In 1850, Joseph Kay, a Victorian educationalist, returned from his European tour puzzled by the apparent contradiction that in England, "where the aristocracy is richer and more powerful than that of any other country in the world, the poor are ... very much worse educated than the poor of any other [western] European country."[1] My results powerfully suggest that this was no contradiction at all.

In a cross-section of counties, I find a robust, negative correlation between landownership concentration and numerous education measures. Funding from property taxes was low, few public schools were built, the system relied extensively on existing church schools, and examination results were miserable. Moreover, I identify the channel through which landownership affects education to be a political one. In particular, I show that land concentration is negatively associated with public schooling provision only in the counties where large landowners were anointed peers, and thus controlled public offices.

England provides a unique setting to study the perverse effects of an unequal distribution of land. First, because land was heavily concentrated in a few hands. Around 1880, fewer than 5,000 landowners owned more than 50 percent of all the land (Cannadine 1990). Second, because the introduction of public schooling was highly decentralized. In response to a growing concern about Britain's loss of industrial leadership, the 1870 Forster's Education Act recognized for the first time that there was a role for the state in providing elementary education (Stephens 1998). In detail, School Boards were created in the districts and boroughs where there was a shortfall in education provision. Each Board could: (1) raise funds from a rate, (2) build and run public schools,[2] where existing Voluntary

[1] Quoted in Stone (1969): p. 129.

[2] These schools were commonly known as Board schools. To be precise, Public

schools, that is, schools run by the church, were scarce, (3) subsidize these Voluntary schools, (4) pay the fees of the poorest children, and (5) create by-laws making attendance compulsory. In sum, School Boards had full powers to decide how much money to collect and how to spend it. This made them a good target for the entrenched landed elites, unwilling to subsidize the provision of public education (Stephens 1998). Were these elites successful in taking over School Boards?

Figure 2.1 suggests the answer is yes. The chart plots the proportion of peer landowners in possession of 3,000 acres and upwards in a given county against the average funds raised from rates by School Boards between 1870–95, measured as shillings per capita. Clearly, counties where land was more concentrated in the peerage are associated with lower taxation and thus lower funds raised to invest in public schooling. As a result, less School Boards were created, expenditure in public schools was smaller, the system relied more on existing Voluntary schools, and, on average, less money was devoted to each scholar. This under-investment had its effects on the quality of education. In detail, children in counties where land was more concentrated presented miserable schooling results: they were significantly less likely to pass the national reading, writing and arithmetics exams. Standard measures of educational attainment, such as enrollment rates, were also affected.

The correlation between land concentration and educational outcomes is robust to the inclusion of many county-level controls that could also account for the provision of schooling. In detail, I include county-level occupational composition, income per capita, urbanization, or religiosity. Interestingly, the correlation between education and the share of manufacturing workers in a given county is of opposite sign than that of land concentration. This suggests that old landed elites and emerging industrialists clashed over the provision of public education in nineteenth century England, as suggested by Lindert (2004) and Galor and Moav (2006).

Finally, I check whether the provision of education is hampered by po-

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schools were fee-charging exclusive secondary schools, Eton, Rugby, or Harrow being the most known. Henceforth, for ease of exposition, I will refer to Board schools as public schools.

litical or economic inequality, both potentially associated with landownership concentration. To do so, I measure the correlation between land inequality and education disentangling the social status of landowners. I can distinguish between large landowners holding a peerage and those who where simply commoners. The correlation between the provision of public schooling and landownership concentration is strong where land is in the hands of peers, but disappears for commoner landowners. In contrast to continental Europe, British peers still retained a lot of political influence in the late nineteenth century (Allen 2009: p. 301), especially at the local level. It would seem, therefore, that land inequality only affected the provision of schooling where the landed elite was sufficiently powerful and influential to effectively take over School Boards.

The data used in this project comes from three main sources, two of which are newly computerized. I measure the provision of public schooling from an unexplored source: the reports of the Committee of Council on Education. These contain information on School Board funding, expenditures, and various educational outcomes beyond traditional measures such as literacy or enrollment rates. To measure landownership concentration, I draw evidence from Bateman's *The Great Landowners of Great Britain and Ireland*. The book presents, for each county, the share of land owned by seven classes, from large landowners of 3,000 acres and upwards, to Cottagers in possession of less than one acre of land. Finally, to control for alternative determinants of schooling provision beyond land concentration, I exploit evidence from Census records and General Election outcomes, computerized by Hechter (1976). This source contains information on income p.c., population, occupational composition, or religiosity at the county level.

The remaining of the paper will be structured as follows. Section 2.2 reviews the literature and states the contribution of this paper. Section 2.3 depicts the expansion of education in nineteenth century England and the functioning of School Boards. Section 2.4 describes the data. Section 2.5 presents the empirical analysis. First, I assess the correlation between land concentration and education. Next, I disentangle landowners into peers and commoners to evaluate whether land affects education through a political channel. Section 2.6 examines the robustness of the results. Section 2.7 concludes.

2.2 Literature review and contribution

This paper draws from various literatures. First, it relates to Unified Growth Theory. Human capital is at the spotlight of the transition from Malthusian stagnation to sustained economic growth. In particular, as the Industrial Revolution progressed to its second phase (1870–1914), human capital contributed both to the acceleration of technological progress and to the demographic transition (Galor and Weil 2000, Galor and Moav 2002). The idea behind this theory is that in coping with a rapidly changing economic environment, education became more attractive. Parents began trading "quality" for "quantity" in offspring, which eventually led to the demographic transition. The central role of human capital in explaining this transition has been established both theoretically (Galor and Moav 2002, Kogel and Prskawetz 2001, Jones and Run 2001, Hansen and Prescott 2002, Galor and Moav 2002) and quantitatively (Doepke and Zilibotti 2005, Fernandez-Villaverde 2007, Lagerlof 2006).

Given the importance of public elementary schooling for human capital formation, studying the process of its introduction is a key challenge for economists (Mokyr and Voth 2009). Galor and Moav (2006) formalize the argument put forward by Lindert (2004) that, due to a high degree of complementarity between human and physical capital, capitalists had an incentive to support and subsidize education, and therefore they lobbied for its provision. They support their theory by analyzing the vote for the 1902 Education Act. In particular, they find that MP's from more skilled-intensive districts were more likely to support the reform.[3] In this paper, I look at the other side of the coin by studying the reaction of the entrenched landed elite after Forster's Act (1870) recognized for the first

[3] In a similar vein, Doepke and Zilibotti (2005) conclude that the introduction of child labor laws in England was also an institutional response to a raising demand for human capital.

time that there was a role of the state in providing public education.

My paper is also related to the seminal work by Sokoloff and Engerman (2000). They suggest that the “reversal of fortunes” between North and South America steams from geographically driven differences in inequality. One channel through which inequality dampens development is the provision of education. In detail, United States and Canada were well-suited for the production of grain and hence ended up with a more egalitarian land distribution. The absence of a powerful landed elite permuted North America to engage in the education of the general population already by the early nineteenth century. In contrast, in Latin America land was concentrated in the hands of a small elite engaged in the production of sugar, cotton, or coffee. There, funding the introduction of a public education system was far more challenging. This ultimately had terrible consequences for their long-run development prospects.

While Latin America provides the more distinctive set of evidence (Coastworth 1993, Sokoloff and Engerman 2000, Nugent and Robinson 2010, Easterly 2007), the literature relating land inequality and education provision also deals with the historical experiences of the United States and Europe. Galor et al. (2009) analyze the US “high-school movement” in the early twentieth century. Land concentration is instrumented with variation in the relative price of crops subject to economies of scale — cotton and sugar cane — and with state specific climate conditions. Results suggest that land inequality had a significant adverse effect on educational expenditures. This finding is confirmed by Vollrath (2009), who nevertheless shows that differences in schooling between the north and the south of the United States cannot be entirely attributed to differences in farm size distribution. For Europe, Cinnirella and Hornung (2011) analyze the case of nineteenth century Prussia. Instrumenting land concentration with soil quality (Bhalla 1988, Bhalla and Roy 1988, Benjamin 1995), they find that a negative causal relationship between landownership concentration and school enrollment rates.

Finally, Clark and Cummins (2012) analyze the case of England, and show that literacy rates between 1815–45 varied across regions, but due to culture, not to landownership inequality. In order evaluate the correlation between landownership concentration and the provision of public education in England, I focus instead in the post 1870 period, when a public education system financed through property taxes for the very first time. Before, the state did not even dip its toes on the provision of education. The elementary system was based on Voluntary schools, ran by the church, and funded only with local endowments, subscriptions, and bequests (Mitch 1992: p. 115). In this context, landowners might have subsidized education because of religious motivations, or because rivalry and emulation among their fellows (Hurt 1968). In any case, these motives are at odds with a landowner's willingness to be taxed for the provision of public schooling. As Thompson 1963 makes clear, the efforts of landowners "proceeded a little sporadically and lazily until galvanized into a sudden fury of action the 1870 Education Act." Thus, I see my paper as the first one to analyze the relation between land concentration and state-sponsored education for England and Wales.

An important contribution of this paper with respect to the previous literature is that I examine the effects of landownership concentration on a broader set of outcomes beyond enrollment and literacy rates. To do so, I use a source that, to the extent of my knowledge, remains unexplored by economists: the reports of the Committee of Council on Education. This source contains information of School Board funding, expenditures, and educational outcomes. In detail, the reports asses how much School Boards raised from rates versus how much they received from the Committee of Education. The reports state how this money was spent: number of elementary schools built, teachers hired, expenses for maintenance, average cost of each scholar in attendance, interests from loans, ... Interestingly, the reports can be also used to check whether students were actually learning something. In detail, the reports state the percentage of scholars passing the national reading, writing, and arithmetics exam, as well as standard measures of enrollment.

In an intriguing work, Acemoglu et al. (2007) suggest that economic inequality may be confounded with political inequality. Thus, the correlation between land distribution and education provision may work through more than one channel. Using micro-evidence from Colombia, the authors show that once one controls for the degree of monopolization of public office, land inequality is no longer negatively associated with school enrollment. This powerfully suggests the existence of a political channel. By comparing the effects of land concentration in the hands of peers versus commoners, I will also be able to disentangle "pure" economic inequality from political inequality. My results are in line with Acemoglu et al. (2007). In England and Wales, land inequality affected the provision of public schooling through a political economy mechanism.

My paper studies how the struggle between entrenched landed elites and emerging capitalists shaped the expansion of public schooling in England. This sheds light on the effect of social conflict on the adoption of superior institutions. On the one side, Bourguignon and Verdier (2000) argue that as long as political participation is determined by education, capitalists may oppose the provision of public schooling. Another stand of the literature suggests that interest groups not only limit the introduction of superior institutions such as public schooling. They also may block the adoption of new technologies (Mokyr 1990, Parente 2000, Acemoglu and Robinson 2006). In contrast, I argue that in England the provision of public schooling was in fact the result of an intra-elite struggle between capitalists and entrenched landowners, and not the result of the social conflict between masses and elites. A similar argument is made by Galor and Moav (2006) for the provision of public education, Lizzeri and Persico (2004) for public services, and by Doepke and Zilibotti (2005) for child labor restrictions.

Finally, this paper is also tangentially related to the Victorian decline literature. The classic explanation for Britain's loss of industrial leadership in the late-nineteenth century is the so-called "entrepreneurial failure" (Landes 1960, Saul 1968, Aldcroft 1964). According to this view, entrepreneurs failed to adopt the best available techniques, did not understand the growing importance of science, over invested in old staple export industries, were bad salesmen, and were insufficiently aggressive to extract monopoly profits from the whole world. These claims have proved to be utterly inconsistent with the quantitative evidence (Coastworth 2004). Indeed, substantial cliometric research (reviewed in Mc-

Closkey and Sandberg 1971, Nicholas 2004) makes clear that the economy was growing as fast as it was allowed by exogenous constraints.[4] Institutional rigidity (Elbaum and Lazonick 1984), a rigid class structure (Weiner 1981), the gentrification of successful capitalists (Thompson 1994), or the predominance of Anglicanism over non-conformism (Berghoff 1990) may instead explain why the "industrial spirit" weakened in England.

Education has also been considered as a potential explanation. Despite the fact that the introduction of public education in England lagged behind Prussia and the United States by half a century (Sanderson 1995), the focus has not been on this delay but on the nature of education. Allen (1979) suggested that schools such as Eton, Harrow, or Rugby, instilled aristocratic values and taught the classics, but excluded science and technology studies from the curriculum. It is not clear, however, that the French and German schools were more conductive to commercial and industrial progress (Pollard 1989, Berghoff and Moller 1994, Cassis 1997). Independently of what was taught, what is clear is that these schools were truly public and had been at place for a much longer time than in England and Wales. My hypothesis suggests that the British aristocracy weakened the "industrial spirit" not (only) by encouraging gentrification of emerging capitalists, but (also) by depriving the masses of education. After years of blaming the entrepreneurs, perhaps it is time to turn our attention to this class of land *rentiers*.

2.3 Historical background

Alonzo Potter, an American educator in the nineteenth century, came back from his trip around England shell-shocked. He wrote that "England has

[4] The clearest example of this is to be found in the cotton textile industry: While New England entrepreneurs were switching to a new technology — ring spinning — as a method of spinning cotton, in the mills of Lancashire industries installed mule spindles. This decision to persist with mules was not the result of entrepreneurs' failure to adopt a new technique, but an optimal response to demand for high-quality goods, and to factor costs (Sandberg 1969, Leunig 2001).

neglected the education of her laboring population, and the consequence is that the land swarms with paupers and vagabonds."[5] The introduction of public education in England and Wales lagged behind west Europe and the United States by fifty years (Sanderson 1995). While Prussia pioneered the development of national education in the eighteenth century, it was not until 1870 that a public system was established in England. Compulsory schooling was not effective until the 1880's (Green 1990). The state of Pennsylvania abolished tuition fees in 1834 (Cubberley 1934), but English elementary schools only became entirely free by 1891. Most notably, secondary schools remained exclusively private until the Balfour's Education Act of 1902. In contrast, Napoleon had created the state *lycee* exactly a century before (Moody 1979). As a consequence, in 1851 30 to 33 percent of the English adult population could not read nor write, in contrast with a 20 percent in Prussia (in 1849), and 9 percent of white Americans (in 1860). Although in 1878 adult illiteracy had reduced to 23 percent in England, it still lagged behind Germany and the United States, with 12 and 9 percent respectively.

It would be an over exaggeration to state that England did not create something like a network of elementary schools in the nineteenth century, but certainly it did so without state intervention. The system was based on Voluntary elementary schools and fee-charging secondary institutions like Eton, Rugby, or Harrow. The state barely dipped their toes in the management of Voluntary elementary schools. They were run chiefly by the National Society (Church of England) and the British and Foreign School Society (non-conformists), who did not receive local tax moneys (Green 1990).

In the 1867 Interntional Exposition in Paris, it became crystal-clear that this *laissez-faire* policy was damned. After winning most of the prizes in the Crystal Palace Exhibition of 1851, the performance in 1867 was rather disappointing: in all of the ninety classes of manufacturers, England only dominated ten. According to Lyon Playfair, member of the jury, England fell behind other nations because "France, Prussia, Austria, Belgium and Switzerland possess good systems of industrial education

[5](Potter and Emerson 1989: p.116).

and É England possesses none."[6]

Forster's Act (1870) was the response to this perceived need for England and Wales.[7] There were objections to the concept of universal education, though. The main fear was that education would make laboring classes "think" and revolt once they realized how miserable their life conditions were (Stephens 1998). Perhaps because of this Forster's Act was never meant to fully break with the existing voluntary system. By 1881 there were only 3,692 (national) public schools against 14,370 Voluntary schools. By the turn of the century, only 50 percent of children attended public schools (Green 1990: p.7). In any case, the Act recognized that the establishment of elementary schools was the responsibility of the state, and it is considered the first attempt to introduce a national school system in England and Wales.

In particular, Forster's Act declared that the ratepayers of each Poor Law Union or borough could petition the creation of a School Board if the district suffered from a substantial shortfall in education. Board powers included: Raising funds from a rate; Building and running public schools, where existing Voluntary schools; Subsidizing Voluntary schools; Paying the fees of the poorest children to attend Voluntary schools; and Creating by-laws making attendance compulsory.

School Boards financed these policies by local rates, that is, prop-

[6]Quoted in Green (1990), p. 296.

[7]A similar act was passed in 1872 for Scotland. In opposition to England and Wales, it required compulsory attendance from the start, although fees still had to be paid until 1890, only one year before the Free Grant Act virtually established free education in England. The challenges faced by School Boards in Scotland were somehow different to those in England. In particular, problems arose where teachers who spoke no Gaelic attempted to teach children who did not know English (Tod 1873). Another important difference is that, in Scotland, the churches made a great contribution to the new system by handing over their schools without charge to the School Boards (Tod 1873). Instead, in England church leaders managed to be voted onto some boards, restrict the building of public schools, or divert the funds raised from rates to church schools (Stephens 1998). Finally, Scottish School Boards were coordinated by the Scotch Education Department, with no intervention from the English administration. Therefore, although the 1872 Scottish Education Act resembles Forster 's Act 1870, the English and Scottish experiences are too different to be included in the same analysis.

erty taxes.[8] They were also eligible for grants from the central Education Committee. Grants were given on the basis of the performance of public schools in the national reading, writing, and arithmetics exams. This "Payment by Results" policy was accused of limiting elementary education to the three "Rs"[9] (Green 1990: p.7). Finally, School Boards also gathered some money from school fees and books sold to children.

According to Galor and Moav (2006), we should expect landowners to be less willing to pay these rates for the provision of education. The election system of Board members suggests that landowners could effectively undermine the provision of schooling. First, because Board members were elected only by ratepayers. Only those paying an annual rent of £10 or holding land valued at £10 could vote.[10]

In addition, the voting system was cumulative voting. Each voter could choose three (or more) Board members from a list of candidates, and those with the highest number of votes were chosen. This system ensured that landed and religious minorities could ensure some representation on the Board (Stephens 1998).

Between 1870 and 1899, several Education Acts enforced and extended the principals of Forster's Act. Table 2.1 presents a timeline of the reforms. Importantly, attendance was made compulsory in 1880, but free elementary schooling was not established until 1891. The School Attendance Acts expanded the age of compulsory schooling until 11 and then 12 years.

School Boards were finally abolished by the Balfour Education Act (1902), which replaced them with around 300 Local Education Authorities. Between 1870–1902, School Boards created 5,700 public schools, providing education for 2.6m pupils (Stephens 1998). Was this sufficient

[8]Rates are a type of property tax system in the United Kingdom. The system of rates had their origin in the Poor Law Act 1601, for parishes to levy rates to fund the Poor Law. Forster's Education Act dictated that School Boards would finance themselves by a precept (a requisition) added to either the local poor rate or the municipal rate (Stephens 1998).

[9]That is, reading, writing, and arithmetics.

[10]The franchise was somewhat different from national elections, since female householders could vote and stand for office.

to overcome England's education shortfall? Did entrenched landed elites gain control of School Boards where they were more powerful? The next section describes the data sources that I will use to answer these questions.

2.4 Data

The data for this project comes from three main sources, two of which are newly computerized. To measure the provision of public schooling, I exploit a rich source which, to the extent of my knowledge, remains unexplored by economists: the reports of the Committee of Council on Education. This reports contain information on School Board funding, expenditures, and various educational outcomes beyond traditional measures such as literacy rates. To measure landownership concentration, I will draw evidence from Bateman's *The Great Landowners of Great Britain and Ireland*. Finally, to control for alternative determinants of schooling provision, I use Hechter (1976) UK county data, 1851–1966.

2.4.1 Reports of the Committee of Council on Education

In 1839 the Committee of Council on Education was created to replace the Church of England and Non Conformist societies in the duty of allocating school grants. The annual reports of this Committee stand as "the most significant single source in existence for the study of elementary education, particularly on State interest in public education, during virtually the whole long reign of Victoria" (Stephens 1997). Importantly, the Committee reports are suited for analysis both at the national and at the regional and local level, since most of the evidence is broken down by counties and districts. A great deal of quantified data is provided, especially for the period 1854 to 99. In detail, the data comprises three dimensions of schooling: School Board funding, that is, the money raised to provide public education, School Board expenditures, and education outcomes, the results from these polices.

Figure 2.2 illustrates the evidence on School Board funding. For the sake of illustration, I extract the information of School Boards located in Berkshire from the 1883–84 report. The three main sources of income for School Boards are reported: grants from the Committee (column 1), funds raised from local rates (column 2), and school fees (column 3). Also, the reports state the School Board endowment, the funds raised from loans, and finally the income arising from other sources. Note that all this information is presented at the School Board level.

Similarly, the reports account for how School Boards spent these funds (Figure 2.3). In particular, there is information on how much was spent on election or on salaries. The reports also state the fraction of income devoted to running and maintaining Public and Industrial schools. The first were the schools created in districts where Voluntary schools were insufficient, the latter consisted in secondary institutions aimed at educating future industrialists. Finally, building and furnishing expenses, legal costs, interests on loans, and School Board indebtedness are reported.

Interestingly, I can assess whether these funds and these expenditures actually helped the children to learn something. From 1879–95, the reports state how many kids passed the reading, writing, and arithmetic national exams. The number of examinees is broken down by standards, from copying a manuscript and simple additions to writing a letter and mastering fractions.[11] These exams were used by inspectors to evaluate the task of School Boards. Committee grants were given as a function of results. This was known as "Payment by Results." Of course, there was an incentive to limit education to the three "Rs" (Green 1990: p.7), which may explain the high success rates. Finally, the reports also provide information on traditional education "outcomes" such as enrollment rates and school attendance.

I computerized School Board funds, expenditures, and education outcomes at the county level for all the reports digitalized by the Northwestern University library.[12] In sum, I have information of School Board funds from over 1,000 county-year observations.

[11] See Appendix A for a detailed description of the standards.

[12] These are the reports for 1870–71 to 1877–78, 1879–80 to 1886–87, 1888–89, 1890–91 to 1891–92, and 1893–94 to 1894–95.

Table 2.2 presents some descriptive statistics of the computerized variables. School Boards mainly financed their activities by raising funds from rates. This property tax collected, on average, 11 pence per capita, almost doubling what School Boards received from the Committee of Council on Education (6.66 pence p.c.), and much more than what was collected from fees and books sold (2.4 pence p.c.). Funds from rates present the larger standard deviation, suggesting that while some counties were eager to collect money for education from property taxes, others were not so keen to this possibility. While School Boards in Essex collected 28.3 pence p.c. between 1894–95. In contrast, Rutland only raised 2.3 pence p,c. from rates the same year.

For a more comprehensive comparison, Figure 2.5 plots the evolution of the funds raised from rates for two different groups of counties: those at the top 10 percent of the distribution in terms of average funds from rates (Essex, Cardiganshire, Warwickshire, Monmouthshire, and Merionethshire), against those in the bottom 10 percent (Cheshire, Rutland, Dorset, Wiltshire, and Oxfordshire). The patterns could not be more different. While both sets of counties see an increase in the funds raised from rates overtime, in the top 10 percent counties it is much more pronounced. In particular, although in the first five years after Forster's Act (1870) differences are not great, by 1890's, the top 10 percent counties collects 30 more pence per capita, that is, 7 times more funds from rates.

Back to table 2.2, one can see that, in terms of expenditures, School Boards were mainly committed to the maintenance of Public elementary schools. On average, more than 60 percent of the money was spent on these institutions. Again, the standard deviation is large, suggesting that depending on the county where it was located, a School Board devoted different efforts to building and running public schools. Following our previous example, in 1893–94, School Boards located in Essex spent, on average, 58.8 pence per capita in public schools, while Rutland only devoted 2.6 d. Note also that the contribution to Industrial schools is negligible, suggesting that these institutions were not taken very seriously in late-Victorian England.

Finally, the high percentage of scholars passing the writing, reading and arithmetics exams reflects the “Payment by Results” policy. The high success rates are explained by the fact that grants were given as a function of exam results. However, there is still some variance, both across exams and across counties. The writing, and especially, the arithmetics exam seem to be harder to pass. Also, as Figure 2.6 makes clear, not all counties performed equally. The chart plots the kernel density of passes across counties for each of the exams. For example, in arithmetics, the percentage of passes ranges from 70 percent (Huntingdonshire) to 82 percent (Lancashire). This suggests that cross-county variation in examination results can be useful to evaluate differences in educational attainment.

2.4.2 Bateman’s *Great Landowners*

Bateman’s *Great Landowners* consists on a list of all owners of 3,000 acres and upwards by 1876, worth £3,000 a year. Also, 1,300 owners of 2,000 acres and upwards, in England, Scotland, Ireland, and Wales are included. In the appendix, the book provides a table for each county showing the number of landowners and cumulative acreage, all divided into eight classes according to acreage and social status: – Peers: Peers or peers’ sons holding 3,000 acres and upwards.

– Great landowners: Commoner owners of 3,000 acres and upwards.
– Squires: owners of 1,000 and 3,000 acres.
– Greater yeomen: owners of 300 and 1,000 acres.
– Lesser yeomen: owners of 100 and 300 acres.
– Small proprietors: over 1 acre and under 100.
– Cottagers: holdings under 1 acre.
– Public bodies: public properties

Bateman’s data is particularly suited for the purposes of this paper. First, it allows me to measure landownership concentration as the share of a county under large landholdings (over 3,000 acres), instead of using the Gini coefficient. I argue, like Cinnirella and Hornung (2011), that political power in nineteenth-century England was associated with the size of land property. Therefore, my measure captures better the effects of “political inequality” than the standard Gini measures of inequality.

Moreover, the Gini index measures both between group and within group inequality. The latter, excluded by my measure of land concentration, is not necessarily associated with an unwillingness to pay for education.

The second advantage of Bateman's data is that it distinguishes between peers and commoners. All landowners had the incentive to oppose the provision of public education, but peers were the ones holding most of the political power, specially but not only in the House of the Lords. Therefore, disentangling land concentration with respect to the status of the landowner I will be able to disentangle economic from political inequality as in Acemoglu et al. (2007).

The greatest shortcoming of Bateman's evidence is that it is a cross-section survey. It was only done in 1876, so I will not be able to exploit time variation in land concentration. However, Britain's land distribution, especially with respect to the largest estates, was quite stable by the end of the nineteenth century. According to Beckett (1977), "since the publication of Sir John Habakkuk (1939) seminal article on English landownership it has generally been held by historians that in the later seventeenth and eighteenth centuries there was a discernible trend of change in the pattern of landownership, which produced a period of stability from about 1750" (p. 567). In sum, Bateman's survey on 1876 can be taken as representative for the whole Victorian period.

Table 2.3 shows the distribution of land for the average county. On average, the largest share of a county is on the hands of large landowners. In particular, 30 landowners own 260 thousand acres out of a total of 630 thousand acres. That is, on average, around 40 percent of a county is on the hands of a small group of large landowners. In opposition, 12,000 cottagers only own 2,6 thousand acres, less than 0.5 percent of the total. Figure 2.7 plots the corresponding Lorenz curve.[13] The Gini index is 0.94, which gives a clear idea of how unequal the land distribution was in England and Wales in the late nineteenth century. Disentangling large landowners into peers versus commoners, it would seem that both groups were in possession of similar amounts of land (106 to 152 thousand acres). However, a peer landowner held 14 thousand acres of land on average,

[13]Calculated excluding public bodies and waste.

while each commoner large proprietor was "only" in possession of 6.5 thousand acres.

Table 2.3 suggests that the lion's share of land was on the hands of the aristocracy. However, across counties there was a meaningful variation in landownership concentration. Figure 2.8 shows the geographical distribution of peer landownership. In Lancashire, the cradle of the Industrial Revolution, and in the rich South East, peers hold a lower share of land. Between 5.1 and 14.4 percent of all landowners are peers in these counties. In contrast, in the West Midlands, Yorkshire and the Humber and the North East region, land seems to be more concentrated in the hands of the peerage. In Rutland, an extreme case, almost a half of the land belonged to members of this class!

2.5 Empirical analysis

2.5.1 The relationship between land inequality and education

To what extent entrenched landowners affected the well-functioning of School Boards? Was land concentration, especially in the hands of a political elite, a threat to the expansion of education in late-Victorian England? To answer these questions I exploit cross-county variation in land concentration. In detail, I check whether School Boards located in counties were land inequality was high systematically under-provide education between 1870–1895.

Figure 2.9 suggests that, in fact, land inequality had a negative impact on education provision. The chart plots the kernel density function of funds raised from rates, the major source of income for School Boards, for two different sets of counties: Counties with large (above median) versus small (below median) land concentration. Land concentration is measured here as the share of a county in the hands of landowners in possession of 3,000 acres or more. Clearly, the estimated distributions are different. Between 1870–95, School Boards in counties with low levels of land concentration raise more funds for public education. The distribution for this counties is concentrated at 80 pence p.c. Instead, where land is largely concentrated property taxes only collected between 0 and 40 pence per capita.

The threats to this simple identification strategy are evident. One could argue that an omitted variable may be driving both land inequality and education measures. For example, counties with large landownership concentration might be poorer or less industrial, factors also affecting education provision. To account for that, my regressions will include a rich set of county-level controls such as income, occupational structure, religious composition, or political preferences (Hechter 1976). Formally, I specify the following relation between land inequality and schooling provision:

$$edu_{c,t} = \alpha + \beta \, land_c + \mathbf{V}'_{c,t}\gamma + \epsilon_{c,t} \tag{2.1}$$

where $edu_{c,t}$ is an education measure in county c at decade t (e.g.. funds raised from rates, expenditure in public schools, examination results, ...); $land$ stands for landownership concentration. In detail, it is the share of county c in the hands of large landowners, that is, those in possession of 3,000 acres and upwards; and $\mathbf{V}_{c,t}$ is a vector of county-decade controls, including income, urbanization rates, occupational structure, ideology, percent non-conformists, religiosity, and a dummy for Wales.

Since Hechter (1976) county-level data only varies by decade, I use decade averages for my education measures rather than their annual values. Unfortunately, my measure of land concentration does not vary over time. This is not a great concern, since Britain's land distribution was quite stable by the end of the nineteenth century. In any case, to deal with this concern I adjust standard errors for clustering at the county level.

Table 2.4 shows the effects of land concentration on School Board funding. School Boards located in counties where land was more concentrated raised less money to invest in public education: they raised less funds from rates, received scarcer grants from the central Education Committee, and also extracted less from fees and books sold. Note that the effect is particularly strong for rates: every percentage point increase in land inequality decreases these funds by 0.17 pence p.c. It would seem, therefore, that the largest landowners could effectively oppose paying for education with taxes on their properties.

Results are robust to the inclusion of controls. As expected, more industrial and urbanized counties raise more funds. In particular, one percentage point increase in the share of employment in the manufacturing sector increases funds raised from rates and Committee grants by 0.1 pence per capita. The fact that landownership concentration and manufacturing employment have opposite signs hints a clash between landed and industrial elites for the provision of public education in late-Victorian England (Lindert 2004, Galor and Moav 2006).

Political ideology does not seem to have a large effect, at least when compared to religiosity and to the percentage of non-conformists in a county. This is consistent with the traditional view that non-conformists were more willing to support public, non-denominational education (Galor and Moav 2006). Finally, income has a negative effect on School Board funds. In particular, a 10 percent increase in income would decrease by 0.4 pence p.c. the funds raised from rates, and in 0.6 pence p.c. Committee grants. This negative relation may be explained by the fact that, *ceteris paribus*, richer counties were already in possession of a proper education network based on Voluntary schools, and thus did not require to raise much funds for School Boards.

One should expect counties raising less funds to under-provide education. Table 2.5 shows that, where land was more concentrated, lower funds implied that the educational system relied more heavily on existing Voluntary schools than on newly built public schools (column 3). In detail, one percent increase in the share of large landholdings decreases by 0.8 the ratio of public over Voluntary schools. Not only the number of schools built is affected by landownership concentration, but also the money spent on them. Every percentage point increase in land concentration decreased in 0.3 pence p.c. the money spent on running and maintaining public schools (column 4).

The effect, however, seems to be negligible for industrial schools. These were the only free secondary schools at the time. Their aim was to educate future industrialists. However, it does not seem they were taken very seriously anywhere in England and Wales, independently of the level of land concentration.

The number of teachers and the average cost per scholar were lower in counties where land was more unequally distributes, but the coefficient is not statistically significant. It would seem, therefore, that entrenched landed elites were more opposed to spend money on infrastructure than on hiring and training teachers.

Again, control variables indicate that School Boards spent more in building and running schools in industrial, non-conformist counties. The coefficient for income is negative and significant for the ratio of public to Voluntary schools. This result is consistent with the hypothesis stated above that richer counties were already in possession of an acceptable education network based on Voluntary schools, and thus did not require to raise as much funds for School Boards. On the contrary, the effect of income seems to be positive for the number of certificate teachers in a county, although again the coefficient is not statistically significant.

Finally, table 2.6 shows the effects of under-investment in education on educational outcomes. It seems that children from counties where land was highly concentrated were less likely to pass the reading, writing and, especially, the arithmetics exam. Every 10 percent point increase in land concentration decreases the chances of passing the reading and writing exams in 0.7 percent, and the arithmetics exam in 0.9 percent. Given the high success rates — explained by the "Payment by Results" policy — these marginal effects are considerably large.

In opposition, the traditional measures of educational attainment — enrollment rates and average attendance — are not significantly affected by landownership concentration, although coefficients point in the expected direction. The lack of statistical power is explained by the fact that in 1880 education was made compulsory for all children aged 5–11.

Finally, note that counties where manufacturing was important display higher success rates in the national exams, more students presented for examination, and also higher enrollment rates. Surprisingly, income at the county level affects negatively the changes to pass the exams.

2.5.2 Political channel? Peer vs. commoner landowners

In the previous section I showed a robust negative association between landownership concentration and funds raised for public education in late-Victorian England. As a consequence, investment in education infrastructure was low and schooling results miserable. This relation, however, might be driven by factors other than the political opposition of landowners to pay for the provision of education with taxes on their properties. Economic inequality may also interact with imperfect capital markets (Banerjee and Newman 1993 and Galor and Zeira 1993) or distort the composition of aggregate demand (Murphy et al. 1989). This may have affected indirectly the provision of public education.

To isolate the political component of land inequality, I disentangle landownership according to the status of the landowner. Bateman's *Great Landowners* allows me to distinguish what fraction of large estates was owned by members of the aristocracy, and what fraction was owned by commoners. In nineteenth century England, political power was heavily concentrated on the former. According to Douglas Allen,

> It is hard to exaggerate the extent to which the aristocracy ruled Britain through its control over what we now call public offices. Both houses of Parliament were controlled by them until the turn of the twentieth century. The King 's household, which evolved into the executive arm of the government, was the domain of the aristocracy, as were the great offices and tenures of state. The army and navy officers were drawn from the aristocracy, as were the judges, justices of the peace, and other local administrators. (Allen 2009: p. 301)

Thus, if landownership concentration affects the provision of education through a political channel, the status and political influence of landowners should matter. In detail, the negative effects on education funds, expenditures of School Boards, and educational outcomes should be greater in counties where land was heavily concentrated in the hands of peers.

Figure 2.10 illustrates the argument. I plot the average per capita funds raised from rates overtime for two groups of counties: those where the relative number of peer landowners is above versus below the median. The right panel does the same for commoner in possession of 3,000 acres and upwards. Clearly, funds raised from rates were larger in counties with fewer relative number of peers (left panel). Instead, a greater concentration of landownership in the hands of commoners does not seem to affect much the capacity of School Boards to raise funds for education (right panel).

In Table 2.7, I present the results of running equation (1) disentangling peer versus commoner landownership. In detail, land concentration is split in two variables: the share of a county owned by peers and the share owned by commoners in possession of 3,000 acres and upwards. The effect of land concentration on education provision is driven mainly by peer landownership. School Boards in counties where land was heavily concentrated in their hands raise less funds from rates and receive less grants from the Education Committee. For example, one percent increase the share of peer landownership decreases by 0.2 pence p.c. the funds raised from rates. For land concentration in commoner hands, the effect is halved and not statistically significant. Commoner landownership significantly affects the funds raised from school fees and books sold. However, the magnitudes are much smaller than for grants and funds from rates, the two main income sources and those to which landowners would be more opposed.

Where the peerage held the lion's share of land schooling funds were low. Table 2.8 shows that this affected the provision of public schooling. Where land was heavily concentrated in peerage possessions, fewer elementary schools were built and fewer School Boards were established. Commoner landownership actually had the opposite effect. This is also true for the number of certificate teachers, although again without statistical significance. Finally, the average expense per scholar decreased in one pence per capita for every additional percentage point land concentration in the hands of peers. It is not affected, though, where large landholdings had commoner proprietors.

Finally, where the peer-commoner difference is perhaps clearer is in terms of education outcomes. In counties where most great lords were peers children where less likely to pass the writing, arithmetics, and reading national exams. In particular, every 10 percent increase in the share of large landholdings owned by peers decreased approximately by 1 percent the chances for examinees to pass these exams. Instead, commoner landownership does not have any significant effect.

School attendance and the number of examinees presented at each county present an even more pronounced pattern. These outcomes are negatively associated with the share of peer large landholdings, while commoner landownership has the opposite effect.

These results suggest that landowners in general opposed the provision of public schooling, but could only do so effectively if they held sufficient political influence. In particular, in counties where land was highly concentrated in the hands of peers, this elite managed undermine the introduction of an effective public education system. This is how England and Wales failed to educate their workforce.

2.6 Robustness

In this section, I stratify my dataset by observables to identify the regions of England where the association between landownership concentration and under-investment in education is stronger. In addition, I gauge the potential effect of unobserved variables in this association using the insights from Altonji et al. (2005).

2.6.1 Sample stratification

An article in The Economist (The Economist 2012) suggested that the cultural, political, and economic differences between the north and south of England were growing to the extent that they were almost separate countries. By the end of the nineteenth century, the North-South divide was already clear. The agriculture in the industrial north was pastoral, while in the south grain production predominated (Clark and Cummins 2012). In this section, I gauge the extent to which my results are driven by these stark geographical differences between the North and the South.

In Table 2.10, I examine if the association between landownership concentration and funds raised for education is broadly similar when I subdivide the sample into northern versus southern counties. Both in the North and in the South, School Boards in counties where land was more concentrated raised less money for education. The magnitude of the effects, however, seem to be larger in the North. In detail, one percent increase in land concentration in the hands of peers decreased by 0.2 pence p.c. the funds raised from rates in the South and the Midlands, by 0.3 pence p.c. in Wales, and by 1,92 pence p.c. in the North. This suggests that in the North peers could exhort a stronger political opposition. They effectively avoided being taxed to pay for education, consequently undermining the introduction of an effective public education system in the North. This pattern is reproduced when I look at grants received from the Committee and school fees. Note also that, in all specifications, landownership concentration in the hands of commoners plays little role everywhere except in the South.

2.6.2 Assessing selection on unobservables

One of the potential weaknesses of my empirical specification is the paucity of control variables. To assess the potential effect of unobservables, I use the insight from Altonji et al. (2005) that selection on observables can be used to gauge the potential bias from unobservables. The strategy consists in examining how much the coefficient of interest changes as control variables are added, and then infer how much strong the effect of unobservables has to be to explain away the estimated effect. Formally, consider two individual regressions of the form $edu_{c,t} = \alpha + \beta land_c + \mathbf{V}'_{c,t}\gamma + \epsilon_{c,t}$. In one regression, $\mathbf{V}_{c,t}$ only includes a subset of all control variables. Call the coefficient of interest in this "restricted" regression β^R. In the other regression, covariates include the "full set" of controls. The corresponding coefficient is β^F. The ratio $\beta^F/(\beta^R - \beta^F)$ reflects how much selection on unobservables needs to be (relative to observables) for results to become insignificant.

Table 2.11 presents the Altonji et al. ratios. Of the 96 ratios reported only two are less than one. In absolute values, the ratios range from 0.7 to 211.5, with a mean ratio of 6.9. In terms funds raised for education the ratios are larger when landownership concentration is defined as land in the hands of the peerage only. For example, consider the baseline specification and a restricted regression with no controls. In this case, the effect of unobservables would have to be 3 times larger (and act to the opposite direction) than the effect of the covariates to explain away the negative impact of peer-landownership on funds raised from rates. The ratios are also large for School Board expenditures and schooling results.

2.7 Conclusion

Sokoloff and Engerman (2000) and Galor et al. (2009) famously argued that an unequal distribution of land might slow down the implementation of public schooling. In this paper I have provided strong evidence suggesting that this explanation is particularly suited for England and Wales. Between 1870–95, England and Wales systematically under-invested in educating their workforce. This pattern was particularly clear where the entrenched landed elites, especially anointed peers, held the lion's share of land.

To quantify the relation between landownership concentration and public schooling, I have analyzed the work of School Boards. These public bodies, introduced after Forster's Education Act (1870), were in charge of providing public elementary education at the local level for the first time in England's history. I find that School Boards in counties where landownership was more concentrated raised less funds from rates, received less money from the central Education Committee, and even collected less from school fees and books sold. As a consequence, investment in education provision (schools built, teachers hires and trained, etc.) was scarce, and the system relied more on existing Voluntary schools run by the Church of England and non-conformist societies. This under-investment in education had important consequences for schooling achievement. Children raised in counties with more land inequality were less likely to pass the reading, writing, and arithmetics national exams.

These correlations are robust to the inclusion of many county level controls, such as income, occupational composition, urbanization, or religiosity. Interestingly, the correlation between education provision and the percentage of workers employed in the manufacturing sector is positive. The opposite effects of land concentration and manufacturing employment suggest that the provision of public education masks a clash between old landed elites and emerging industrialists (Galor and Moav (2006)). While emerging capitalists might be willing to support and subsidize education, entrenched landowners oppose educational reforms because human capital and agrarian work are not complementary, and to reduce the mobility of the rural labor force.

This result is in line with a large body of work arguing that a negative correlation between landownership inequality and education provision exists in various settings (Coastworth 1993, Sokoloff and Engerman 2000, Easterly 2007, Nugent and Robinson 2010, Galor et al. 2009, Vollrath 2009, Cinnirella and Hornung 2011). However, according to Clark and Cummins (2012) England seems to be an exception to this rule. They conclude that "large scale farming has no connection with illiteracy in England" (p. 31) between 1810–45. In this paper, I argue that England was no exception: when the first public education system was introduced in 1870 and education no longer relied exclusively on Voluntary schools — subsidized by subscriptions and bequests — but on public schools — funded with taxes on property — the provision of education depended largely on the land distribution.

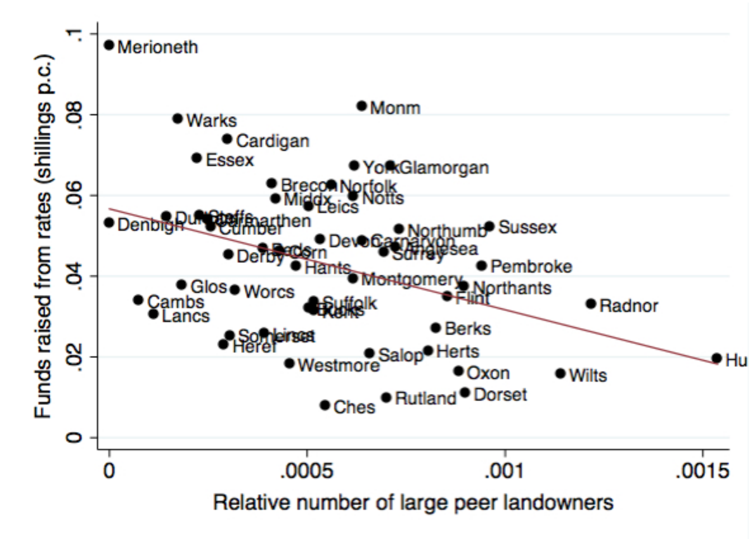
In contrast to previous work, I asses this correlation for a broader set of educational outcomes beyond literacy and enrollment rates. Instead, I exploit the reports from the Committee of Council on Education, which contain detailed information on the funds devoted to education, how they were spent, and whether children where actually learning something out of it.

Moreover, as in Acemoglu et al. (2007), I identify the channel linking land inequality and education provision to be a political one. Landonwership concentration in the hands of peers has much stronger effects that the same land concentration on the hands of commoners. In opposition to commoner landowners, in the late nineteenth century peers had an enormous political power, especially but not restricted to the House of Lords Allen (2009). Therefore, it would seem that landowners may had in general opposed the provision of public schooling, but could only do so effectively if they held sufficient political influence.

Of course, this paper is about a very specific historical setting. Nonetheless, the questions it touches on are of relevance today. Piketty and Saez (2006) show that, over the last decades, inequality has increased sharply in many OECD countries. This trend is explained by the very rich, the 0.1 percent of the population, whom have accumulated the lion's share of wealth. My paper speaks to the potential negative effects of such inequality. Taxation and the provision of public schooling might be severely distorted, ultimately affecting economic growth.

2.8 Figures and tables

Figure 2.1: Relationship between land concentration and funds raised from rates



Note: The sample is all counties in England and Wales. The X-axis is the proportion of landowners in a county who are peers and own 3,000 acres and upwards. The Y-axis are the average funds raised from rates by School Boards between 1870–95, measured as shillings per capita.

Figure 2.2: School Board funding: Berkshire, 1883–84

School Board and County.	INCOME. 1. Grants from the Committee of Council on Education.	2. Amount paid to the Treasurer by the Rating Authority.	2. Equivalent to a Rate per £ on the Rateable Value of the District, of	3. School Fees, and Books, &c. sold to Children.	4. Endowment.	5. Contributions in aid of Industrial Schools.	6. Loans.	7. Income arising from other Sources.	Total Receipts.
BERKS.	£ s. d.	£ s. d.	d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Reading -	1,576 12 3	4,600 0 0	7·	646 11 7	- -	- -	4,104 0 0	- -	10,927 3 10
Balking - -	50 0 6	40 0 0	1·75	11 8 7	- -	- -	- - -	- -	101 9 1
Chieveley -	116 5 0	{ 180 0 0 { 43 15 0	6· —	} 41 18 0	22 7 11	- -	- - -	1 9 6	405 15 5
Cholsey - -	151 14 4	120 0 0	2·25	71 11 5	- -	- -	- - -	- -	343 5 9
Earley - -	421 19 9	850 0 0	8·75	158 13 6	- -	- -	- - -	- -	1,425 13 3
East Ilsley -	80 18 1	60 0 0	3·5	31 8 10	- -	- -	- - -	4 2 5	176 9 4
Inkpen - -	65 10 0	130 0 0	9·5	33 10 10	- -	- -	- - -	4 8 3	233 9 1
Leckhampstead - -	30 5 0	60 0 0	6·	12 8 10	12 7 11	- -	- - -	17 1	115 18 10
SuttonCourtney	- - -	20 0 0	1·	- - -	- -	- -	- - -	- -	20 0 0
Tilehurst -	172 1 0	300 0 0	2·75	96 7 3	- -	- -	- - -	- -	568 8 3
Total -	2,665 5 11	6,403 15 0	- -	1,098 18 10	34 15 10	- -	4,104 0 0	10 17 3	14,317 12 10

Source: Report from the Committee of Council in Education, 1883–84.

Figure 2.3: School Board expenditures: Berkshire, 1883–84

EXPENDITURE. Expenses 1. of Administration. Election Expenses.	1. Salaries of Officers of the Board.	1. Legal and other Expenses of Administration.	2. Expenses of Maintenance of Public Elementary Schools.	3. Contributions towards, or Expenses of, Industrial Schools.	4. Capital Charges. Purchase of Land, and Erection, Enlargement, or Alteration of School Buildings.	4. Capital Charges. Furnishing School Buildings.	5. Loans. Repayment of Principal of Loans.	5. Loans. Interest on Loans.	6. Expenses not included under foregoing Heads.	Total Expenditure.	Liabilities on 29th September 1883. For Loans.	Liabilities on 29th September 1883. Other Liabilities.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
10 13 6	369 14 4	127 2 5	5,038 15 8	22 16 6	3,499 9 0	608 15 8	418 15 10	850 19 2	- -	10,947 2 1	25,645 14 10	—
- -	10 0 0	3 4 10	91 18 8	- -	- -	- -	- -	- -	- -	105 3 6	- - -	18 3 7
- -	22 10 0	26 4 11	376 5 2	- -	2 18 0	- -	- -	- -	- -	427 18 1	- - -	43 8 3
- -	37 6 8	7 14 6	289 6 4	- -	- -	- -	15 11 6	52 12 6	- -	402 11 6	1,468 0 0	15 17 9
- -	95 0 0	13 16 7	1,036 0 0	- -	- -	- -	51 1 9	142 4 6	- -	1,338 2 10	4,025 2 8	—
- -	4 0 0	3 1 1	137 18 10	- -	- -	- -	- -	- -	- -	144 19 11	- - -	54 11 5
- -	10 0 0	2 5 6	160 3 8	- -	- -	- -	12 7 2	44 19 1	- -	229 15 5	1,271 18 6	—
- -	12 0 0	2 2 0	84 8 8	- -	- -	- -	4 2 5	14 19 7	- -	117 12 8	423 17 2	3 5 8
- -	10 0 0	4 3 7	- - -	- -	- -	- -	- -	- -	- -	14 3 7	—	—
- -	123 19 0	11 3 9	446 0 4	- -	- -	3 0 0	70 3 6	105 19 3	- -	740 5 10	2,596 9 6	—
10 13 6	674 10 0	200 19 2	7,660 17 4	22 16 6	3,502 7 0	611 15 8	572 2 2	1,211 14 1	- -	14,467 15 5	35,451 2 8	135 6 8

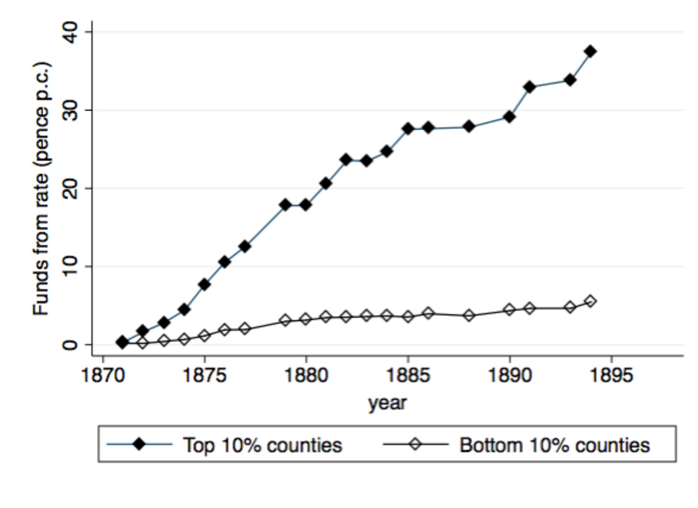
Source: Report from the Committee of Council in Education, 1883–84.

Figure 2.4: Schooling outcomes: England, 1883–84

County.	Accommodation.	Number of Scholars on Registers.	Average Number of Scholars in Attendance.	Number of Scholars presented for Examination: Under Ten Years.	Over Ten Years.	In Standards: I.—III.	IV.	V.	VI.	VII.	Number of Scholars presented, Ex. Standard VI.	Per-centage of Scholars who passed in: Reading.	Writing.	Arithmetic.
Bedford - -	30,627	25,949	19,671	7,370	6,143	10,355	1,988	849	318	3	40	82·78	80·63	78·24
Berkshire - -	41,057	36,740	28,713	10,021	9,786	14,086	3,331	1,762	588	40	25	85·68	81·98	74·84
Buckingham -	36,422	32,698	23,949	8,714	8,055	12,564	2,638	1,090	433	44	41	84·39	78·11	76·58
Cambridge -	36,224	32,121	23,197	8,878	7,811	12,530	2,519	1,137	432	71	27	86·57	76·97	73·00
Chester - -	128,523	110,627	80,909	30,047	31,130	42,591	10,478	5,888	2,143	77	213	89·17	81·64	76·08
Cornwall - -	60,252	50,700	35,273	13,445	14,248	19,962	4,274	2,255	1,025	157	76	90·13	79·44	71·34
Cumberland -	48,738	42,768	30,955	11,175	11,858	16,269	3,542	2,221	954	47	138	88·64	79·43	75·56
Derby - -	93,310	87,339	62,594	23,480	22,754	33,805	7,225	3,701	1,386	117	91	87·05	79·82	71·07
Devon - -	107,922	91,989	68,938	24,385	23,786	33,653	8,370	4,355	1,668	125	189	92·20	82·45	75·02
Dorset - -	38,650	32,013	24,034	8,528	8,109	11,468	2,909	1,475	690	95	36	91·71	80·33	75·28
Durham - -	158,528	158,493	116,613	41,883	42,006	60,994	12,841	7,081	2,734	239	304	89·49	83·04	81·65
Essex - -	99,135	92,964	68,753	25,120	24,464	36,267	7,904	3,753	1,557	103	94	88·21	77·72	73·35
Gloucester -	97,820	84,982	61,761	22,150	21,652	31,791	7,355	3,433	1,123	100	91	87·69	78·04	75·28
Hampshire -	95,501	88,171	65,038	22,341	22,694	32,468	7,440	3,658	1,392	77	102	89·45	82·59	75·80
Hereford - -	23,250	19,246	14,291	5,558	6,413	8,256	2,217	1,090	372	36	4	89·99	75·90	72·36
Hertford - -	40,217	34,617	25,803	9,328	8,508	12,906	2,952	1,320	594	64	57	87·05	76·87	69·23
Huntingdon -	12,833	10,050	7,735	2,944	2,651	4,234	860	320	148	33	8	80·52	76·57	69·26

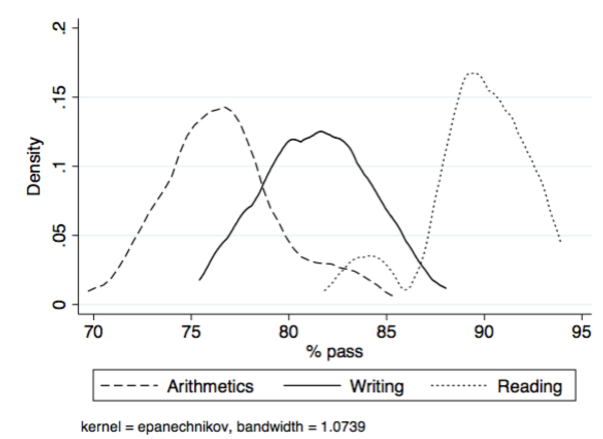
Source: Report from the Committee of Council in Education, 1883–84.

Figure 2.5: Funds from rates over time: top decile vs. bottom decile counties



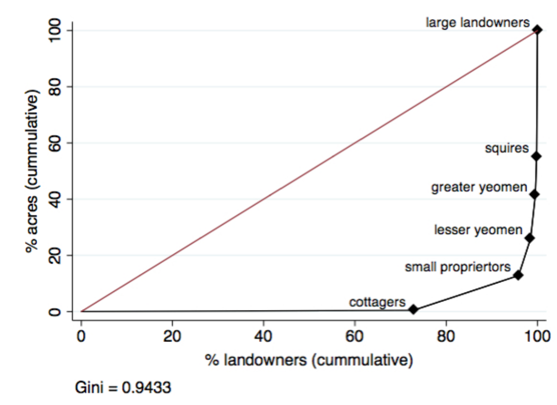
Note: The sample comprises the top counties at the top and bottom 10% in terms of funds raised from rates over 1871–72 and 1894–95 (excluding 1878—-79, 1887–88, 1889–90, and 1892–93, for which I do not have any report from the Committee of Council on Education). The top 10% counties are Essex, Cardiganshire, Warwickshire, Monmouthshire, and Merionethshire. The bottom 10% are Cheshire, Rutland, Dorset, Wiltshire, and Oxfordshire. The chart plots the average funds raised from a rate overtime, in pence per capita.

Figure 2.6: Kernel density of the percentage of scholars passing the arithmetics, reading, and writing exams



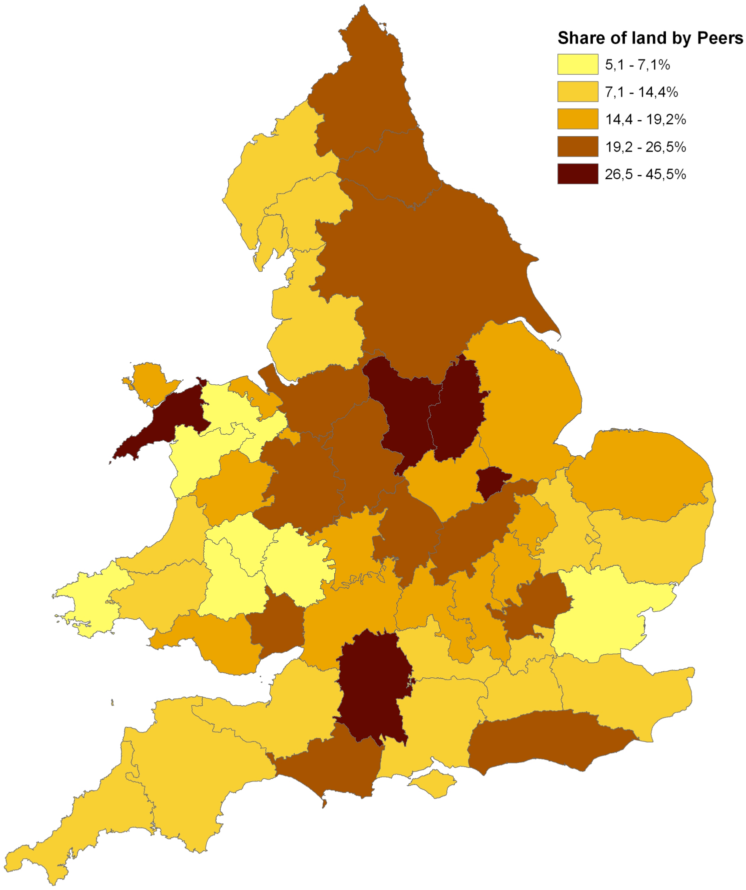
Note: The sample is all counties in England and Wales over 1879–80 to 1894–95, except 1887–88, 1889–90, and 1892–93. To calculate the kernel density estimate I use the Epanechnikov kernel with 1.0739 width.

Figure 2.7: Lorenz curve for the land distribution in the average county



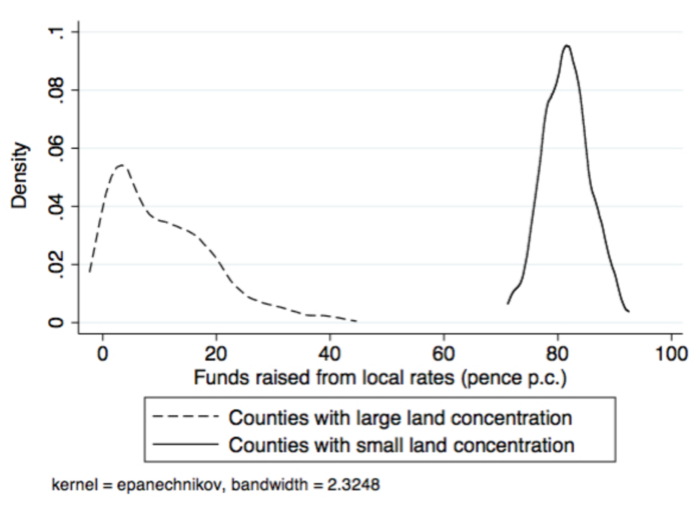
Note: The sample is all counties in England and Wales. The Lorenz curve is calculated excluding waste and land owned by public bodies.

Figure 2.8: Share of land owned by peers across counties



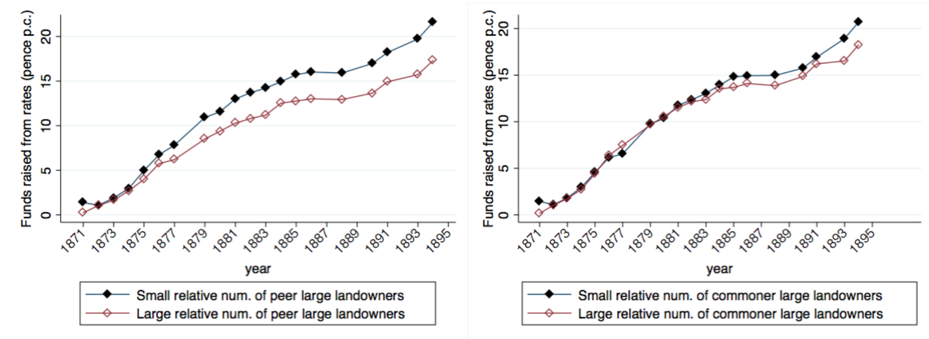
Note: The map plots the geographical distribution of landownership concentration. The latter is measured as the share of land in a county owned by peers.

Figure 2.9: Kernel density for funds from rates: counties with land concentration above vs. below the median



Note: The sample includes all counties in England and Wales over 1871–72 and 1894–95 (excluding 1878–79, 1887–88, 1889–90, and 1892–93, for which I do not have any report from the Committee of Council on Education). Counties are broken down in two groups: Counties with large (above median) and small (below median) land concentration. Land concentration is measured as the share of a county in the hands of large landowners, that is, those owning at least 3,000 acres. The chart plots the kernel density function of funds raised from rates, the major source of income for School Boards, for the two different sets of counties. To calculate the kernel density estimate I use the Epanechnikov kernel with 2.3248 width.

Figure 2.10: Funds raised from rates over time: counties with large vs. small land concentration, by status of the landowner



Note: The sample is all counties in England and Wales over 1871–72 and 1894–95 (excluding 1878–79, 1887–88, 1889–90, and 1892–93, for which I do not have any report from the Committee of Council on Education). In the left panel, counties are broken down in two groups: Counties with a relative number of *peer* large landowners above the median, and counties below the median. The left panel also breaks down counties in two groups: Counties with a relative number of *commoner* large landowners above the median, and counties below the median. The chart shows the average funds raised from a rate overtime, for each group. Funds from a rate are in pence per capita.

Table 2.1: Elementary Education Acts, 1870–1902

Year	Act	Description
1870	Forster's Act	State to provide education
1873	Education Act	School attendance condition for outdoor relief
1876	Sandon's Act	Creates School Attendance Committees
1879	Industrial School	School Boards to manage Industrial Schools
1880	Mundella's Act	Attendance compulsory for children aged 5–10
1890	Education Code	Standards of education
1891	Free Grant	Virtually establishes free elementary schooling
1893	Blind and Deaf	Special schools for blind and deaf children
1893	School Attendance	Attendance compulsory for children aged 5–11
1899	School Attendance	Attendance compulsory for children aged 5–12
1902	Balfour's Act	Abolishes School Boards

Source: Stephens (1998).

Table 2.2: Descriptive statistics

	mean	std. Dev.	min	max	N	unit
Funding						
Funds from rates	11.00	9.92	0	84.86	1055	pence p.c.
Grants from the Committee	6.66	7.19	0	42.89	1060	“
School fees and books sold	2.40	2.28	0	11.16	1055	“
Endowment	0.05	0.09	0	0.73	633	“
Aid to Industrial Schools	0.09	0.37	0	3.52	583	“
Loans	5.80	7.53	0	54.09	741	“
Other incomes	0.27	0.36	0	4.27	742	“
Total receipts	32.20	23.40	0	176.89	742	“
Expenditures						
Election	0.23	1.61	0	43.02	719	pence p.c.
Salaries of Board officers	1.39	1.25	0	24.54	561	“
Legal	0.50	0.30	0	1.60	602	“
Maintenance of Public Schools	21.37	28.46	0.19	644.15	683	“
Contribution to Industrial Sch.	0.49	2.24	0	43.43	737	“
Land purchase & building exp.	6.45	18.30	0	451.40	736	“
Furnishing	0.27	0.82	0	19.25	736	“
Principal of loans	1.88	2.69	0	43.47	737	“
Interest of loans	3.29	6.03	0	140.85	737	“
Other expenses	0.12	0.27	0	3.15	728	“
Total expenses	34.79	58.13	0	1403.5	737	“
Liabilities for loans	96.44	186.19	0	4365.0	737	“
Other liabilities	2.53	14.71	0	355.04	680	“
Average cost per scholar	1.92	0.25	1.56	4.14	639	£
Outcomes						
Reading pass	89.6	5.2	24.9	98.2	370	“
Writting pass	81.4	4.3	68	92.8	410	“
Arithmatic pass	76.6	5.2	61.22	90.3	410	“
Total pass	85.1	3.2	76.61	93.5	205	“
Examinees	51393	70556	0	368962	411	“
Examinees (specific exam)	3317	7450	17	53013	203	“
Certificate teachers	919.4	1374	43	11303	639	number
Assistant teachers	366.1	558.1	1	4339	639	“
Pupil teachers	615.7	826.1	11	4544	639	“
Female assistant	159.9	148.0	5	1007	434	“
Elementary schools	420.8	387.8	32	3153	288	“
Accomodation	109671	154997	10	868734	570	“
Scholars	74064	103858	0	567676	570	“

Source: Reports from the Committee of Council on Education.
Note: For the three main income sources (funds from rates, grants, and fees) the sample is all years for which a report was available at NWU library, i.e., All years between 1871–72 and 1894–95 except 1878–79, 1887–88, 1889–90, and 1892–93. For the remaining income sources and expenditures, 1872–73 to 1877–78 are not yet computerized. For outcomes, the data is only available for 1879–80 to 1894–95, again excluding 1878–79, 1887–88, 1889–90 , and 1892–93 for which NWU did not have a computerized report.

Table 2.3: Land distribution in the average county

	Acres		Num. of owners	
	mean	std. dev.	mean	std. dev.
Large landowners	258,625.0	170,819.1	30.8	19.2
Peers	106,328.4	78,706.4	7.5	5.5
Commoners	152,296.6	100,633.6	23.3	14.9
Squires	79,178.3	47,100.5	46.3	27.1
Greater Yeomen	88,806.5	56,865.0	178.0	113.8
Lesser Yeomen	76,228.9	53,212.3	449.1	313.0
Small Propriertors	71,342.7	49,649.2	3,928.2	2,999.2
Cottagers	2,634.2	2,709.2	12,408.1	13,328.2
Public Bodies	26,335.7	21,876.5	263.6	204.7
Waste	24,882.4	34,326.2		
Total	628,033.6	372,567.5	17,304.1	15,808.7

Source: Bateman (1883).
Note: The sample is all counties in England and Wales. “Large landowners” are all owners of 3,000 acres and upwards. They are broken down by status: commoners versus peers. “Squires” own estates between 1,000 and 3,000 acres. ‘Greater Yeomen’ between 300 and 1,000 acres. “Lesser Yeomen”: between 100 and 300. “Small Proprietors”: over 1 acre and under 100. Finally, “Cottagers ” hold less than 1 acre.

Table 2.4: Land concentration and funds for education

	Funds from local rates (p.c.)		Grants from the Committee (p.c.)		School fees and books sold (p.c.)	
	(3)	(4)	(1)	(2)	(5)	(6)
Large landholdings (share)	-0.11**	-0.17***	-0.06**	-0.12***	-0.02**	-0.03**
	(0.04)	(0.04)	(0.03)	(0.03)	(0.01)	(0.01)
% in manufacturing	0.19***	0.09	0.13***	0.09*	0.05***	0.03**
	(0.04)	(0.06)	(0.03)	(0.05)	(0.01)	(0.01)
log income (pence p.c.)	0.27	-4.00*	-1.56	-5.69***	-0.10	-0.64
	(2.18)	(2.28)	(1.62)	(1.64)	(0.51)	(0.55)
City size		0.07***		0.04***		0.01***
		(0.02)		(0.01)		(0.00)
% voting conservative		0.06		0.08*		-0.02**
		(0.04)		(0.04)		(0.01)
% non-conformists		0.27**		0.26***		0.03*
		(0.13)		(0.08)		(0.02)
Religiosity		-0.15*		-0.11*		-0.05**
		(0.08)		(0.06)		(0.02)
Wales	3.95**	-1.18	3.99***	-1.08	0.68*	-0.67
	(1.55)	(3.03)	(1.23)	(1.94)	(0.36)	(0.61)
Constant	2.38	18.67**	2.21	11.72*	0.14	6.92***
	(3.99)	(8.75)	(3.00)	(6.94)	(1.00)	(2.47)
Observations	156	104	156	104	156	104
Adjusted-R2	0.140	0.483	0.132	0.435	0.192	0.576

Note: The sample is all counties in England and Wales between 1871–72 and 1894–95 except 1878–79, 1887–88, 1889–90, and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Funds from rates, grants, and fees are expressed in pence per capita. "Large landholdings" is the share of a county in the hands of large landowners, that is, those in possession of 3,000 acres and upward. County controls are from Hechter (1976). Standard errors clustered by county are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.5: Land concentration and education expenditures

	Number of			Expenditures on			
	School Boards	Element. Schools	Public to Voluntary	Public Schools	Industrial Schools	# Cert. teachers	Av. expense per scholar
Large landholdings	-0.48*	-3.79	-0.80***	-0.31***	-0.00	-8.14	-0.62
	(0.27)	(3.59)	(0.24)	(0.10)	(0.01)	(6.15)	(0.39)
% in manufacture	-0.14	12.77*	0.19	0.17	0.00	25.25**	0.07
	(0.42)	(6.57)	(0.21)	(0.11)	(0.01)	(9.77)	(0.27)
log income	-5.00	-121.8	-13.51**	-9.86**	0.03	174.98	1.01
	(11.22)	(183.4)	(6.55)	(4.08)	(0.24)	(211.7)	(16.20)
City size	0.16	1.56	-0.06	0.05	0.01	3.03	0.15
	(0.10)	(1.39)	(0.07)	(0.03)	(0.00)	(2.40)	(0.10)
% voting conserv.	-0.24	14.42	-0.18*	0.04	0.00	1.87	1.78***
	(0.36)	(9.38)	(0.10)	(0.07)	(0.01)	(3.28)	(0.20)
% non-conformists	0.81	21.23*	1.37**	0.44**	0.02	10.96	1.52
	(0.55)	(12.00)	(0.61)	(0.19)	(0.01)	(11.51)	(1.04)
Religiosity (%)	-0.54	11.59	-1.46***	-0.39	-0.03*	26.09	0.32
	(0.84)	(7.40)	(0.39)	(0.24)	(0.02)	(16.97)	(0.61)
Wales	-50.48**	1,9823***	0.03	-9.09	-1.04*	-182.56	87.69***
	(19.63)	(505.2)	(28.86)	(8.36)	(0.60)	(368.9)	(24.44)
Constant	154.15	-1,177	285.2***	126.1***	2.67	-4,410.9	322.8**
	(108.64)	(1,750.6)	(65.38)	(44.14)	(2.63)	(3,220)	(158.05)
Observations	104	41	104	104	104	132	132
Adjusted-R2	0.0948	0.661	0.584	0.330	0.167	0.272	0.374

Note:The sample is all counties in England and Wales between 1877–78 and 1894–95 except 1878–79, 1887–88, 1889–90, and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Dependent variables come from the Reports of Council on Education. "Public to voluntary"' is the ratio of public to voluntary schools in a county. Expenditures on public and industrial schools are expressed in pence per capita. "Large landholdings" is the share of a county in the hands of large landowners, that is, those owning at least 3,000 acres. County controls are from Hechter (1976). Log income in pence per capita. Standard errors clustered by county are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.6: Land concentration and education outcomes

	% passes in				Presented for	
	Reading	Writing	Arithmetics	Scholars in attendance	examination	specific exam
Large landholdings	-0.07*	-0.07**	-0.09***	-895.4	-625.8	-44.4
	(0.04)	(0.03)	(0.03)	(767.5)	(634.9)	(38.0)
% in manufacture	0.06	0.14***	0.17***	3,007.1**	2,450.0**	183.6**
	(0.03)	(0.02)	(0.02)	(1,265.2)	(1,025.9)	(79.6)
log income	-0.66	-2.88**	-2.95**	2,198.2	7,080.7	-856.6
	(1.43)	(1.17)	(1.20)	(23,687.1)	(21,852.2)	(1,863.0)
City size	-0.02	0.01	0.02**	274.8	148.1	16.8
	(0.02)	(0.01)	(0.01)	(245.1)	(184.9)	(12.1)
% voting conserv.	0.09	0.16***	0.16***	424.3	363.4	230.3*
	(0.08)	(0.03)	(0.03)	(683.8)	(550.2)	(131.4)
% non-conformists	0.19*	0.09	-0.00	1,374.9	1,768.7	216.5
	(0.09)	(0.08)	(0.07)	(1,739.2)	(1,936.3)	(150.7)
Religiosity (%)	-0.05	-0.00	-0.01	2,670.5	2,518.8	117.6
	(0.06)	(0.05)	(0.06)	(1,766.2)	(1,621.5)	(76.3)
Wales				-36,649	-95,309	
				(43,912)	(78,786)	
Constant	93.82***	90.77***	88.49***	-367,415	-391,221	-23,382
	(11.69)	(11.82)	(10.97)	(345,964)	(328,457)	(18,272)
Observations	80	80	80	93	81	40
Adjusted-R2	0.0188	0.464	0.464	0.297	0.268	0.356

Note: The sample is all counties in England and Wales between 1879–80 to 1894–95, except 1887–88, 1889–90 , and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Dependent variables come from the Reports of Council on Education. “Large landholdings” is the share of a county in the hands of large landowners, that is, those owning at least 3,000 acres. County controls are from Hechter (1976). Log income expressed in pence per capita. Wales dummy omitted when data for Welsh counties is not available. Standard errors clustered by county are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.7: Land concentration and funds for education, by status of the landowner (peer vs. commoner)

	Rates (p.c.)	Grants (p.c.)	Fees (p.c.)	Total
Large landholdings (share)				
Peer	-0.20***	-0.13**	-0.01	-0.35***
	(0.07)	(0.05)	(0.02)	(0.13)
Commoner	-0.13	-0.10	-0.06***	-0.29*
	(0.09)	(0.07)	(0.02)	(0.17)
% in manufacturing	0.10	0.09*	0.02*	0.21*
	(0.06)	(0.05)	(0.01)	(0.12)
log income (pence p.c.)	-3.92*	-5.66***	-0.69	-10.27**
	(2.29)	(1.64)	(0.52)	(4.27)
City size	0.07***	0.04***	0.01***	0.13***
	(0.02)	(0.01)	(0.00)	(0.03)
% voting conservative	0.06	0.07*	-0.02**	0.11
	(0.04)	(0.04)	(0.01)	(0.08)
% non-conformists	0.24**	0.24***	0.04*	0.51**
	(0.12)	(0.07)	(0.02)	(0.20)
Religiosity (%)	-0.12	-0.08	-0.05**	-0.24
	(0.09)	(0.06)	(0.02)	(0.16)
Wales	-0.64	-0.63	-0.54	-1.81
	(2.87)	(1.74)	(0.61)	(4.68)
Constant	45.64**	51.56***	12.70***	109.89***
	(17.53)	(12.42)	(4.41)	(32.17)
Observations	104	104	104	104
Adjusted-R2	0.494	0.449	0.591	0.518

Note: The sample comprises all counties in England and Wales between 1871–72 and 1894–95 except 1878–79, 1887–88, 1889–90, and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Funds from rates, grants, and fees are expressed in pence per capita. "Large landholdings" is the share of a county in the hands of large landowners, that is, those in possession of 3,000 acres and upward. This is broken down by status of the landowner: peers versus commoners. County controls are from Hechter (1976). Standard errors clustered by county are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.8: Land concentration and education expenditures, by status of the landowner (peer vs. commoner)

	Number of			Expenditures on			
	School Boards	Element. School	Public to Voluntary	Public Schools	Industrial Schools	# Cert. teachers	Av. expense per scholar
Large landholdings							
Peer	-0.82**	-14.17**	-0.53	-0.23**	0.01	-20.18	-1.09**
	(0.36)	(5.81)	(0.59)	(0.11)	(0.01)	(12.65)	(0.49)
Commoner	0.04	13.42*	-1.09*	-0.44**	-0.02	11.56	0.15
	(0.61)	(7.38)	(0.57)	(0.21)	(0.02)	(12.18)	(0.87)
% in manufacturing	-0.04	17.23**	0.10	0.15	-0.00	29.26**	0.23
	(0.41)	(6.78)	(0.27)	(0.10)	(0.01)	(11.19)	(0.31)
log income	-4.03	-42.21	-14.54**	-10.09**	0.00	234.11	3.33
	(11.24)	(154.12)	(7.00)	(4.11)	(0.25)	(213.65)	(16.78)
City size	0.16	1.29	-0.06	0.05	0.01	2.60	0.13
	(0.10)	(1.22)	(0.07)	(0.03)	(0.00)	(2.23)	(0.10)
% voting conserv.	-0.22	18.49**	-0.17*	0.04	0.00	2.98	1.82***
	(0.35)	(8.91)	(0.10)	(0.07)	(0.01)	(3.57)	(0.20)
% non-conformists	0.69	18.42*	1.42**	0.47**	0.02	6.95	1.36
	(0.55)	(9.86)	(0.61)	(0.20)	(0.01)	(10.46)	(0.96)
Religiosity (%)	-0.49	11.25	-1.49***	-0.40	-0.03*	27.78	0.38
	(0.84)	(6.75)	(0.39)	(0.25)	(0.02)	(17.50)	(0.57)
Wales	-51.53**	1,832***	2.58	-8.84	-1.01*	-149.86	88.97***
	(19.52)	(451.4)	(30.6)	(8.16)	(0.58)	(358.48)	(24.83)
Constant	132.7	-2,374	301.7***	131.3***	3.30	-5,472	281.2
	(107.9)	(1,607)	(75.4)	(47.2)	(2.86)	(3,477)	(171.0)
Observations	104	41	104	104	104	132	132
Adjusted-R2	0.0939	0.691	0.583	0.326	0.169	0.288	0.376

Note: The sample is all counties in England and Wales between 1877–78 and 1894–95 except 1878–79, 1887–88, 1889–90, and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Dependent variables come from the Reports of Council on Education. "Public to voluntary" is the ratio of public to voluntary schools in a county. Expenditures on public and industrial schools are expressed in pence per capita. "Large landholdings" is the share of a county in the hands of large landowners, that is, those owning at least 3,000 acres. This is broken down by status of the landowner: peers versus commoners. County controls are from Hechter (1976). Log income in pence per capita. Standard errors clustered by county are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 2.9: Land concentration and education outcomes, by status of the landowner (peer vs. commoner)

	% passes in				Presented for	
	Reading	Writing	Arithmetics	Scholars in attendance	examination	specific exam
Large landholdings						
Peer	-0.10*	-0.11***	-0.12***	-2,011.7	-1,827	-131.3
	(0.06)	(0.03)	(0.03)	(1,517.4)	(1,378)	(81.5)
Commoner	-0.01	0.00	-0.04	878.2	1,366	99.8
	(0.08)	(0.05)	(0.06)	(1,124.8)	(1,125)	(86.3)
% in manufacture	0.07	0.15***	0.18***	3,332.3**	2,889**	221.0**
	(0.04)	(0.02)	(0.02)	(1,412.1)	(1,183)	(91.6)
log income	-0.45	-2.64**	-2.77**	6,786.0	14,228	-189.8
	(1.43)	(1.10)	(1.17)	(23,264.8)	(20,994)	(1,572.4)
City size	-0.02	0.01	0.02*	238.8	102.4	14.5
	(0.02)	(0.01)	(0.01)	(230.7)	(166.7)	(10.8)
% voting conserv.	0.09	0.16***	0.16***	459.1	461.9	264.3*
	(0.08)	(0.03)	(0.03)	(703.3)	(587.3)	(138.9)
% non-conformists	0.17	0.08	-0.02	905.3	1,207	192.9
	(0.10)	(0.08)	(0.08)	(1,568.8)	(1,722)	(125.0)
Religiosity (%)	-0.05	0.00	-0.01	2,802	2,631	114.8
	(0.05)	(0.05)	(0.05)	(1,823)	(1,664)	(69.6)
Wales				-39,599	-103,415	
				(44,593)	(78,450)	
Constant	90.68***	87.10***	85.79***	-447,602	-501,899	-33,413*
	(12.72)	(10.78)	(10.82)	(365,609)	(343,042)	(19,734)
Observations	80	80	80	93	81	40
Adjusted-R2	0.0100	0.468	0.461	0.306	0.294	0.395

Note: The sample is all counties in England and Wales between 1879–80 to 1894–95, except 1887–88, 1889–90, and 1892–93. The evidence is averaged by decades such that it varies at the same level as the county controls. Dependent variables come from the Reports of Council on Education. "Large landholdings" is the share of a county in the hands of large landowners, that is, those owning at least 3,000 acres. This is broken down by status of the landowner: peers versus commoners. County controls are from Hechter (1976). Log income expressed in pence per capita. Wales dummy omitted when data for Welsh counties is not available. Standard errors clustered by county are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2.10: Sample stratification

	Baseline	South and Midlands	North	Wales
Panel A: Funds from local rates (p.c.)				
Large landholdings (share)				
Peer	-0.21***	-0.20**	-1.92*	-0.27***
	(0.07)	(0.07)	(0.93)	(0.08)
Commoner	-0.12	-0.29**	1.59	0.25
	(0.09)	(0.11)	(0.95)	(0.14)
log income (pence p.c.)	-4.02*	-4.18*	-20.95	-12.73**
	(2.25)	(2.31)	(35.27)	(5.28)
% in manufacturing	0.10	0.20***	0.70	0.04
	(0.06)	(0.05)	(0.61)	(0.08)
City size	0.07***	0.05***	-0.26	0.09
	(0.02)	(0.01)	(0.26)	(0.08)
% voting conservative	0.06	0.10*	-0.38	-0.21
	(0.04)	(0.05)	(0.94)	(0.22)
% non-conformists	0.22***	0.07	0.02	0.05
	(0.06)	(0.15)	(0.81)	(0.17)
Religiosity (%)	-0.11	-0.20*	-0.18	0.31
	(0.09)	(0.11)	(0.76)	(0.20)
Observations	104	66	14	24
Adjusted-R2	0.501	0.616	0.469	0.479
Panel B: Grants from the Committee (p.c.)				
Large landholdings (share)				
Peer	-0.14***	-0.17***	-1.82	-0.14
	(0.05)	(0.04)	(1.45)	(0.09)
Commoner	-0.10	-0.16*	1.71	0.15
	(0.06)	(0.09)	(1.38)	(0.10)
log income (pence p.c.)	-5.76***	-5.74***	-20.89	-13.62*
	(1.63)	(1.47)	(51.76)	(6.23)
% in manufacturing	0.09*	0.17***	0.83	0.01
	(0.05)	(0.04)	(0.78)	(0.08)
City size	0.04***	0.04***	-0.35	0.05
	(0.01)	(0.01)	(0.31)	(0.08)
% voting conservative	0.07*	0.13***	-0.12	-0.23
	(0.04)	(0.04)	(1.20)	(0.26)
% non-conformists	0.22***	0.32**	0.08	0.01
	(0.05)	(0.12)	(1.10)	(0.19)
Religiosity (%)	-0.07	0.01	-0.24	0.26
	(0.06)	(0.08)	(0.99)	(0.26)
Observations	104	66	14	24
Adjusted-R2	0.455	0.540	-0.0257	0.239

Sample stratification (continuation)

	Baseline	South and Midlands	North	Wales
Panel C: School fees and books sold (p.c.)				
Large landholdings (share)				
Peer	-0.02	0.00	-0.60**	-0.04*
	(0.02)	(0.02)	(0.22)	(0.02)
Commoner	-0.06**	-0.05**	0.32	-0.01
	(0.02)	(0.03)	(0.20)	(0.04)
log income (pence p.c.)	-0.78	-0.65	-12.60	-1.02
	(0.51)	(0.52)	(7.36)	(0.79)
% in manufacturing	0.03*	0.04**	0.01	-0.00
	(0.01)	(0.02)	(0.11)	(0.01)
City size	0.01***	0.01**	-0.01	0.03***
	(0.00)	(0.00)	(0.05)	(0.01)
% voting conservative	-0.02**	-0.02*	-0.02	0.01
	(0.01)	(0.01)	(0.13)	(0.02)
% non-conformists	0.02	0.03	-0.05	0.04
	(0.01)	(0.04)	(0.17)	(0.03)
Religiosity (%)	-0.04**	-0.02	-0.19	-0.05
	(0.02)	(0.02)	(0.10)	(0.03)
Observations	104	66	14	24
Adjusted-R2	0.587	0.610	0.857	0.692
Panel D: Total funding (p.c.)				
Large landholdings (share)				
Peer	-0.36***	-0.36***	-4.34*	-0.46**
	(0.13)	(0.12)	(2.38)	(0.18)
Commoner	-0.27	-0.51**	3.62	0.39
	(0.17)	(0.21)	(2.42)	(0.24)
log income (pence p.c.)	-10.56**	-10.56**	-54.44	-27.37**
	(4.19)	(3.97)	(84.45)	(11.16)
% in manufacturing	0.22*	0.40***	1.54	0.04
	(0.12)	(0.11)	(1.39)	(0.15)
City size	0.13***	0.09***	-0.62	0.17
	(0.03)	(0.02)	(0.59)	(0.16)
% voting conservative	0.12	0.21**	-0.52	-0.44
	(0.08)	(0.09)	(2.13)	(0.49)
% non-conformists	0.46***	0.41	0.04	0.10
	(0.12)	(0.29)	(1.93)	(0.36)
Religiosity (%)	-0.23	-0.21	-0.61	0.52
	(0.16)	(0.20)	(1.72)	(0.43)
Observations	104	66	14	24
Adjusted-R2	0.524	0.612	0.368	0.448

Note: The sample is all counties in England and Wales between 1871–72 and 1894–95 (except 1878–79, 1887–88, 1889–90, and 1892–93). South and Midlands are all English counties south of Cheshire, and West and East Riding, Yorkshire. Northern counties are Cheshire, Cumberland, Durham, Lancashire, Northumberland, Westmoreland, and Yorkshire. Variables averaged by decades. All funding sources in pence p.c. "Large landholdings" is the share of a county owned by landowners in possession of 3,000 acres and upwards. Controls are from Hechter (1976). Constants not reported. Standard errors clustered by county; *** p<0.01, ** p<0.05, * p<0.1

Table 2.11: Using selection from observables to assess the selection on unobservables

Panel A: School Boards funding

		Funds from local rates (p.c.)		Grants from Committee (p.c.)		School fees books sold (p.c.)	
		All	Peers	All	Peers	All	Peers
		(1)	(2)	(3)	(4)	(5)	(6)
restricted set	full set						
none	all	-1.5	-2.9	-1.1	-3.6	-1.2	-2.8
log income	all	-1.8	-2.9	-1.5	-3.8	-1.6	-3.1
% in manufacturing	all	-2.4	5.6	-1.5	3.1	-2.4	0.7

Panel B: School Boards expenditures

		Number of School Boards		Public to Voluntary		Expenditures on: Public Schools		Expenditures on: Industrial Sch.		Num. Cert. teachers		Av. expense per scholar	
		All	Peers	All	Peers	All	Peers	All	Peers	All	Peers	All	Peers
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
restricted set	full set												
none	all	-2.2	-1.6	-1.7	6.1	-1.5	-71.4	-1.0	1.3	-3.7	-1.3	32.3	3.8
log income	all	-2.2	-1.6	-6.5	2.2	-10.4	6.0	-1.2	1.3	-2.6	-1.3	3.4	3.8
% in manufacturing	all	-3.6	-2.2	-2.0	0.7	-2.2	1.3	-5.3	-1.6	7.1	-3.2	-25.0	5.3

Panel C: Education outcomes

		% passes in: Reading		% passes in: Writting		% passes in: Arthmetics		Av. Scholars in attendance		Presented for: examination		Presented for: specific exam	
		All	Peers	All	Peers	All	Peers	All	Peers	All	Peers	All	Peers
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
restricted set	full set												
none	all	-2.6	-2.7	-1.3	-0.9	-1.9	-0.9	-2.3	-1.1	-2.5	-1.5	-2.4	-1.3
log income	all	-3.9	-3.1	-3.2	-1.0	-6.8	-1.1	-2.8	-1.1	-4.7	-1.6	-3.8	-1.4
% in manufacturing	all	-2.9	-4.7	-1.8	-2.1	-3.2	-2.8	-48.3	-2.4	-8.0	-5.6	-211.5	-3.8

Note: Each cell reports ratios based on the coefficients for $educ_{c,t} = \alpha + \beta\, land_c + \mathbf{V}'_{c,t}\gamma + \epsilon_{c,t}$ from two individual-level linear regressions. In one regression, $\mathbf{V}_{c,t}$ includes the "restricted set" of control variables. Let the coefficient of interest in this "restricted" regression be β^R. In the other regression, $\mathbf{V}_{c,t}$ includes the "full set" of controls, and the coefficient of interest is β^F. The reported ratio is the absolute value of $\beta^F/(\beta^R - \beta^F)$ (Altonji et al. 2005). $land_c$ is the measure of landownership concentration. Odd columns consider the share of county c in the hands of landowners in possession of 3,000 acres and upwards. Even columns only consider the share of county c in the hands of peers in possession of 3,000 acres and upwards. For the latter, both "restricted" and "full" regressions include the share of land in the hands of commoners as a control.

2.9 Appendix A: Examination standards

Table 2.A1: Examination standards

STANDARD I	
Reading	One of the narratives next in order after monosyllables in an elementary reading book used in the school.
Writing	Copy in manuscript character a line of print, and write from dictation of a few words.
Arithmetic	Simple addition and subtraction of numbers of not more than four figures, and the multiplication table to multiplication by six.
STANDARD II	
Reading	A short paragraph from an elementary reading book.
Writing	A sentence from the same book, slowly read once, and then dictated in single words.
Arithmetic	The multiplication table, and any simple rule as far as short division (inclusive)
STANDARD III	
Reading	A short paragraph from a more advanced reading book.
Writing	A sentence slowly dictated once by a few words at a time, from the same book.
Arithmetic	Long division and compound rules (money).
STANDARD IV	
Reading	A few lines of poetry or prose, at the choice of the inspector.
Writing	A sentence slowly dictated once, by a few words at a time, from a reading book, such as is used in the first class of the school.
Arithmetic	Compound rules (common weights and measures).
STANDARD V	
Reading	A short ordinary paragraph in a newspaper, or other modern narrative.
Writing	Another short ordinary paragraph in a newspaper, or other modern narrative, slowly dictated once by a few words at a time.
Arithmetic	Practice and bills of parcels.
STANDARD VI	
Reading	To read with fluency and expression.
Writing	A short theme or letter, or an easy paraphrase.
Arithmetic	Proportion and fractions (vulgar and decimal).

Source: Revised code of Regulations, 1872

Chapter 3

Kissing Cousins: Estimating the Causal Effect of Consanguinity on Fertility Using Evidence from the London Season

3.1 Introduction

More than 10 percent of people worldwide are either married to a close relative or are the offspring of such a marriage (Bittles 2012). In North Africa, the Middle East, and South Asia consanguineous unions[1] constitute between 20 and 50 percent of total marriages (see Figure 3.1).[2] In

[1] A consanguineous marriage as "a union between a couple related as second cousins or closer" (Bittles 2001).

[2] In Iraq 46.4 percent of marriages are between first or second cousins (Hamamy and al Hakkak 1989). In India the rate varies from 6 percent in the north to 36 percent in the south (IIPS and ORC Macro International 1995, Banerjee and Roy 2002). The highest

the Western world, instead, cousin marriage is taboo. It is banned in 30 US states and the issue came recently to the fore in the United Kingdom.[3] Where does this stigma come from? Many associate cousin marriage with genetic risks leading to infertility, miscarriage, or childhood mortality. However, the empirical evidence on this matter is mixed. Several studies show that cousin marriage increases the odds of passing on genetic abnormalities (Nabulsi et al. 2003), leading to a negative correlation between consanguinity and fertility (Schull and Neel 1965, Ober et al. 1999, Bittles 2001, Labouriau and Amorim 2008). In contrast, Bittles (2012) argues that the genetic risks of consanguinity apply only to carriers of very uncommon disorders. Helgason et al. (2008) and Bailey et al. (2014) find a positive effect of kinship on fertility in Iceland and in 46 small-scale societies.

Whether consanguinity affects fertility is a key question for economists. All the more as fertility is tied to incomes per capita, education, and female autonomy in developing countries (Chesnais 1992, Chenery et al. 1975). Estimating the effect of consanguinity on fertility, however, is not straightforward. First, one should not ignore the socio-economic benefits of cousin marriage. Consanguineous unions may confer greater reproductive success through earlier age at marriage or by preserving landholdings and wealth within the family. This is particularly important in communities with large socio-economic disparities, which also happen to

level has been recorded in the South Indian city of Pondicherry, where 54.9 percent of marriages were consanguineous. High rates of consanguinity are also reported in many Muslim countries. In Sudan 65 percent of women are married to a relative (Federal Ministry of Health, Sudan 1995), in Saudi Arabia 57.7 percent (el Hazmi et al. 1995), in Jordan 51.3 percent (Khoury and Massad 1992), in the United Arab Emirates 50.5 percent (Al-Gazali et al. 1997), in Tunisia 49 percent (Ministry of Public Health, Sudan 1996), in Egypt 40 percent (National Population Council, Egypt 1996), in Yemen 40 percent (Jurdi and Saxena 2003) and in Kuwait 36 percent (Ministry of Health, Kuwait 1996). This practice is also widespread among immigrant populations. For example, among British Pakistanis consanguinity is estimated to be as high as 50 to 60 percent of all marriages in this community (Modell 1991).

[3]MP Phil Woolas claimed in 2008 that "The issue we need to debate is first cousin marriages, whereby a lot of arranged marriages are with first cousins, and that produces lots of genetic problems in terms of disability [in children]" BBC News (2008).

be those with higher rates of consanguinity. A second key challenge is unobserved heterogeneity. Unobserved characteristics affecting the decision to marry a cousin may be correlated with unobservable factors influencing fertility, such as personality, intelligence, or beauty (Kim 2013).

In this paper, I estimate the causal effect of consanguinity on fertility. To address the aforementioneded endogeneity problems, I exploit a unique historical setting. In the nineteenth century, from Easter to August every year, a string of social events was held in London to "aid the introduction and courtship of marriageable age children of the nobility and gentry"[4] — the London Season. Courtship in noble circles was largely restricted to London; in most cases, the only place where a young aristocrat could speak with a girl was at a ball during the Season. This centralized marriage market was once interrupted by a major, unanticipated, exogenous shock: the death of Prince Albert. When Queen Victoria went into mourning, all royal dinners, balls, and luncheons were cancelled for three consecutive years (1861–63). However, noblemen did not stop marrying. The only difference was that now marriage decisions shifted to local marriage markets. These markets were more shallow and populated by genetically related noblemen.[5] Consequently, cousin marriage blossomed. This exogenous increase in consanguineous unions — unrelated to its socio-economic advantages or to the unobservable factors that may ultimately affect fertility — allows me to estimate the causal effect of consanguinity on fertility.

Combining evidence from Hollingsworth's demographic data (1964), the S&N Peerage CD, and `thepeerage.com`, I analyze around 1,500 marriages of peers' and peers' offspring. I find that the interruption of the Season almost quadrupled the number of marriages between close relatives. These consanguineous unions give birth to 1.5 times more children than the matrimonies of unrelated spouses. However, the time elapsed from marriage to the first birth is much larger, indicating among other

[4]Motto of the London Season at `londonseason.net`.

[5]The classic Malécot theory on spatial genetic structure of populations suggests that consanguinity is a decreasing function of the geographic distance between spouses (Malecot 1948).

factors an increased probability of miscarriage. The adverse effects of consanguinity over reproductive success are clearer in the second generation. The children of consanguineous unions are less likely to reach the age at which a British noblemen typically married. They also have less children and are 50 percent more likely to be childless. Therefore, over the long-run, consanguinity leads to smaller families and reduces reproductive success. My estimates also suggest that these negative effects are only partly offset by the effect of unobservable factors simultaneously affecting consanguinity and fertility. All the effects are identified based on variation among members of the same lineage, capturing the genetic similarities of these related individuals, as well as their cultural and socio-economic proximity. Further, the results are robust to the inclusion of controls over spouses' age at marriage, socio-economic status, birth order, and socio-economic and demographic conditions during their lifetime, as partly captured by birth year fixed effects.

This paper relates closely to two different strands of the literature. The first is the rich literature on the economics of fertility. Living standards in what is now the developed world only began to improve once fertility had fallen significantly. The same is true nowadays: falling fertility in developing countries is associated with higher incomes per capita, better education, and somewhat greater female autonomy (Chesnais 1992, Chenery et al. 1975). Not surprisingly, the determinants of fertility have engaged the interest of economists for some time. In the eighteen century, Robert Malthus observed a positive relation between income and the number of births. Shortly after his classic work was published, however, industrialization swept through Europe and the United States and the Malthusian link between income and fertility was broken. In his pioneering work, Becker (1960) tried to reconcile Malthus' proposition with the trends observed thereafter. Following this important contribution, fertility behavior is usually analyzed within the choice-theoretic framework of neoclassical economics, where children are considered normal goods. The empirical evidence, however, is mixed. On the one hand, Heckman and Walker (1990) show that rising female wages increase the spacing of births, reducing total fertility. On the other hand, tax incentives (Whittington et al.

1990), lower housing prices (Dettling and Kearney 2014) and reductions in the unemployment rate (Adsera 2005), are associated with higher birth rates.

One of the criticisms of the Beckerian approach is that it tends to give a short shrift to social norms. In contrast, some studies have shown that fertility choices can be heavily affected by culture (Blau 1992, Guinnane et al. 2006). Fernandez and Fogli (2009), for example, proxy culture for immigrant populations with the attitudes towards female labor force participation in their home country. Since preferences for consanguineous marriages have deep cultural roots, this paper sheds new light on the relation between culture and fertility.

Beyond culture, religion and religiosity also affect fertility (Westoff and Jones 1979, Sander 1992, Lehrer 1996, Adsera 2006, Berman et al. 2012). In the context of developing countries, Heaton (2011) and de la Croix and Delavallade (2014) not only find a strong effect of religious affiliation on fertility, but show that the level of educational achievement matter for this relationship. In fact, women's education has been one of the most thoroughly studied determinants of fertility (Strauss and Thomas 1995, Breierova and Duflo 2003, Currie and Moretti 2003, Black et al. 2008, Chou et al. 2010, Cygan-Rehm and Maeder 2013).

Despite the whirlwind of factors analyzed, social scientists have seldom considered the biological determinants of fertility. Galor and Klemp (2014) and Kim (2013) stand as notable exceptions. The former show that moderate fecundity is conductive of long-run reproductive success within early settlers in Quebec. The latter looks at the effects of physical beauty on the timing of childbearing and completed fertility.

To the extent of my knowledge, however, the economic literature has ignored consanguinity as a potential determinant of fertility. Only biologists have looked at the effects of consaguinity. As mentioned above, much of this work does not account for unobserved heterogeneity, which could be the reason behind their contradictory results. Aside from resolving these endogeneity issues, my setting offers several advantages relative to previous studies. First, in contrast with most previously analyzed populations (Bittles et al. 1993, al Husain and al Bunyan 1997, Bittles et al. 2002), the British peerage was a small and culturally homogeneous group.[6] Second, in this society divorce and contraceptive practices were almost non-existent. Third, the peerage "held the lion's share of land, wealth, and political power in the world's greatest empire" (Cannadine 1990).[7] They were immensely rich and thus unconstrained regarding fertility. This partly mitigates the confounding effects of the socio-economic benefits associated with cousin marriage. Fourth, previous studies have rarely evaluated consanguineous relationships more distant than second cousins.[8] In contrast, the S&N Peerage CD permits me to estimate kinship up to the level of third cousins thrice removed.[9]

Aside from the determinants of fertility, my results also contribute to the assignment literature. In detail, the study of consanguineous unions allows me to shed some light on the effects of market disruptions on match quality and its consequences in the long run. Most of the literature on this topic is concerned with the effects of labor market institutions on job quality (Ehrenberg and Oaxaca 1976, van Ours and Vodopivec 2008, Addison and Blackburn 2000, Gaure et al. 2012, Sorensen 2012). The marriage market has also been used as a test bed. Abramitzky et al. (2011) show that disruptions in sex ratios in post WWI France reduced marital sorting. Similarly, Goñi (2014a) finds that reduced search frictions in the London Season crucially determined assortative matching. In contrast, Fisman et al. (2008) et al. and Hitsch et al. (2010) show that the reduction in search frictions associated with speed dating and online dating does not affect sorting in dates. This paper uses consanguinity as a proxy for match quality instead of sorting over socio-economic status, a measure typically considered in the literature. In particular, I show that match quality was

[6] As it was the Icelandic population in Helgason et al. (2008).

[7] Around 1880, fewer than 5,000 landowners still owned more than 50 percent of all land (Cannadine 1990).

[8] Again, Helgason et al. (2008) stands as a notable exception.

[9] The degree of relationship between cousins is determined by the number of generations to their closest common ancestor. When the cousins are not the same generation, they are described as "removed". In this case, the degree is determined by the smaller number of generations to the common ancestor, and the difference in generations determines the number of times removed.

larger in centralized rather than in local markets. In the absence of a thick market externality — that is, when the centralized marriage market in London was interrupted in 1861–63 — consangunity increased, reducing the quality of matches in terms of fertility. This result also suggests that there are increasing returns to scale in the marriage market,[10] and therefore, that agglomeration increases match quality.

Finally, this paper also contributes to understand the widespread incidence and the persistence of consanguinity in the developing world. Do et al. (2013) argue that consanguineous marriage is a rational response to marriage market failure, rather than simply a consequence of culture, religion, or preferences.[11] My results also suggest that consanguinity arises when the marriage market is disrupted. In detail, I find that the incidence of consanguinity is larger in isolated, local marriage markets.

Relative to the existing literature, I make the following contribution: First, this paper is the first to incorporate consanguinity into the economic analysis of fertility. Second, my setting tackles the endogeneity issues that may mask the effect of consanguinity on fertility. Third, by using disruptions to the marriage market as a source of identifying variation, this paper also sheds light on the effect of thick market externalities on the quality of the match. And fourth, my results give credence to the idea that consanguinity is closely linked to marriage market failures, rather than simply a consequence of culture.

The remainder of the paper is organized as follows. Section 3.2 depicts the historical background. Section 3.3 presents the identification strategy. Section 3.4 describes the data sources and section 3.5 presents

[10] In a similar vein, Gautier et al. (2010) look at migration flows in and out the city and find that it is a more attractive place to live for singles because it offers more potential partners. Botticini and Siow (2011) compare the city and countryside marriage markets in the United States, China, and early renaissance Tuscany. They find no evidence of increasing returns to scale in the matching function.

[11] In short, their argument is that when two people marry their families make a long-term commitment to support them through bequests and gifts. However, once links have formed, each family may now prefer to free-ride on the other family's investments. To overcome this time inconsistency between families, individuals may be keen to enter a consanguineous union.

the empirical results. First I show how the disruption in the marriage market affected consanguinity. Thereafter I present the effects of consanguinity on fertility for the first and second generations. Finally, section 3.6 concludes.

3.2 Historical background

3.2.1 Cousin marriage in Britain

Nowadays, consanguineous unions in Europe constitute between 1 and 3 percent of total marriages (`consang.net`). Historically, however, consanguinity was a widespread practice. In England, marriage between first cousins has been considered legal since the sixteenth century (Do et al. 2013). Such marriages were usually associated with royalty. The British royal family is brimming with marriages between close relatives, even to first-cousins. The current monarch Elizabeth II and her husband are third cousins as a result of both being direct descendants of Queen Victoria. Queen Victoria herself married her first cousin, Prince Albert.

Consanguinity was not restricted to the royals. It was also common amongst the nobility and landowning families (Bittles and Hussain 2004), who used it as a method of forming political alliances. Between 1851–75, 1.3 percent of all the marriages of peers' offspring where between first cousins, 2 percent were related up to the degree of third cousins, and 3 percent up to the level of third cousins thrice removed.[12]

The acceptability of consanguineous unions differs across religions. Protestant denominations permit first cousin marriage. In contrast, the Roman Catholic church requires permission from a diocese to allow them. In the United Kingdom there has been a great deal of debate in the past few years, partly prompted by the predominance of consanguinity among Pakistani immigrants.[13] According to Modell (1991), 50 to 60 percent of all marriages in this community are consanguineous.

[12]Own calculations from the Hollingsworth dataset on the British peerage and the S&N Peerage CD.

[13]"No 10 steps back from cousins row", BBC News (2008).

3.2.2 The London Season

Lucy, daughter of the fourth Baron Lyttelton, kept a diary. She described June 11, 1859 as "a very memorable day" and a "moment of great happiness."[14] She was to be presented to Queen Victoria at court, officially coming out into society. In the following weeks, before returning to Hagley Hall, the family seat in Worcestershire, Lucy attended countless breakfasts, evening parties, concerts, and balls, where she danced with the most eligible bachelors. She even participated in a royal ball at Buckingham Palace, where she thought her heart "would crack with excitement!"[15] Lucy's experience was not unique. In the nineteenth century, for seven months each year, Parliament was in session and the British elite converged on London. Their offspring participated in a string of social events designed to introduce rich and influential bachelors to eligible debutantes. This annual period was known as the London Season.

The Season was a huge event. Figure 3.2 plots over 4,000 movements into and out of London of members of the 'fashionable world' — that is, dukes, earls, barons, baronets and knights — as reported by the Morning Post, a newspaper that kept track of the Season. At the beginning of the year most people of fashion were out of town. However, at the end of January there was the biggest influx of the year. It was the sitting of Parliament, and anyone who was anyone in the elite moved from their country seats to London. On April 20, the Queen joined them from Windsor, and the first debutante was presented at court; which means she was announced to come out to the marriage market. This marked the commencement of the main Season. It was the most crowded time of the year in London, and also the period in which most of the social events designed to introduce bachelors to debutantes took place. For example, on May 15 — day of the royal ball at Buckingham — over 800 'fashionable' families were in London. Most noble children met their future spouses at these events. Courtship in noble circles was largely restricted to the London Season. In most cases, the only place where a young aristocrat

[14]The diary of Lady Frederick Cavendish, June 11, 1859.

[15]Diary, June 29, 1859.

could speak with a girl was at a ball during the Season.

This centralized marriage market took place every year. However, the Season did not always work as smoothly. Figure 3.3 plots the number of attendees at royal parties, the most exclusive events in the Season, between 1851-75. The data comes from 121 invitation lists that I hand-collected from the British National Archives. At first sight, one can see a huge disruption to the Season between 1861-63. While in normal years royal parties gathered between 4,000-6,000 individuals, during these three years only a couple of hundreds dropped by Buckingham.

Crucially, this disruption is explained by a major, unanticipated, and exogenous shock: the death of Prince Albert in 1861. On March 16, 1861, Queen Victoria's mother died. Victoria was grief-stricken, and her husband, Prince Albert, took over most of her duties despite being ill already (Hobhouse 1983). This was the start to a disastrous year that would end with Albert's unexpected death on December 14.[16] Victoria plunged into deep grief. She wore black for the rest of her life and avoided public appearances as much as she could. The London Season was no exception: from 1861 to 1863, most royal parties were cancelled. In addition, in 1862, the Queen suspended all court presentations (Ellenberger 1990).

3.3 Identification strategy

The key challenge in estimating the effect of consanguinity on fertility is that unobserved characteristics affecting the choice to enter a consan-

[16]Prince Albert's death was unexpected. He was only 42 when he died. Albert's doctors diagnosed typhoid fever as the cause of his death. Only recently it has been discovered that Albert suffered a chronic disease and that he had been ill for the last two years of his life (Hobhouse 1983: pp. 150-151). In addition, Albert took on important government duties until one month before his death. For example, on November 8, 1861, Union forces intercepted the British RMS Trent and removed two Confederate envoys, James Mason and John Slidell. The initial reaction of the British government was to demand an apology and the release of the prisoners. Meanwhile, Britain took steps to mobilize its military forces in Canada and the Atlantic. Albert intervened to soften the British diplomatic response, lowering the threat that a war would break out (Hobhouse 1983: pp. 154-155).

guineous union are potentially correlated with unobservable factors influencing fertility or the decision to have children. For instance, extroverted women with high ability and physical beauty are relatively more likely to secure a proper match without the need to marry within their families. At the same time there is evidence that suggests that, at any given level of consanguinity with her husbands, such women will give birth to more children (Kim 2013). Therefore, one might expect a negative relationship between the degree of relatedness between spouses and number of children even in the absence of any causal effect of consanguinity. On the other hand, in societies with large socio-economic disparities consanguineous unions may improve reproductive success through the benefits of preserving wealth and land within extended families. Consanguineous unions may also be associated with earlier age at marriage or lower age differences between spouses, both of which positively affect fertility. As a result, a positive spurious correlation between consanguinity and fertility is possible too.

To address these issues, one would ideally need to randomly assign some people into consanguineous unions. Since these consanguineous unions would be set up independently to the unobservable factors affecting fertility and to the socio-economic advantages of endogamy, any particularity regarding their fertility behavior should reflect the causal effect of consanguinity on fertility.

Of course, randomizing individuals into consanguineous unions is a chimera. However, the unique way in which the British aristocracy courted in the nineteenth century offers a way out. Back then, courtship in noble circles was largely restricted to the London Season. By centralizing the marriage decisions in London, the Season allowed singles from all over the country to meet, court, and eventually, to marry. However, as Queen Victoria went into mourning between 1861 and 1863, almost all royal balls and court presentations in the Season were suspended, and thus the centralized marriage market was disrupted. Noblemen did not stop marrying though. The only difference between those marrying in 1861–63 and those marrying before and after is that the former did not court in London, but in the local marriage markets. These markets were more shallow. Consequently many noblemen may have started to consider the possibility of marrying within their family to secure a proper, sociably acceptable match. Also, according to the classic Malécot theory, local markets would have been crowded of related individuals (Malecot 1948). In other words, those marrying in 1861–63 faced an exogenously higher probability of ending up marrying their kin. Thus, the interruption of the Season between 1861–63 provides me an as-good-as random assignment of noblemen into consanguineous unions.

Furthermore, I account for a range of confounding factors that may affect both consanguinity and fertility. Following Galor and Klemp (2014), I include family fixed effects. In other words, the effect of consanguinity on fertility is identified based on variations in fertility among members of the same lineage. This will capture the similarities in genetic predisposition of these genetically linked individuals, as well as their cultural, religious, and socio-economic proximity. In addition, consanguinity and the reproductive success of peers and peers' offspring may be affected by the socio-economic and demographic conditions during their lifetime. To capture this lifecycle effects, I include birth year fixed effects. Finally, I account for additional confounding variations with the inclusion of both spouse's marriage age, gender, birth order, and social position.

Formally, I estimate the causal effect of consanguinity on fertility using the regression model:

$$y_i = \beta_1 \, consang_i + \beta_2 \, \mathit{(1861\text{–}63)}_i + \beta_3 \, consang \times \mathit{(1861\text{–}63)}_i + X_i' \beta_4 + \phi_{family} + \phi_{byear} + \epsilon_i \, , \tag{3.1}$$

where y_i is a fertility measure (number of children, time to first birth, mortality of the children, or infertility) for individual i. The variable $consang_{i,}$ describes the degree of consanguinity between spouses. Thus, β_1 captures the endogenous relation between consanguinity and fertility. That is, the effect of the unobserved characteristics that affect consanguinity and are potentially correlated with unobservable factors affecting fertility. The variable *(1861–63)* indicates whether i married during the interruption of the Season in 1861–63. The corresponding coefficient β_2 therefore captures any direct effect that the disruption to the marriage market may have had on fertility, both for consanguineous and non-consanguineous unions. The interaction term $consang \times$ *(1861–63)* indicates whether i entered an exogenous consanguineous union (i.e., set in 1861–63, and thus independent to the unobservable factors affecting fertility). Therefore, β_3 is the coefficient of interest capturing the causal effect of consanguinity on fertility. X_i is a vector of observable characteristics of i, her spouse, and couple characteristics. ϕ_family is a family fixed effect, therefore I focus on variation within lineage. ϕ_byear is a birth year fixed effect accounting for lifecycle conditions that may affect i's fertility. Finally, $\epsilon_{i,j}$ is an error term. I run this regression separately for the peers and peers' offspring who married in 1859–67 (generation 1) and for their children (generation 2).

3.4 Data

I use three data sources for this research. To measure fertility, I use information from the Peerage records computerized by Hollingsworth (1964) and from the website `thepeerage.com`. Hollingsworth tracked all peers who died between 1603 and 1938 (primary universe) and their offspring (secondary universe).[17] The data comprises approximately 26,000 individuals. Each entry provides information about spouses' date of birth, marriage, and death, the number of children, and various measures of social status.[18] I use this source for all peers and peers' offspring who married in 1859–67 (generation 1). For their children (generation 2), I use the Hollingsworth dataset and information that I collected manually from `thepeerage.com`. In detail, I use the former for the children of

[17]The primary universe is defined from Cokayne 1913. The universe of children comes from Collins 1756, Lodge 1859, Douglas 1904, Burke 1866, Burke 1898, and modern peerage editions by Burke and Debrett. The remaining gaps were filled from a large list of sources (see Hollingsworth 1964 for details).

[18]For example, whether the husband was heir-apparent at age 15, her own rank, and the rank of the highest ranked parent. Rank is presented in five categories: (1) duke, earl, or marquis, (2) baron or viscount, (3) baronet, (4) knight, and (5) commoner. Moreover, the entries state whether a particular title belonged to the English, Scottish, or Irish peerage.

members of generation 1 and the primary universe, and the later for the children of members of generation 1 and the secondary universe.

To assess the degree of consanguinity between spouses, I complement this dataset with genealogical evidence from the S&N Peerage CD. The CD originally included all the ancestors of Elizabeth II and the Prince of Wales. It was then expanded with the lineages of all the hereditary British Peers.[19] The CD provides family trees for 33,497 individuals (19,380 males and 13,667 females) born between 740 and 1995.[20] Previous studies have rarely evaluated consanguineous relationships more distant than second cousins (Bittles et al. 2002).[21] In contrast, the S&N Peerage CD permits me to estimate kinship up to the level of third cousins thrice removed.

Tables 3.A1 and 3.A2 in the appendix present summary statistics for all the 613 peers and peers' offspring who married in 1859–67 (generation 1) and the 3,976 children they had (generation 2). Note that the sample of individuals of generation 2 from which I know their age at marriage, social status, or number of children is reduced to around 800 observations. There is no reason to believe, however, that this selection is correlated with unobservable factors affecting the probability of entering a consanguineous union.

3.5 Results

3.5.1 The interruption of the Season and cousin marriage, 1861–63

By centralizing the marriage decisions in London, the Season allowed singles from all over the country to meet, court, and eventually marry. However, when Queen Victoria went into mourning in 1861 peers turned

[19]The sources used were Burke's *Peerage*, Cokayne's *Complete Peerage*, Debrett's *Peerage* and The Lineage and Ancestry of HRH Prince Charles.

[20]Given the external connections of the British Aristocracy, over a 15 percent of entries refer to continental Europe (mostly France and Germany).

[21]Helgason et al. (2008) stands as a notable exception.

back to the area around their country seats to search for a spouse. Figure 3.4 shows that local markets became a more important source of partners. The chart plots the number of attendees at royal parties each year along with the average distance between spouses' family seats. In 1862 and 1863, when royal dinners, balls, and luncheons were almost completely cancelled, spouses came from much closer places than in years when the Season worked smoothly. Comparing 1859 with 1863, for example, shows that the average distance between spouses' seats was halved from 200 to 100 miles.

Local marriage markets were more shallow. There, the children of the nobility faced a reduced pool of proper singles. In these circumstances, many noblemen may have started to consider the possibility of marrying within their extended family to secure a decent, sociably acceptable match, which in normal years could have been easily arranged in London. In addition, the classic Malécot theory on spatial genetic structure of populations suggests that consanguinity is a decreasing function of the geographic distance between spouses (Malecot 1948). In other words, these local makers may have been brimming with related noblemen.

Did consanguineous unions increase as a result of the interruption of the London Season? Figure 3.5 suggests the answer is yes. Again, the chart plots the number of attendees at royal parties each year along with the percentage of peers and peers' offspring marrying their first cousins. Before 1861, no such union took place. However, the percentage of noblemen marrying their first cousins sharply increased when Queen Victoria went into mourning and the Season was cancelled. In 1863, 4 percent of marriages were between first cousins. Consanguineous marriages were also high in 1865, a year in which the Season was working smoothly, but when royal parties attracted less attendees than usual.

The increase in consanguinity that followed the disruption of the marriage market was large. Table 3.1 shows that the percentage of people marrying their first cousin quadrupled during the interruption of the Season. The increase in consanguinity was not restricted to first cousins though. Marriages between individuals related up to the level of second cousins increased by a factor of six, and marriages between less than third cousins increased by a factor of 3.8. A coefficient of consanguinity based on Wright's index[22] also confirms that the degree of relatedness between spouses increased significantly.

Figure 3.6 shows that the interruption of the Season increased the degree of consanguinity between spouses, but did not alter the overall proportion of marriages between related individuals. In other words, marriages between third cousins, third cousins once removed, and further relations seemed to be common in the nobility in normal years. During Queen Victoria's mourning, however, the proportion of people marrying more closely related spouses increased.

A potential concern over this results is that the effects of interrupting the Season on consanguinity may steam from less attractive candidates selecting into marriage in 1861–63, while proper singles waiting for the Season to resume. Table 3.2 suggests that this was not the case. In fact, noble children marrying in 1861–63 were essentially identical to those marrying in the years before and after the mourning period. Among peers and peers' offspring, age at first marriage, the proportion of duke children, and the origins of the peerage did not vary significantly across periods. This result is explained by the pressure for women to marry young in Victorian England. If a lady was not engaged two or three Seasons after "coming out" into the marriage market, she was written off as a failure (Davidoff 1973: p. 52). This custom was deeply internalized in young ladies minds. That is probably why, when ladies saw that Queen Victoria's mourning extended over time — far more than expected — they panicked and got married even if the Season was not at place and they had to do so in the local marriage markets.

In addition, Table 3.2 suggests that Queen Victoria's mourning was the only disruption to the marriage market between 1861 and 1863. Nei-

[22]In detail, the coefficient is equal to $\sum_i \frac{1}{2}^{K_i} \times (1 + \frac{1}{K_i})$, where K_i is the degree of relationship based on the Knot System (see Figure 3.A1 in the Appendix). The summation over i takes into account that an individual can be related to her spouse in more than one way. For example, one could be her spouse's second cousin from the mother side, and her third cousin once removed from her mother's side.

ther the size of the cohort [23] nor the sex ratio[24] was distorted during this period.

All together, these results confirm that the interruption of the Season following Queen Victoria's mourning (1861–63) shifted marriage decisions to the local marriage markets, where consanguinity sharply increased. This significant increase in consanguinity is unrelated to the socio-economic advantages of endogamy or to any unobservable factor affecting consanguinity and fertility simultaneously (intelligence, personality, physical beauty, ...). The next sub-section uses this source of exogenous variation in consanguinity to identify its causal effect on fertility.

3.5.2 The effect of consanguinity on fertility

At first glance, there seems to be a positive correlation between consanguinity and fertility. Figure 3.7 plots the mean of the total number of children of peers and peers' offspring who married in 1851–75 against the degree of consanguinity with their spouses. The latter is measured by a coefficient based on Wright's index such that larger numbers correspond to more consanguinity. On average, the most consanguineous unions (coef. $= 0.1$) have one more child than totally unrelated spouses (coef. $= 0$). The correlation coefficient between this two variables is 0.04.

Of course, this correlation may be spurious. Unobserved characteristics such as intelligence, physical beauty, and personality, as well as environmental factors such as the degree of inequality, may affect the choice to enter a consanguineous union. At the same time, these characteristics are potentially correlated with unobservable factors influencing fertility or the decision to have children. To address these endogeneity issues, I take advantage of the fact that consanguinity increased exogenously between 1861 and 1863 as a result of the interruption of the London Season.

[23]The size of the cohort is measured as the number of girls aged 18–24. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women decreases sharply.

[24]The sex ratio is the ratio of men aged 19–25 to women aged 18–24. The year lag accounts for the fact that men married later.

The differential fertility between consanguineous and unrelated unions in 1861–63 reflects the causal effect of consanguinity on fertility, since these unions were set up independently of the aforementioned unobserved characteristics associated with consanguinity and fertility.

Table 3.3 presents the results of a series of fixed effects poisson regressions capturing the effect consanguinity on the number of births for generation 1, that is, peers and peers' offspring marrying in 1859–67. Following the standard convention in clinical genetics, consanguinity is defined as "a union between a couple related as second cousins or closer" (Bittles 2001). All estimates account for family fixed effects, and thus are based on exogenous variation in consanguinity within lineages. Birth year fixed effects are included to account for the socio-economic and demographic conditions during each individual's lifetime.

Consistently with Helgason et al. (2008) and Bailey et al. (2014), I find that consanguinity has a positive and significant effect on the number of births. Column 1 presents the results without controlling for spousal characteristics. The endogenous relation between consanguinity and fertility, captured by the dummy indicating whether spouses where related (row 1), is not significant although has a negative sign. The disruption of the marriage market also does not seem to have a big effect besides that through consanguinity. Instead, the individuals entering an exogenous consanguineous union — that is, a consanguineous union set up in 1861–63, and thus independent to the unobservable factors affecting fertility — seem to produce more children. In a poisson regression, the coefficients may be interpreted as semi-elasticities. A coefficient of 2.67 indicates that an individual induced to marry consanguineously due to disruptions in the marriage market is expected to give birth to around 2.63 times more children (263 percent) than what she would have if she entered a non-consanguineous union.

Columns 2-6 include a range observable control variables. The estimated effects of consanguinity, however, remain stable. Adding gender, age at marriage, age at marriage interacted with gender, and dummies for different levels of social status[25] does not change the results significantly

[25] In detail, I include dummies for the status of his/her father; i.e., whether his/her

(columns 2-4). The effect of consanguinity on fertility is reduced once I account for spouse's age at marriage and social status[26] (column 5). Including wife's age at marriage has a similar effect: it negatively predicts the number of children, and it reduces the estimated effect of consanguinity (column 6). In detail, in the full specification an individual marrying consanguineously due to disruptions in the marriage market is expected to give birth to around 1.43 times more children than what she would have if she entered a non-consanguineous union.

Does this mean that reproductive success is enhanced by consanguinity? While it is true that consanguineous unions produce more children, table 3.4 shows that other outcomes associated with reproductive success do not look so positive. Column 1 presents the fixed effects OLS estimates of the effect of consanguinity on the time interval between marriage and the birth of the first child, a proxy for fecundity (Galor and Klemp 2014). A consanguineous union matched in 1861–63 will give birth to their first child 9 years later than if they had not been kin. This is a very large effect, which almost surely reflects an increased probability of miscarriage (Helgason et al. 2008). Note, however, that the endogenous effect of consanguinity on time to first birth has a similar magnitude but opposite sign. Formally, a Wald test cannot reject the null hypothesis that the coefficients on consanguinity and consanguinity interacted with 1861–63 add up to zero. In other words, the unobservable characteristics simultaneously affecting consanguinity and fecundity offset the causal effect of consanguinity.

Columns 2 and 3 look at death of children before reaching the typical marriage age (24.5 for women and 30.1 for men in 1859–67). A child of a consanguineous union matched in 1861–63 is two times more likely to die before reaching the marriageble age than what she would had her parents not been kin. In addition, these consanguineous unions will see 3.5 more children dying before that time than identical non-consanguineous unions. As with time to first birth, these negative, causal effects of consan-

father was (1) a commoner, (2) a knight, (3) a baronet, (4) a viscount or a baron, and (5) an earl, a duke or a marquess.

[26]Using dummies for their parent's highest ranked progenitor.

guinity are offset by the positive effect of the unobserved characteristics that affect consanguinity and are potentially correlated with unobservable factors influencing fertility.

The adverse effects of consanguinity on fertility are perhaps clearer for the second generation, that is, for the children of consanguineous unions. Table 3.5 presents the results of a series of fixed effects poisson regressions capturing the effect of consanguinity in generation 1 on the number of births for generation 2. That is, the number of births of the children (generation 2) of all peers and peers' offspring marrying in 1859–67 (generation 1). Again, all estimates account for family fixed effects, and thus are based on exogenous variation in consanguinity within lineages. Birth year fixed effects are included to account for the socio-economic and demographic conditions during each children's lifetime.

Results suggest that the children of consanguineous unions give birth to less children. Column 1 presents the results without adding controls for spousal characteristics. A child of consanguineous parents who married in 1861–63 is expected to give birth to around 3.6 times fewer children than what she would had her parents not been kin.

Columns 2-7 include a range observable control variables. The estimated effects of consanguinity remain stable when adding gender, birth order, age at marriage, age at marriage interacted with gender, and dummies for social status (columns 2-5). However, accounting for spouse's age at marriage and social status, and for wife's age at marriage (columns 6 and 7) dramatically increases the magnitude of the effect. In detail, in the full specification the child of a consanguineous union is expected to give birth to around 16 times fewer children than what she would had their parents not been kin. As the average number of births among members of the second generation is 2.13, ranging from 0 to 12 (see table 3.A2 in the appendix), the magnitude of the effect implies that the child of an exogenous consanguineous union is 16 times less likely to have a child. Note that here the effect of unobservable characteristics simultaneously affecting consanguinity and fecundity (i.e., the coefficient on the dummy indicating consanguineous parents) is not large enough to offset the causal effect of consanguinity.

Note that the positive effect of consanguinity in the first generation (table 3.3) is offset by the negative effect on the second (table 3.5). While consanguineous couples gave birth to 1.5 times more children, these are had 16 times fewer children than what they would had their parents not been kin. In other words, over the long-run, non-consanguineous lineages grew larger than consanguineous clans.

On a separate note, it is important to note that the coefficients on age at marriage are remarkably similar across generations. Since there is no reason to believe that the effect of age at marriage on the number of births varied from one generation to another, this stability can be taken as proof that the empirical model is tightly identified.

Is there a gender effect? Do sons and daughters of consanguineous unions present different fertility records? Table 3.6 presents fixed effects poisson estimates of the effect of consanguinity in generation 1 on the number of births for generation 2 by gender. The estimated effect of consanguinity is larger for women across specifications. Columns 1-2 include birth order, age marriage, and social status for each member of generation 2, aside from birth year and family fixed effects. According to this specification, the daughters of consanguineous unions set up in 1861–63 are expected to give birth to 17 fewer children than what they would had their parents not been kin. Instead, sons are only expected to give birth to 2 fewer children. Once I control for spouses' age at marriage and social status, and wife's age at marriage (columns 3-6), the effect for men is reduced and becomes insignificant. These results suggest that consanguinity affects women more severely.

The objective of noble dynasties was to perpetuate their name throughout centuries. In that respect, it is interesting to look at whether consanguinity lead to infertility. Table 3.7 presents the fixed effects OLS estimates for the probability of remaining childless for the children (generation 2) of peers and peers' offspring marrying in 1859–67 (generation 1). Across specifications, the children of consanguineous unions set when the marriage market was disrupted are between 50-70 percent more likely to remain childless than what they would had their parents not been kin. In detail, once I account for gender, birth order, wife's age at marriage, and both spouses' social status, parental consanguinity seems to double the odds of their children remaining childless.

Note also that, in the full specification, the coefficient on the dummy indicating consanguineous parents is also negative and significant. In the case of infertility, therefore, the causal effect of consanguinity and the effect of unobservable characteristics go in the same direction.

3.6 Conclusion

This research analyzes a crucial determinant of fertility, seldom considered by economists: consanguinity. To do so, I exploit the vast demographic and genealogical material on the British peerage. My identification strategy takes advantage of a unique historical event: as Queen Victoria went into mourning in 1861–63, the marriage market embedded in the London Season was interrupted. British noblemen shifted back to the local marriage markets in search for a spouse. There, markets were more shallow and populated by genetically related noblemen, leading many of them to enter consanguineous unions. I use this exogenous increase in consanguinity as a source of identifying variation. To account for unobserved heterogeneity further, my identification is based on variations in reproductive success among members of the same lineage.

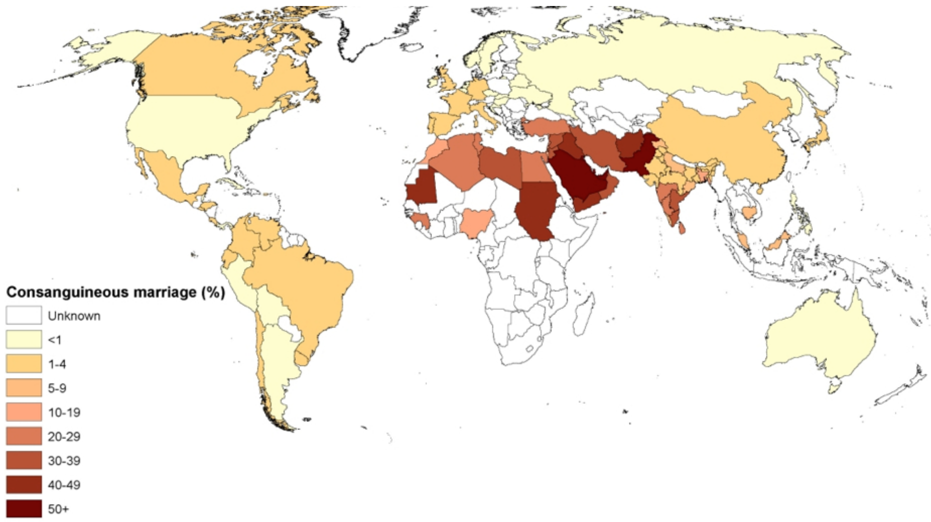
I find that, on average, consanguineous unions give birth to 1.5 more children than what they would had they not been kin. However, the time elapsed from marriage to the first birth is much larger, indicating among other factors an increased probability of miscarriage. My results suggest that this important effect is masked by the effect of unobservable factors affecting both consanguinity and fertility. In addition, the children of consanguineous unions are two times less likely to reach the typical marriage age, have much less children, and are 50 percent more likely to be childless. In sum, although consanguinity may have an initial positive effect on fertility, it is offset in the next generation, severely constraining reproductive success in the long run.

This results have several implications. On the one hand, recently there have been calls to ban cousin marriage in the United Kingdom. The debate has been prompted by the widespread popularity of this practice among British pakistanis. Although my results attach negative effects to cousin marriage, they also suggest that the high incidence of consanguinity among British pakistanis may reflect a marriage market failure rather than culture or preferences. Active integration policies aimed increasing intermarriage across communities may thus be a more effective policy than simply banning the practice.

On the other hand, my results suggest that consanguinity will eventually push fertility downwards in North Africa, the Middle East, and South Asia, where cousin marriage is widespread. Falling fertility in these developing countries is often associated with higher incomes per capita, better education, and somewhat greater female autonomy (Chesnais 1992, Chenery et al. 1975). Therefore, consanguinity may have positive effects in the long run at the cost of worse health conditions. However, more research on the economic consequences of consanguinity, for example on outcomes such as inequality, is needed to assess the pros and cons of this widespread custom.

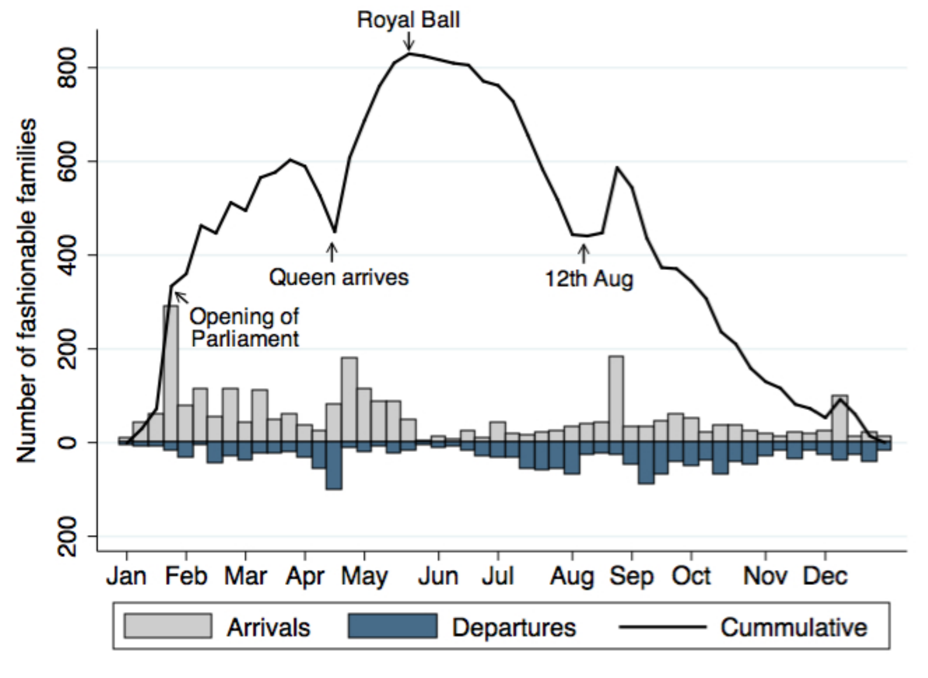
3.7 Figures and tables

Figure 3.1: Global prevalence of consanguineous marriages, 2001



Source: `www.consang.net`. © Bittles (2009).
Note: Unions between persons biologically related as second cousins are categorized as consanguineous.

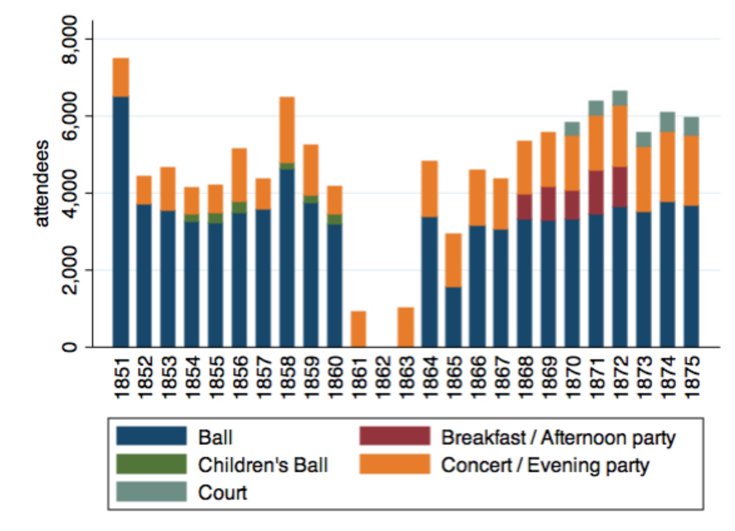
Figure 3.2: Seasonable migrations of the "Fashionable World", 1841



Source: Sheppard (1977).

Note: "This figure plots over 4,000 movements into and out of London of members of the "Fashionable World", as resorted in The Morning Post in 1841. Movements of single individuals or of married couples or of whole families are all expressed as one movement. Thus the total number of persons arriving and departing was in reality much larger than that given here. The hatched columns show the total number of arrivals and departures reported in each week. Sometimes there was a time lag of up to ten days between the date of a movement and its publication. The heavy black line shows the cumulative total of arrivals after subtraction of departures. The departures were not so fully reported as the arrivals, and to correct this shortfall the departures have been multiplied by a factor of 1.6" Sheppard (1977).

Figure 3.3: Number of attendees at royal parties, by type of event



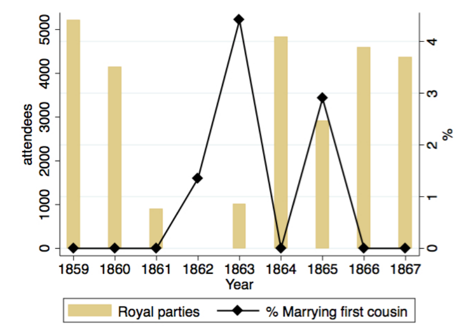
Source: British National Archives, LC 6/31–55.

Note: The sample comprises all 126 parties held at Buckingham, St. James' Palace, and Windsor during the London Season from 1851 to 1875. The number of attendees was collected from the invitation lists written by the Lord Chamberlain. Balls include state balls and costume balls at Buckingham. Court refers to the Queen's diplomatic and official court at Buckingham. The initial year, 1851, displays unusually high attendance rates, explained by the Crystal Palace Exhibition. Between 1861 and 1863, most royal parties were cancelled due to Queen Victoria's mourning for her mother (died March 16, 1861), and her husband (died December 14, 1861).

Figure 3.4: The effects of the interruption of the Season on the distance between spouses' seats

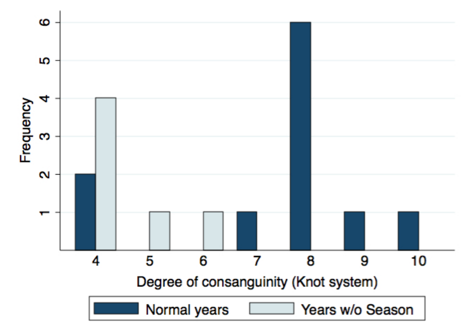
Source: Attendees come from the British National Archives, LC 6/31–55.
Note: Shaded bars show attendees at royal parties per year (left axis). The sample for the connected line are all marriages in 1859–66 for which I locates both spouses family seats in Burke (1826). 1867 is excluded because of a small sample size.

Figure 3.5: The effects of the interruption of the Season on cousin marriage



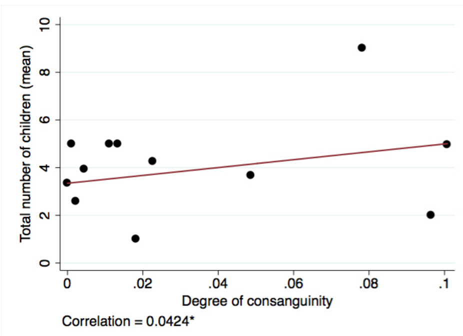
Source: Attendees come from the British National Archives, LC 6/31–55.
Note: Shaded bars show attendees at royal parties per year (left axis). Diamonds display the percentage marrying a first cousin (right axis). The sample includes all peers' and peers' offspring first marrying in 1859–67 ($N = 613$).

Figure 3.6: The effects of the interruption of the Season on consanguinity



Note: The sample includes all peers' and peers' offspring first marrying in 1859–67 ($N = 613$). Dark bars correspond to those marrying in 1859–60 and 1864–67, light bars to those marrying in 1861–63. The Knot system describes blood relationships such that smaller numbers correspond to more consanguinity (see Figure 3.A1 for details).

Figure 3.7: Relationship between consanguinity and number of children



Note: The sample is all peers' and peers' offspring first marrying in 1851–75 ($N = 2,013$). Dots show the mean number of births. Consanguinity is such that larger numbers correspond to more consanguinity. In detail, it is equal to $\sum_i \frac{1}{2}^{K_i} \times (1 + \frac{1}{K_i})$, where K_i is the degree of relationship in the Knot System. The summation over i takes into account that an individual can be related to her spouse in more than one way. Fitted values weighted by the number of observations; *** p<0.01, ** p<0.05, * p<0.1

Table 3.1: The relationship between disruptions to the matching technology and consanguinity, 1859–67

	Normal years	Years w/o Season	Diff.
% marrying first cousins	0.50	1.91	-1.42 **
	(0.35)	(0.95)	(0.84)
% marrying up to second cousins (Knot≤6)	0.50	2.87	-2.38 ***
	(0.35)	(1.16)	(0.96)
% marrying less than third cousins (Knot<8)	0.74	2.87	-2.13 **
	(0.43)	(1.16)	(1.02)
% marrying consanguinious (Knot≤11)	2.72	2.87	-0.15
	(0.81)	(1.16)	(1.40)
Degree of consanguinity	0.0006	0.0022	-0.0016**
	(0.0004)	(0.0010)	(0.0009)
Observations	404	209	

Note: The sample are all peers and peers' offspring first marrying between 1859–60 and 1864–67 (column 1) and 1861–63 (column 2). Therefore, the first column corresponds to those marrying when Season worked normally, and column 2 corresponds to those matched when the marriage market was disrupted by the death of Prince Albert. Rows describe different degrees of consanguinity based on the Knot System (see Figure 3.A1). The consanguinity index is based on Wright's coefficient of inbreeding. In detail, it is equal to $\sum_i \frac{1}{2}^{K_i} \times \left(1 + \frac{1}{K_i}\right)$, where K_i is the degree of relationship based on the Knot System. The summation over i takes into account that an individual can be, for example, her spouse's second cousin from the mother's side, and her spouse's third cousin twice removed from the father side. Standard errors are in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 3.2: Balanced cohorts: Interruption of the Season vs. normal years

	Years w/o Season (1861–63)		Normal years (1859–67)†		Difference	
Demographic characteristics at marriage						
	wom.	men	wom.	men	wom.	men
Age at first marriage	24.73	30.4	24.36	31.1	0.37	-0.67
	(0.59)	(0.65)	(0.43)	(0.59)	(0.74)	(0.95)
Duke children	0.51	0.44	0.52	0.42	-0.01	0.02
	(0.05)	(0.05)	(0.04)	(0.03)	(0.06)	(0.06)
Baron children	ref.					
Peerage of England	0.65	0.66	0.59	0.60	0.06	0.06
	(0.05)	(0.04)	(0.04)	(0.03)	(0.06)	(0.06)
Peerage of Scotland and Ireland	ref.					
Observations	96	113	180	224		
Cohort characteristics						
Female cohort size (18–24)	264	261	3			
	(1.93)	(3.06)	(3.46)			
Sex ratio (men/women)	1.111	1.107	0.005			
	(0.010)	(0.024)	(0.021)			

Note: The demographic characteristics are for all peer children first marrying in 1859–67. The sample is then divided into women and men marrying during Queen Victoria's mourning period (1861–63) and women and men marrying the years before and after. Age at first marriage is presented in years, "duke children" and "peerage of England" in proportions. Differences are "Years w/o Season" - "Normal years". Cohort characteristics are yearly averages. Female cohort size is the number of peers' daughters aged 18–24. Eighteen was the earliest age at which a girl was presented at court. After 24, the hazard rate for women sharply decreases (see Figure 3.A4 in the appendix). Sex ratio is computed as the number of peers and peers' sons aged 19–25 to peers' daughters aged 18–24. For years when the latter is underreported, I estimate the number of girls to be $0.95 \times men$. Standard errors are in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
† 1859–67 excludes the years of the mourning.

Table 3.3: The effect of consanguinity on the number of births, first generation

	(1)	(2)	(3)	(4)	(5)	(6)
Consanguineous	-0.27	-0.38	-0.29	-0.38	-0.37	0.00
	(0.41)	(0.45)	(0.39)	(0.42)	(0.43)	(0.45)
Married in 1861–3	-0.02	-0.02	-0.09	-0.07	-0.09	-0.05
	(0.13)	(0.13)	(0.13)	(0.13)	(0.14)	(0.14)
Consang.×(1861–3)	1.32***	1.69***	1.76***	1.50***	1.43**	1.21**
	(0.51)	(0.54)	(0.51)	(0.55)	(0.56)	(0.57)
Woman		-0.21*	0.80	-0.30**	-0.08	0.06
		(0.12)	(0.64)	(0.12)	(0.17)	(0.13)
Age at marriage						
Own			-0.04	-0.06**	-0.04	
			(0.03)	(0.03)	(0.03)	
× Woman			-0.04*			
			(0.02)			
Spouse's					-0.02*	
					(0.01)	
Wife's						-0.08***
						(0.02)
Own social status	NO	NO	NO	YES	YES	YES
Spouse social status	NO	NO	NO	NO	YES	YES
Birth year FE	YES	YES	YES	YES	YES	YES
Family FE	YES	YES	YES	YES	YES	YES
Observations	606	606	606	606	606	606
Pseudo R-squared	0.339	0.341	0.347	0.346	0.352	0.361
Ho: $\beta_1 + \beta_3 = 0$						
prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00

Note: This table presents the results of fixed-effects poisson regressions of the number of births on consanguinity in generation 1, i.e., peers and peers' offspring first-marrying in 1859–67. The variable capturing the effect of consanguinity is *Consang. × (1861–63)*, which indicates entering an exogenous consanguineous union (i.e., set during the interruption of the London Season in 1861–63). Consanguinity is defined as a couple related up to the degree of second cousins thrice removed (i.e., Knot < 8). All regressions account for birth year and family fixed effects. Column 1 does not include any control. Columns 2-4 include controls for the observed individual, column 5 adds controls for his/her spouse, and column 6 adds couple controls. Constants not reported. Standard errors clustered by family are in parenthesis; *** p<0.01, ** p<0.05, * p<0.1

Table 3.4: The effect of consanguinity on other fertility outcomes, first generation

	(1)	(2)	(3)
	Time to first birth	Under age at marriage mortality	
	(years)	(probability)	(total number)
Consanguineous union	-8.28***	-1.55*	-2.46*
	(1.94)	(0.91)	(1.32)
Parents married in 1861–63	-0.32	-0.12	-0.05
	(1.58)	(0.23)	(0.45)
Consang. $\times$ (1861–63)	9.56**	2.17*	3.47*
	(4.03)	(1.13)	(1.87)
Woman	0.44	-0.28	-0.48
	(1.05)	(0.32)	(0.42)
Wife age at marriage	-0.14	-0.00	0.03
	(0.27)	(0.03)	(0.05)
Own social status	YES	YES	YES
Spouse social status	YES	YES	YES
Birth year FE	YES	YES	YES
Family FE	YES	YES	YES
Observations	383	375	375
R-squared	0.82	0.87	0.86
Ho: $\beta_1 + \beta_3 = 0$			
prob $>$ F	0.68	0.32	0.42

Note: This table presents the results of fixed-effects OLS regressions of various fertility measures on consanguinity among generation 1 individuals with descendancy, i.e., peers and peers' offspring first-marrying in 1859–67 and having at least one child. The variable capturing the effect of consanguinity is *Consang.* $\times$ *(1861–63)*, which indicates entering an exogenous consanguineous union (i.e., set during the interruption of the London Season in 1861–63). Following the standard convention in clinical genetics, consanguinity is defined as a couple related up to the degree of second cousins thrice removed (i.e., Knot $<$ 8). All regressions account for birth year and family fixed effects. Column 1 looks at the time interval between marriage and the first birth. Column 2 looks at the probability that their children die before reaching the (gender-specific) average marriage age in 1859–67. Finally, Column 3 looks at the number of children who die before that time. Constants not reported. Standard errors clustered by family are in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

Table 3.5: The effect of consanguinity on the number of births, second generation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Consanguineous parents	2.64***	2.58***	2.52***	1.94***	1.93***	-1.45***	-1.28***
	(0.10)	(0.11)	(0.12)	(0.08)	(0.08)	(0.20)	(0.17)
Parents married in 1861–63	-0.17	-0.17	-0.11	-0.27	-0.19	1.15***	0.34
	(0.15)	(0.15)	(0.16)	(0.18)	(0.17)	(0.43)	(0.37)
Consang. × (1861–63)	-3.63***	-3.50***	-3.57***	-3.00***	-3.20***	-16.87***	-16.54***
	(0.86)	(0.83)	(0.83)	(1.04)	(0.93)	(1.16)	(1.10)
Woman		-0.11	-0.12	0.90***	0.87***	0.84**	0.00
		(0.08)	(0.08)	(0.30)	(0.30)	(0.36)	(0.09)
Birth order			-0.06*	-0.03	-0.03	-0.01	-0.01
			(0.03)	(0.03)	(0.03)	(0.05)	(0.04)
Age at marriage							
Own				-0.02***	-0.02***	-0.02**	
				(0.01)	(0.01)	(0.01)	
× Female				-0.04***	-0.04***	-0.03**	
				(0.01)	(0.01)	(0.01)	
Spouse's						-0.02***	
						(0.01)	
Wife's							-0.07***
							(0.01)
Own social status	NO	NO	NO	NO	YES	YES	YES
Spouse social status	NO	NO	NO	NO	NO	YES	YES
Birth year FE	YES	YES	YES	YES	YES	YES	YES
Family FE	YES	YES	YES	YES	YES	YES	YES
Observations	956	956	956	819	819	557	628
Pseudo R-squared	0.165	0.166	0.167	0.168	0.170	0.203	0.209
Ho: $\beta_1 + \beta_3 = 0$							
prob > chi2	0.24	0.25	0.20	0.31	0.17	0.00	0.00

Note: This table presents the results of a series of fixed-effects poisson regressions of the number of births in generation 2 on consanguinity in generation 1, i.e., the number of births of the children (generation 2) of all peers and peers' offspring first-marrying in 1859–67 (generation 1). The variable capturing the effect of consanguinity is *Consang.* × *(1861–63)*, which indicates being the offspring of an exogenous consanguineous union (i.e., set during the interruption of the London Season in 1861–63). Following the standard convention in clinical genetics, consanguinity is defined as a couple related up to the degree of second cousins thrice removed (i.e., Knot < 8). All regressions account for birth year and family fixed effects. I also include a dummy indicating the source of the data (i.e., Hollingsworth (1964) or `thepeerage.com`) except in column 2, where it is excluded to avoid collinearity. Column 1 does not include any control. Columns 2-5 include controls for the observed individual, column 2 adds controls for his/her spouse, and column 3 adds couple controls. Constants not reported. Standard errors clustered by family are in parenthesis.
*** p$<$0.01, ** p$<$0.05, * p$<$0.1

Table 3.6: The effect of consanguinity on the number of births by gender, second generation

	(1)	(2)	(3)	(4)	(5)	(6)
	Women	Men	Women	Men	Women	Men
Consanguineous parents	0.31	1.86***	-3.47***	-0.04	0.50	-0.09
	(0.60)	(0.11)	(0.84)	(1.22)	(0.55)	(1.20)
Parents married in 1861–63	0.41	-0.11	-2.80***	-0.25	0.58*	-0.28
	(0.36)	(0.18)	(0.80)	(0.74)	(0.33)	(0.75)
Consang. × (1861–63)	-17.38***	-2.02***	-13.31***	-0.19	-17.37***	-0.17
	(1.12)	(0.47)	(1.28)	(0.66)	(1.10)	(0.67)
Birth order	0.04	-0.00	0.15	-0.02	0.06	-0.02
	(0.07)	(0.04)	(0.10)	(0.08)	(0.08)	(0.07)
Age at marriage						
Own	-0.07***	-0.02***	-0.07***	0.00		
	(0.01)	(0.01)	(0.02)	(0.01)		
Spouse's			0.00	-0.09***		
			(0.01)	(0.02)		
Wife's					-0.07***	-0.09***
					(0.01)	(0.02)
Own social status	YES	YES	YES	YES	YES	YES
Spouse social status	NO	NO	YES	YES	YES	YES
Birth year FE	YES	YES	YES	YES	YES	YES
Family FE	YES	YES	YES	YES	YES	YES
Observations	334	485	262	295	333	295
Pseudo R-squared	0.325	0.186	0.370	0.267	0.338	0.267
Ho: $\beta_1 + \beta_3 = 0$						
prob > chi2	0.00	0.72	0.00	0.83	0.00	0.82

Note: This table presents the results of a series of fixed-effects poisson regressions of the number of births in generation 2 on consanguinity in generation 1, i.e., the number of births of the children (generation 2) of all peers and peers' offspring first-marrying in 1859–67 (generation 1). Even columns consider men, odd columns consider women. The variable capturing the effect of consanguinity is *Consang. × (1861–63)*, which indicates being the offspring of an exogenous consanguineous union (i.e., set during the interruption of the London Season in 1861–63). Following the standard convention in clinical genetics, consanguinity is defined as a couple related up to the degree of second cousins thrice removed (i.e., Knot < 8). All regressions account for birth year and family fixed effects. I also include a dummy indicating the source of the data (i.e., Hollingsworth (1964) or `thepeerage.com`) except in columns 2-4 and 6, where it is excluded to avoid collinearity. Columns 1-2 only include controls for the observed individual, columns 3-4 add controls for his/her spouse, and columns 5-6 add couple controls. Constants not reported. Standard errors clustered by family are in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

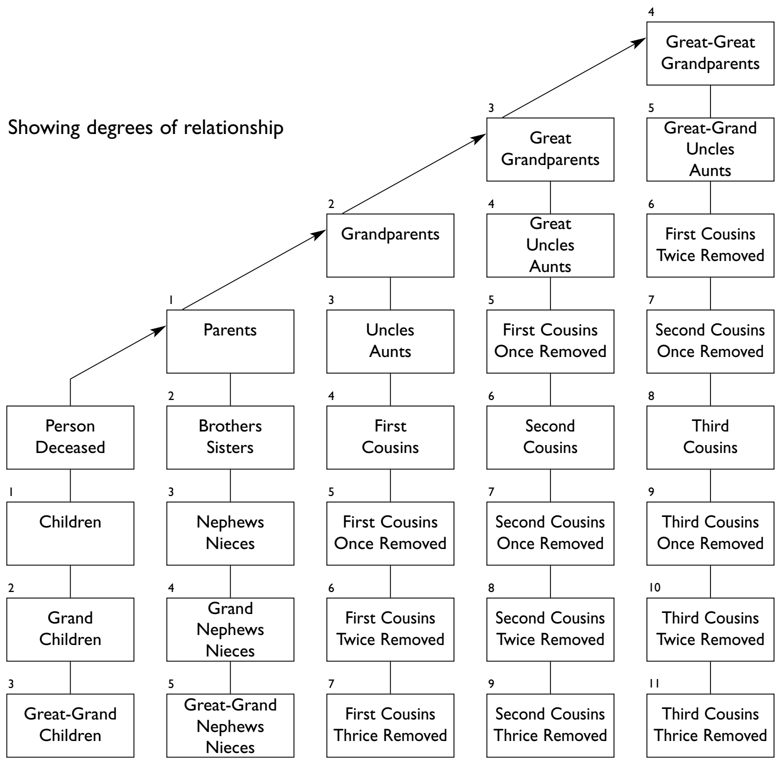
Table 3.7: The effect of consanguinity on infertility, second generation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Consang. parents	-0.33***	-0.26***	-0.26***	0.02***	0.02***	0.35***	0.32***
	(0.00)	(0.03)	(0.03)	(0.01)	(0.01)	(0.07)	(0.06)
Parents marr. in 1861–3	0.07	0.07	0.07	0.08	0.07	-0.02	0.08
	(0.09)	(0.09)	(0.09)	(0.11)	(0.11)	(0.10)	(0.13)
Consang. $\times$ (1861–3)	0.72***	0.58***	0.58***	0.49***	0.52***	0.46***	0.56***
	(0.14)	(0.13)	(0.14)	(0.16)	(0.17)	(0.14)	(0.16)
Woman		0.11***	0.11***	-0.15	-0.13	-0.00	0.02
		(0.04)	(0.04)	(0.14)	(0.14)	(0.18)	(0.05)
Birth order			0.01	-0.00	-0.00	-0.01	-0.01
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age at marriage							
Own				0.01***	0.01***	0.01*	
				(0.00)	(0.00)	(0.00)	
$\times$ Woman				0.01*	0.01*	-0.00	
				(0.01)	(0.01)	(0.01)	
Spouses'						0.01***	
						(0.00)	
Wife's							0.02***
							(0.00)
Own social status	NO	NO	NO	NO	YES	YES	YES
Spouse social status	NO	NO	NO	NO	NO	YES	YES
Birth year FE	YES	YES	YES	YES	YES	YES	YES
Family FE	YES	YES	YES	YES	YES	YES	YES
Observations	978	978	978	819	819	557	628
R-squared	0.32	0.33	0.33	0.37	0.37	0.41	0.43
Adjusted R-squared	0.0972	0.110	0.109	0.119	0.115	0.172	0.168
Ho: $\beta_1 + \beta_3 = 0$							
prob > F	0.01	0.01	0.01	0.00	0.00	0.00	0.00

Note: This table presents the results of a series of fixed-effects OLS regressions of infertility in generation 2 on consanguinity in generation 1, i.e., the infertility of the children (generation 2) of all peers and peers' offspring first-marrying in 1859–67 (generation 1). The variable capturing the effect of consanguinity is *Consang. $\times$ (1861–63)*, which indicates being the offspring of an exogenous consanguineous union (i.e., set during the interruption of the London Season in 1861–63). Following the standard convention in clinical genetics, consanguinity is defined as a couple related up to the degree of second cousins thrice removed (i.e., Knot < 8). All regressions account for birth year and family fixed effects. I also include a dummy indicating the source of the data (i.e., Hollingsworth (1964) or `thepeerage.com`) except in column 6, where it is excluded to avoid collinearity. Column 1 does not include any control. Columns 2-5 only includes controls for the observed individual, column 6 adds controls for his/her spouse, and columns 7 adds couple controls. Constants not reported. Standard errors clustered by family are in parenthesis.
*** p<0.01, ** p<0.05, * p<0.1

3.8 Appendix A: Supplemental figures and tables

Figure 3.A1: Knot system for relative consanguinity



Note: This figure illustrates the degree of relative consanguinity based of the Knot system (Knud 1996). The degree of relationship is determined by the number of generations to the closest common ancestor (columns). When the cousins are not the same generation (rows), they are described as "removed". In this case, the degree is determined by the smaller number of generations to the common ancestor, and the difference in generations determines the number of times removed. Small numbers correspond to more related individuals.

Table 3.A1: Summary statistics, first generation

Panel A. Fertility measures	N	mean	sd	min	max
Number of births	606	4.07	3.15	0	15
Time to first birth	380	2.09	2.42	0	16
Under age at marriage mortality					
Probability	372	0.46	0.5	0	1
Number	372	0.64	0.8	0	4

Panel B. Consanguinity of spouses	N	mean	sd	min	max
First cousins	613	0.01	0.1	0	1
Up to second cousins	613	0.01	0.11	0	1
Up to third cousins	613	0.01	0.12	0	1
Any consanguinity relation	613	0.03	0.16	0	1
Degree index (based on Wright)	613	0	0.01	0	0.1
Distance between spouses' seats (ml.)	122	152.32	131.26	1.38	413.97

Panel C. Other controls	N	mean	sd	min	max
Female	613	0.45	0.5	0	1
Age at marriage					
Female	613	23.95	5.5	16	55
Male	613	31.43	8.32	18	60
Own social status (highest ranked parent)					
Foreign	613	0	0.04	0	1
Commoner	613	0.08	0.27	0	1
Knight	613	0	0.04	0	1
Baronet	613	0.01	0.11	0	1
Baron, Viscount	613	0.44	0.5	0	1
Duke, Earl, Marquess	613	0.46	0.5	0	1
Spouses' social status (highest ranked parent)					
Foreign	613	0.04	0.19	0	1
Commoner	613	0.58	0.49	0	1
Knight	613	0.03	0.16	0	1
Baronet	613	0.08	0.28	0	1
Baron, Viscount	613	0.1	0.3	0	1
Duke, Earl, Marquess	613	0.17	0.38	0	1
Birth year	613			1800	1848

Note: This table presents summary statistics for all peers and peers' offspring first-marrying in 1859–67. Under age mortality (panel A, rows 4 and 5) refers to the death of children before reaching the average marriage age between 1859–67 (24.5 for women, 30.1 for men). The degree index (panel B, row 5) is a coefficient of inbreeding equal to $\sum_i \frac{1}{2}^{K_i} \times (1 + \frac{1}{K_i})$, where K_i is the degree of relationship (Knot System, Figure 3.A1). The summation over i takes into account that an individual can be related to her spouse in more than one way (e.g., one could be her spouse's second cousin from the mother side, and her third cousin once removed from her mother's side).

Table 3.A2: Summary statistics, second generation

	N	mean	sd	min	max
Panel A. Fertility measures					
Number of births	978	2.13	2.02	0	12
Infertility	978	0.29	0.45	0	1
Panel B. Consanguinity of spouses					
First cousins	3,976	0.01	0.08	0	1
Up to second cousins	3,976	0.01	0.09	0	1
Up to third cousins	3,976	0.01	0.11	0	1
Any consanguinity relation	3,976	0.03	0.16	0	1
Parents degree index (based on Wright)	3,976	0.00	0.01	0	1
Panel C. Other controls					
Female	1,500	0.47	0.50	0	1
Age at marriage					
Female	697	25.58	6.03	16	50
Male	808	31.79	8.19	18	72
Own social status (father)					
Foreign	3,976	0.01	0.10	0	1
Commoner	3,976	0.41	0.49	0	1
Son of Baron, Viscount	3,976	0.16	0.37	0	1
Son of Duke, Earl, Marquess	3,976	0.21	0.41	0	1
Knight	3,976	0.03	0.17	0	1
Baronet	3,976	0.05	0.21	0	1
Baron, Viscount	3,976	0.07	0.25	0	1
Duke, Earl, Marquess	3,976	0.06	0.24	0	1
Spouses' social status (highest ranked parent)					
Foreign	952	0.07	0.26	0	1
Commoner	952	0.65	0.48	0	1
Knight	952	0.02	0.15	0	1
Baronet	952	0.07	0.25	0	1
Baron	952	0.08	0.27	0	1
Duke	952	0.11	0.31	0	1
Birth year	1,451			1857	1889
Data source					
`thepeerage.com`	1,896	0.52		0	1
Hollignsworth (1964)	1,896	0.48		0	1

Note: This table presents summary statistics for the children (generation 2) of all peers and peers' offspring first-marrying in 1859–67 (generation 1). Reproductive success (panel A, rows 2) refers to the probability of giving birth to at least one child. The degree index (panel B, row 5) is a coefficient of inbreeding equal to $\sum_i \frac{1}{2}^{K_i} \times (1 + \frac{1}{K_i})$, where K_i is the degree of relationship (Knot System, Figure 3.A1). The summation over i takes into account that an individual can be related to her spouse in more than one way (e.g., one could be her spouse's second cousin from the mother side, and her third cousin once removed from her mother's side).

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