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# Malthus in Germany?

*Fertility, Mortality and Status in pre-industrial Germany 1600-1850*

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## **Abstract:**

This paper studies the individual-level assumptions of the Malthusian model in pre-industrial Germany. By exploiting demographic records for 150,000 individuals from the historical county of Wittgenstein, I test for status gradients in child mortality (the Malthusian positive check) and marital fertility (preventive check). While I find no evidence for a status gradient in child mortality, I find strong evidence for a status gradient in fertility. The richest families had, on average, one extra child when compared to their poorer compatriots. Turning to the mechanics of the preventive check, this appears to have been driven mostly by an earlier age of marriage amongst high status families. Disaggregating my dataset into six periods reveals that this fertility differential began to disintegrate around 1800. Ergo, I conclude that prior to 1800, the German population was subject to some Malthusian forces, albeit it was not stuck in a rigid Malthusian equilibrium, as conceptualised by some neo-Malthusian scholars.

## **JEL Classification:**

J12, J13, N34, N94.

## **Keywords:**

German Economic History, Malthus, Demographic History, European Marriage Pattern

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## INTRODUCTION

Scholars stress the Malthusian demographic regime, as a core component of the pre-industrial world. Here, history is divided into a Malthusian and post-Malthusian era. Multiple theories locate the fundamental cause of modern economic growth deep in the demographic dynamics of the latter.<sup>2</sup> For example, a historically distinct European Marriage Pattern (hereafter EMP) is credited with alleviating demographic pressure in north-western Europe, increasing living standards and encouraging greater investment in human capital.<sup>3</sup> A parallel literature stresses how differential rates of reproductive success, led to a slow restructuring of society, with the proliferation of the growth-inducing traits of reproductively more successful groups, culminating in the industrial revolution.<sup>4</sup> Across this literature, the Malthusian model is advanced as a central tenet of a ‘history of the world’. However, while the mechanics of the Malthusian era are asserted with credence, multiple empirical contributions illustrate that pre-industrial demographic regimes do not obey Malthus as closely as some authors presume.<sup>5</sup> This paper contributes to this literature by assessing the applicability of the Malthusian model at the individual-level in a novel German case study.

Malthus’s model contains three central assumptions: (1) the *preventive check*: a positive relationship between fertility and living standards; (2) the *positive check*: a negative relationship between mortality and living standards; and (3) a negative relationship between living standards and population.<sup>6</sup> The third assumption links the two former individual-level assumptions to the population-level outcomes of the Malthusian regime. With most empirical studies focusing on these population-level outcomes, the fundamental individual-level assumptions of the Malthusian model remain understudied.<sup>7</sup> We find mixed results where the individual-level assumptions have been tested in Europe (mainly France and England). There is little evidence for a positive check; studies find no evidence for a class gradient in child mortality across households. And there is significant, albeit varying, evidence for the preventive check, with studies finding that upper- and middle-class families tend to have more

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<sup>2</sup> Guinnane, ‘The Historical Fertility Transition’.

<sup>3</sup> Hajnal, ‘European Marriage Patterns in Perspective’; De Moor and Van Zanden, ‘Girl Power’; Henrich, Heine, and Norenzayan, ‘The Weirdest People in the World?’; Voigtländer and Voth, ‘How the West “Invented” Fertility Restriction’.

<sup>4</sup> Clark, *A Farewell to Alms*; Galor and Moav, ‘Natural Selection and the Origin of Economic Growth’.

<sup>5</sup> Dennison and Ogilvie, ‘Does the European Marriage Pattern Explain Economic Growth?’; de la Croix, Schneider, and Weisdorf, ‘Childlessness, Celibacy and Net Fertility in Pre-Industrial England’.

<sup>6</sup> Clark, *A Farewell to Alms*, p. 20.

<sup>7</sup> Cummins, ‘The Micro-Evidence for the Malthusian System. France, 1670–1840’, pp. 1–2; for macro-level analysis see: Pfister and Fertig, ‘From Malthusian Disequilibrium to the Post-Malthusian Era’; Crafts and Mills, ‘From Malthus to Solow’; Lee and Anderson, ‘Malthus in State Space’; Fernihough, ‘Malthusian Dynamics in a Diverging Europe’; Fertig et al., ‘Das Postmalthusianische Zeitalter’; Pedersen, Riani, and Sharp, ‘Malthus in Preindustrial Northern Italy?’

children.<sup>8</sup> Several studies identify similar gradients in fertility for non-European societies. However, outside of this relatively small set of countries, the validity of these findings for other study areas remains untested. For Germany, several papers test for specific facets of the Malthusian model at the individual-level in 19<sup>th</sup> century Germany.<sup>9</sup> Others test the Malthusian model at the population-level.<sup>10</sup> However, this is the first paper to explicitly test the individual-level assumptions of the Malthusian model for pre-industrial Germany.

To do so, this paper draws upon the one-place study (*Ortsfamilienbuch*) of the rural county Wittgenstein, encompassing 150 thousand individuals across 42 thousand families. One-place studies – the select vehicle for the study of family history in Germany – are the non-academic analogue to the family reconstitution. One-place studies vary in breadth and rigour. A subset of one-place studies – characterised by consistent sourcing and the complete transcription of parish records – constitute a viable alternative to purpose-built reconstitutions.<sup>11</sup>

To understand the relationship between living standards and fertility and mortality at the individual level, I proxy living standards with occupational status. The positive check is operationalised as a status-gradient in under-15 mortality, and the preventive check is operationalised as a status-gradient in gross marital fertility. I find no evidence for the positive check; low- and high-status families had similar levels of child mortality. However, family-level associations do support the presence of the preventive check; high-status families had on average one extra child when compared to low-status families.

I check whether controlling for the extensive margin of fertility – namely childlessness and celibacy – influences this result, but it does not. To elucidate how the preventive check functions, I turn to its internal mechanics. I estimate the status-gradients in the *starting* (proxied by mother's age at marriage), the *spacing* (proxied by the average birth interval), and the *stopping* of reproductive behaviour (proxied by mother's age at last birth). In accordance with Malthus (and the EMP), I find no clear status-gradient in spacing or stopping – hinting at natural fertility within marriage – but a significant gradient in starting, showing that mothers of lower socioeconomic status tended to delay marriage. Disaggregating the dataset into six periods yields further insight. Notably, the preventive check seems to have disappeared at the end of the 18th century, almost a century before the fertility transition, in the absence of any discernible socio-economic change.

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<sup>8</sup> Clark and Hamilton, 'Survival of the Richest'; Clark and Cummins, 'Malthus to Modernity'; Cummins, 'The Micro-Evidence for the Malthusian System. France, 1670–1840'; Boberg-Fazlic, Sharp, and Weisdorf, 'Survival of the Richest?'; de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England'; Kelly and Ó Gráda, 'Living Standards and Mortality since the Middle Ages'.

<sup>9</sup> Brown and Guinnane, 'Infant Mortality Decline in Rural and Urban Bavaria'.

<sup>10</sup> Pfister and Fertig, 'From Malthusian Disequilibrium to the Post-Malthusian Era'.

<sup>11</sup> Knodel and Shorter, 'The Reliability of Family Reconstitution Data in German Village. Genealogies (Ortssippenbücher)'; Knodel, *Demographic Behavior in the Past*; Imhof, *Lebenserwartungen in Deutschland Vom 17. Bis 19. Jahrhundert*.

Extending the scope of analysis to Germany is relevant to our understanding of the Malthusian demographic regime for several reasons. First, by showing that in Germany also, the positive check was absent in cross-section, I add to the current body of evidence against the rigid conception of the Malthusian model as a homeostatic equilibrium with countervailing preventive and positive checks. Instead, much like England or France, pre-industrial Germany was subject to Malthusian forces but was not stuck in a strict Malthusian equilibrium. Notably this concurs with population-level findings by Pfister and Fertig (2020) who describe a ‘Malthusian disequilibrium’.<sup>12</sup> Second, my findings carry implications for the neo-Malthusian models that stress ‘survival of the richest’ or the EMP as fundamental causes of growth. While the presence of a strong preventive check – underpinning ‘survival of the richest’ – seems to support the validity of these thesis, the similarity to the English findings undermines claims that ‘survival of the richest’ set England apart at the dawn of the Industrial Revolution. This lends some credibility to de la Croix, Schneider and Weisdorf (2019) who argue that the reproductive advantage of the middle-classes set England apart.<sup>13</sup> While also supporting Dennison and Ogilvie’s (2014) assertion that the EMP was not a driver of growth.<sup>14</sup> Last, although my estimates are tentative, the disappearance of Malthusian forces around 1800 is a striking result, particularly given the simultaneity of this change to demographic changes in England and France.

## I. TESTING MALTHUS

Although much of Malthus writing on political economy has long disappeared from reading lists, his articulation of demographic dynamics persists.<sup>15</sup> Aside the heavily politicised and often unscientific use of Malthus to create a vision of an overpopulation induced judgment day, his writings still underpin how we conceptualise pre-industrial demography.<sup>16</sup> Readings range from Galor and Weil (2000), who explain pre-industrial demography using the Malthusian regime, to Clark (2007), who identifies the latter as the *prima causa* of modern economic growth.<sup>17</sup>

Malthus first defined his *Principles of Population* in a 1798 essay composed in response to the utopian speculations of Godwin and Condorcet.<sup>18</sup> He describes what he interpreted as the fundamental laws of population, binding constraints that made the visions of his optimistic contemporaries redundant. The visions of a society of absolute equality and welfare,

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<sup>12</sup> Pfister and Fertig, ‘From Malthusian Disequilibrium to the Post-Malthusian Era’.

<sup>13</sup> de la Croix, Schneider, and Weisdorf, ‘Childlessness, Celibacy and Net Fertility in Pre-Industrial England’.

<sup>14</sup> Dennison and Ogilvie, ‘Does the European Marriage Pattern Explain Economic Growth?’

<sup>15</sup> Winch, ‘Introduction’.

<sup>16</sup> Ehrlich, *The Population Bomb*.

<sup>17</sup> Clark, *A Farewell to Alms*; Galor and Weil, ‘Population, Technology, and Growth’.

<sup>18</sup> Malthus, *An Essay on the Principle of Population*.

conceptualised by Godwin and Condorcet, become an impossibility, because population would increase at such a rate, that scarcity re-emerges with a vengeance, returning society to its natural state of competition, misery, and inequality.

The central tenet of his *Principles* is that “Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio”.<sup>19</sup> With subsistence always a binding constraint for population, he saw his contribution less in identifying this *a priori* truth, than in describing how population is kept in check.<sup>20</sup> The checks on population come in two varieties. The positive check constrains population growth by increasing mortality. The unfortunate strata of society that are exposed to the binding constraint of subsistence die due to ‘war, pestilence, and famine’. The preventive check operates through fertility; here, births are reduced pre-emptively to avoid the wrath of the positive check. Notably, due to the unchanging and necessary “passion between the sexes”, Malthus does not allow for fertility control within marriage. As such, the preventive check could operate only through delaying marriage or celibacy. Once married, unchecked natural fertility was the rule.

The two sides of the Malthusian system – the imbalance between population and subsistence on one and the two *checks* on the other – produce a homeostatic equilibrium where population growth is nil, living standards are determined chiefly by population, and any gains from technological progress are swallowed up by the population growth they induce. As such, according to a Malthusian reading of demographic history, the pre-modern demographic regime is not characterised by high fertility and mortality alone; moreover, it posits fundamentally distinct demographic dynamics to the modern regime. Although Malthus never formalised this model, given the evidence he cites, he appears to have conceptualised the checks on population at the individual-level. These individual-level associations then underpin the population-level responses associated with the Malthusian demographic regime.<sup>21</sup> Markedly, I do not test for population-level responses – aggregate-level time series inquiry is better suited to this. To gain a holistic understanding of the Malthusian regime both individual and population-level associations need to be considered.

At the population-level, Pfister and Fertig (2020) differentiate between these structural (long-run), and instantaneous (short-run) Malthusian checks.<sup>22</sup> Drawing upon this classification I argue that the individual-level assumptions of the Malthusian model underpin the structural, but not the instantaneous checks. The instantaneous checks are characterised by fertility and mortality adjustments to real income shocks. Such population-level responses – even if their effect is heterogenous by social class – do not depend on a persistent association between social class and demographic outcomes. The structural checks however, which

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<sup>19</sup> Malthus.

<sup>20</sup> Winch, ‘Introduction’; Wrigley, ‘Elegance and Experience: Malthus at the Bar of History’, pp. 46–47.

<sup>21</sup> Malthus, *An Essay on the Principle of Population*.

<sup>22</sup> Pfister and Fertig, ‘From Malthusian Disequilibrium to the Post-Malthusian Era’.

should operate irrespective of short-run responses to shocks, necessitate individual-level associations between living standards and demographic outcomes. Such aggregate-level inquiry into population-level outcomes prevails among empirical studies of the Malthusian checks. Subsequent generations of studies focused on estimating the checks in the short-run using bivariate relationship between vital rates and grain prices; and in the long-run by turning to the structural relationships between population and real wages.<sup>23</sup> Still even, to infer the individual-level Malthusian associations from such structural population-level relationships constitutes an *ecological fallacy*.<sup>24</sup>

Additionally, the focus neo-Malthusian authors head to the the individual-level assumptions, necessitates scrutinising these associations. Using evidence from population-level studies to argue for or against the neo-Malthusian growth theories articulated by Galor and Moav (2002) or Clark (2007) would be fruitless, since both base their models on the cross-sectional individual-level associations of the Malthusian model and not on its population-level outcomes.<sup>25</sup> Still, studies testing the Malthusian model at the individual-level are sparse outside England and France.

For England, Clark and Hamilton (2006) and Clark and Cummins (2015) use probate records to identify a strong association between wealth and fertility among English men prior to 1800.<sup>26</sup> Using the Cambridge Group reconstitution instead of probate records, Boberg-Fazlic, Sharp, and Weisdorf (2011) reaffirm the findings of Clark, Cummins, and Hamilton.<sup>27</sup> The advantage of the reconstitution is that it is more representative (the probate records are from the southwest) and broader (only a small portion of men was probated). The disadvantage is that wealth and income are not observed.<sup>28</sup> However, since parish registers observed occupation for a subset of the population, occupational status – as a proxy for both income and wealth – is assigned to individuals. Using the same dataset, de la Croix, Schneider, and Weisdorf (2019) revise earlier estimates by accounting for the extensive margin of fertility (celibacy and childlessness). Although they identify a status-gradient in fertility, once the extensive margin is accounted for, the middle-class has higher net fertility than the upper-class.<sup>29</sup> None of these studies find conclusive evidence for a positive check. By using records of property transfer, Kelly and Ó Gráda (2014) extend the scope of inquiry into the high middle-ages. They find that prior to the introduction of the Tudor poor laws, the positive check affected both high and low-income families with a disproportionately greater impact on

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<sup>23</sup> Pfister and Fertig, 'From Malthusian Disequilibrium to the Post-Malthusian Era', p. 1146.

<sup>24</sup> The same is true in the opposite direction; individual-level associations between income and fertility/mortality do not necessitate the same association between aggregate income and crude birth or death rates.

<sup>25</sup> Galor and Moav, 'Natural Selection and the Origin of Economic Growth'; Clark, *A Farewell to Alms*.

<sup>26</sup> Clark and Hamilton, 'Survival of the Richest'; Clark and Cummins, 'Malthus to Modernity'.

<sup>27</sup> Boberg-Fazlic, Sharp, and Weisdorf, 'Survival of the Richest?'; de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England'.

<sup>28</sup> Clark and Cummins, 'Malthus to Modernity', pp. 6–7.

<sup>29</sup> de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England'.

the poor.<sup>30</sup> This implies that the positive check was eroded by early iterations of public welfare policy.<sup>31</sup>

For France, individual-level associations have been tested by Weir (1995) and Cummins (2020). Weir links tax records to a family reconstitution for a small town outside Paris; he finds evidence for both a strong positive and preventive check. However, given the small sample size – encompassing 91 households – then external validity of these findings should be taken with a grain of salt.<sup>32</sup> Cummins draws upon a much larger sample, using the Henry reconstitution of 41 French villages. He finds no evidence for the positive check but strong evidence for the preventive check, which was weaker than in England and had disappeared by the late 18<sup>th</sup> century.<sup>33</sup>

Dribe and Scalone (2014) investigate the association between occupational status and fertility in Sweden. Counter to the Malthusian assumption they find lower net fertility amongst the upper and middle classes.<sup>34</sup> However, with their study period commencing in 1880, at the eve of the fertility transition, this result has limited applicability to the study of the Malthusian regime. More recent papers have tested for the individual-level dynamics of the Malthusian model outside of Europe. Kumon and Saleh (2023) are the first to illuminate the existence of the pre-industrial preventive check in the Middle East and North Africa. They draw upon unique census data from 19<sup>th</sup> century Egypt, and show that, much like European dynamics, higher fertility rates amongst the upper-classes were mostly attributable to marriage behaviour. Notably, they find that in Egypt, polygyny contributed to this status-gradient in gross marital fertility and changed the shape of the preventive check.<sup>35</sup> Studies for East Asia, document that here too, families of the upper-class had higher fertility. However, here the dynamics diverge, with higher fertility rates attributable to marital fertility – through infanticide, abstinence, or breastfeeding practices – instead of marriage behaviour.<sup>36</sup>

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<sup>30</sup> Kelly and Ó Gráda, 'Living Standards and Mortality since the Middle Ages'.

<sup>31</sup> The differential between the positive check at the aggregate level between France and England supports this interpretation Weir, 'Life Under Pressure'.

<sup>32</sup> Weir, 'Family Income, Mortality, and Fertility on the Eve of the Demographic Transition'.

<sup>33</sup> Cummins, 'The Micro-Evidence for the Malthusian System. France, 1670–1840'.

<sup>34</sup> Dribe and Scalone, 'Social Class and Net Fertility before, during, and after the Demographic Transition'.

<sup>35</sup> Kumon and Saleh, 'The Middle-Eastern Marriage Pattern?'

<sup>36</sup> Lee and Feng, 'Malthusian Models and Chinese Realities'; Lee and Park, 'Quality over Quantity'; Campbell and Lee, 'State Views and Local Views of Population'; Feng, Lee, and Campbell, 'Marital Fertility Control among the Qing Nobility'.



## II. THE WITTGENSTEIN ONE-PLACE STUDY

As evident above, the study of pre-industrial demography requires a set of sources distinct from those employed for later epochs. In Europe, census or population registry data with sufficient granularity to construct individual life and family histories are seldom available prior to the mid-19<sup>th</sup> century.<sup>37</sup> In light of this, researchers have turned to probate records, crowd-source genealogies, or family reconstitutions. In family reconstitutions, demographic events – usually based on ecclesiastic records of baptisms, marriages and funerals – are linked to recreate family histories.<sup>38</sup> Family reconstitutions have high coverage at the intensive margin, but due to the labour-intensive process of linking demographic events, reconstitutions tend to focus on singular, or at most, a collection of parishes and rarely capture urban populations.<sup>39</sup> Although crowd-source genealogies have advantages at the *extensive* margin – capturing ‘substantial spatial variation’ – low coverage at the *intensive* margin makes them a suboptimal source for studying the Malthusian assumptions.<sup>40</sup> In the absence of probate records, this makes family reconstitutions the best-suited source for the research questions posed in this paper.<sup>41</sup>

Here, without a preeminent family reconstitution project for Germany, the question remains whether the one-place study constitutes a viable alternative. One-place studies, as a unique source for German demographic history, have been exploited in seminal studies by Knodel (1988) and Imhof (1990). However, with over 4,000 recorded one-place studies for Germany the range in motivation and meticulousness of these studies is enormous. Not all one-place studies fulfil the criteria of a scientific family reconstitution.<sup>42</sup> The oversampling of genealogies of particular interest to the researcher or the inclusion of demographic events from outside the study area can bias demographic measures by obscuring the population at risk. Still, a subset of all one-place studies constitute sources on par with scientific family reconstitutions.<sup>43</sup> Knodel and Short (1976) concur, finding that for some one-place studies “the standards of accuracy of these local genealogists meet the generally established standards of scientific research” and moreover, that “the genealogists appear to have been conscientious in the extreme, and industrious beyond what most professional historical demographers can

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<sup>37</sup> Campbell, ‘Demographic Techniques’, pp. 139–42; Wrigley and Schofield, *The Population History of England, 1541-1871*, pp. 7–8.

<sup>38</sup> Campbell, ‘Demographic Techniques’, p. 138; Alter, Newton, and Oeppen, ‘Re-Introducing the Cambridge Group Family Reconstitutions’.

<sup>39</sup> Blanc, ‘Crowdsourced Genealogies’, p. 4.

<sup>40</sup> For a more thorough discussion see Appendix A1. Blanc, ‘Crowdsourced Genealogies’.

<sup>41</sup> Alter, ‘The Evolution of Models in Historical Demography’, pp. 330–33, 336–38; Henry and Houdaille, ‘Fécondité Des Mariages Dans Le Quart Nord-Ouest de La France de 1670 a 1829’.

<sup>42</sup> Fertig, Stelter, and Boose, ‘Ortsfamilienbücher – eine exzellente Forschungsgrundlage für die Geschichts-, Wirtschafts- und Sozialwissenschaften’; Alter, Newton, and Oeppen, ‘Re-Introducing the Cambridge Group Family Reconstitutions’.

<sup>43</sup> Fertig, Stelter, and Boose, ‘Ortsfamilienbücher – eine exzellente Forschungsgrundlage für die Geschichts-, Wirtschafts- und Sozialwissenschaften’.

manage”.<sup>44</sup> The Wittgenstein one-place study compiled by Jochen Mehldau appears a perfect exemplar of this. Its exceptional scientific rigour (citing the specific source for each demographic event) and breadth (capturing the universe of ecclesiastically recorded demographic events for an entire county instead of one parish) set it apart within the universe of one-place studies.

The Wittgenstein reconstitution encompasses 150,000 individuals across 42,000 families. The core of the study draws upon the complete registers of 16 parishes (11 Reformed-protestant, 1 Lutheran-protestant, 4 Roman-catholic).<sup>45</sup> Although the reconstitution contains records from as early as 1525, to account for infrequent observations, the effect of the reformation in Wittgenstein during 1560s, and the severe demographic shock of the 30-year war, observations from prior to 1650 are treated with caution. An 1876 law transferring the responsibility for recording demographic events from the ecclesiastic to the secular realm marks the end of parish registers as a reliable source.<sup>46</sup> Hence, to ensure that most time at risk of birth is observed for all included families, 1850 marks the end of the study period.

Besides the place and date of demographic events, parish registers recorded occupation for a subset of the population. Occupation could be recorded upon marriage, death, or the baptism of one’s children. This illustrates one of the fundamental features of family reconstitutions; individuals are not observed across all their lifetime but instead, only enter observation at discrete instances when specific demographic events occur. Migration is not one of these specific events. This makes it impossible to know when individuals entered or left the parish if either their baptism or burial goes unobserved. Records with an unknown start date are considered *left-censored*, while those without a reliable end date are considered *right-censored*.<sup>47</sup> If this censoring is accounted for, demographic measures can accurately capture the observed population. However, since the characteristics of the uncensored population may be distinct from the censored populations, excluding the latter can distort estimates.

In addition to the biases introduced by censoring, if the quality and quantity of recorded information is a function of the frequency of observation, the reconstitution is subject to *information bias*. If whether a priest recorded occupation is random and not a direct function of occupation, the sample of men for whom occupation is recorded will be biased towards those with higher fertility since they enter observation more often. For example, let us assume the probability of a priest recording occupation is 0.25. The probability that occupation is recorded at least once is 0.76 for the father of three (five possible instances of

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<sup>44</sup> Knodel and Shorter, ‘The Reliability of Family Reconstitution Data in German Village. Genealogies (Ortssippenbücher)’.

<sup>45</sup> Mehldau, ‘Wittgensteiner Familiendatei. Eine Datenbank Zur Familiengeschichtsforschung.’

<sup>46</sup> Gesetz über die Beurkundung des Personenstandes und die Eheschließung.

<sup>47</sup> Campbell, ‘Demographic Techniques’, p. 141.

observation), whilst it is only 0.58 for the father of one (three instances). A logistic model, estimating the effect of instances of observation on occupation being recorded, indicates that the Wittgenstein reconstitution is subject to such information bias.<sup>48</sup>

Notably the approach of the Wittgenstein reconstitution is micro-historical. Instead of looking at a broad sample of remote parishes, I observe one-cluster of neighbouring parishes. Given this approach, it is paramount to contextualise the study area. Wittgenstein is found nestled in the *Rothaargebirge* – a low-mountain range – in the south-east of Westphalia. Prior to the *Reichsdeputationshauptschluss* of 1803, the territory was split between the two principalities of *Sayn-Wittgenstein-Hohenstein* in the south and *Sayn-Wittgenstein-Berleburg* in the north.<sup>49</sup> Protestantism was adopted early; most of the population was Reformed Protestant, with a sizable Lutheran minority and smaller Roman Catholic and Jewish ones. However, since I draw only upon the core parishes of the reconstitution, I do not observe the Jewish population. For the Catholic minority, the inclusion restrictions reduce their proportion from 6.3 to 2.6 *per cent*.

Wittgenstein is notable for its ordinariness. The economic structure of Wittgenstein derives from its first-nature geography. Given its mountainous geography, extensive forests, and low agricultural suitability, the primary industries were Forestry and Mining. Aside from artisans a small – predominantly domestic – textile *proto*-industry constituted an additional source of employment.<sup>50</sup> Low agricultural productivity – worsened by a partible inheritance structure – and infrastructural backwardness, isolated Wittgenstein from modernising tendencies late into the 19<sup>th</sup> century.<sup>51</sup> Political and economic power was concentrated in the hands of the Counts and the administrative elite they installed. Although it would be misguided to claim that these two principalities are wholly representative of German demographic behaviour, this ordinariness makes Wittgenstein a viable case-study for the demographic behaviour amongst the protestant, rural population of Germany.

Additionally, the intensive breadth of the Wittgenstein reconstitution – capturing the universe of ecclesiastically recorded demographic events in two sovereign principalities instead of isolated parishes – sets it apart. While earlier studies using one-place studies attempt to create extensive samples, I choose to focus on a singular area as a case-study. This is advantageous as it mitigates some of the biases introduced by migration. Much early-modern migration occurred over short distances (e.g. neighbouring parish).<sup>52</sup> While such migration will

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<sup>48</sup> For empirical test see Appendix A2.

<sup>49</sup> Klein, *Studien Zur Wirtschafts-Und Sozialgeschichte Der Grafschaft Sayn-Wittgenstein-Hohenstein Vom 16. Bis Zum Beginn Des 19. Jahrhunderts*, pp. 10–18.

<sup>50</sup> Klein, pp. 80–82; Göbel, *Bevölkerung Und Ökonomie. Historisch-Demographische Untersuchung Des Kirchspiels Siegen in Der Nassau-Oranischen Zeit (1742-1806)*.

<sup>51</sup> For a more thorough discussion of Wittgenstein see Appendix A3.

<sup>52</sup> Anderson, 'The Social Implications of Demographic Change'; Clark, 'Migration in England during the Late Seventeenth and Early Eighteenth Centuries'; Patten, 'Patterns of Migration and Movement of Labour to Three Pre-Industrial East Anglian Towns'.

ensor records in the Henry or Cambridge group data – where constituent parishes are remote – in the Wittgenstein one-place study, internal migrants are observed.<sup>53</sup>

Although the one-place study links records from outside of Wittgenstein, to avoid oversampling of some subset of genealogies, I include only families with marriage records from the core parishes of the reconstitution (50.25 *per cent* of families). Further, to ensure that I exclude censored records, only non- and in-migrants prior to marriage are included (42.3 *per cent* of remaining families).<sup>54</sup> Summary statistics support the reasonable representativeness of Wittgenstein, with demographic measures closely resembling those reported for other areas of Germany (Table 1).

**Table 1**

Summary Statistics of demographic outcomes at the Family level (1650-1850)

	<i>Mean</i>	<i>Std. Err.</i>	<i>95 per cent Confidence Interval</i>	
<b>Marital Fertility</b>				
Gross	4.768	0.032	4.704	4.832
Net	3.352	0.026	3.302	3.402
<b>Mortality</b>				
<sub>0</sub> Q <sub>5</sub>	0.249	0.002	0.243	0.254
<sub>0</sub> Q <sub>10</sub>	0.278	0.003	0.271	0.283
<sub>0</sub> Q <sub>15</sub>	0.292	0.003	0.286	0.298
<b>Age at Marriage</b>				
Male	30.22	0.085	30.05	30.38
Female	26.35	0.077	26.20	26.50
<b>Mothers age at last birth</b>	38.42	0.063	38.30	38.55

**Note:**

Summary statistics are reported at the household level using a sample based on (1) the core parishes of the reconstitution, and (2) excluding all out-migrants and in-migrants after marriage (N=8,499).

### III. EMPIRICAL STRATEGY

To test for the individual-level assumptions of the Malthusian regime, I run simple cross-sectional regressions. Since income and wealth are not observed directly, I operationalize the positive check as a status-gradient in under-15 mortality, and the preventive check as a status-gradient in gross marital fertility.<sup>55</sup> Given Malthus's articulation of the preventive check – pertaining to natural fertility within marriage – the preventive check should operate through later starting, but not through earlier stopping or greater spacing. All

<sup>53</sup> de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England', p. 232.

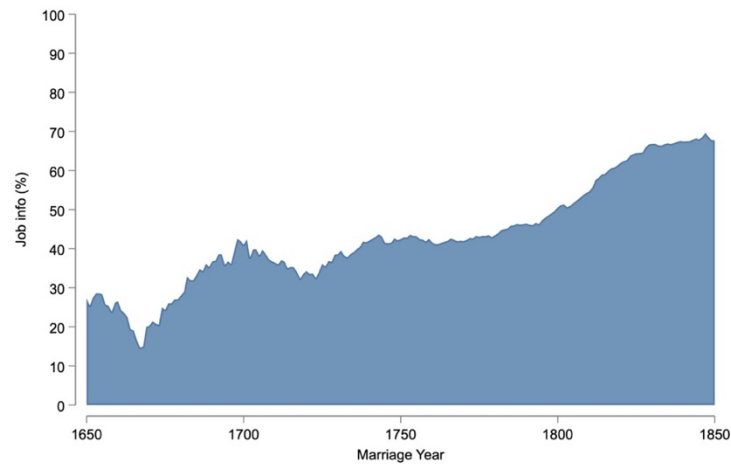
<sup>54</sup> I also run regressions based on a sample that's only restricted by mothers' death (51.6 *per cent* of remaining families), allowing for the out-migration of fathers. This has a negligible effect on results, and as such only the stricter restriction is reported throughout.

<sup>55</sup> de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England'; Cummins, 'The Micro-Evidence for the Malthusian System. France, 1670–1840'; Boberg-Fazlic, Sharp, and Weisdorf, 'Survival of the Richest?'

associations are tested using one baseline regression that estimates the effect of occupational status on different demographic estimands. To account for a non-status-induced temporal variation, marriage period fixed effects ( $\pi_t$ ) are included. Further, to account for variation in reporting practices and environmental factors, parish fixed effects ( $\tau_p$ ) are included.<sup>56</sup> Throughout,  $\beta_l$  – capturing the association between the demographic estimand and occupational status – is the coefficient of relevance.

$$Y_{i,t,p} = \alpha + \beta_1 \cdot Status_i^u + \pi_t + \tau_p + \epsilon_{i,t,p} \quad (1)$$

In the patriarchal context of rural pre-industrial Germany, male status was the pre-eminent determinant of household status and income. Hence, household status is approximated by husband's/father's status throughout. 23.3 *per cent* of all male observations contain some occupational information.<sup>57</sup> Occupational labels were cleaned and manually coded into HISCO, a historical occupational classification scheme, yielding 303 unique occupations.<sup>58</sup> To account for the specificities of the German context occupations were also coded into OhdAB, yielding a total of 458 unique occupations.<sup>59</sup> These classification schemes were used to assign occupational status.



**Figure 1** Share of families with husband's occupation recorded.

First, all occupations were linked to HISCAM occupational scores. HISCAM is based on the observed stratification of social interactions in historical societies – as such, it is distinct

<sup>56</sup> Given the small number of parishes, clustering standard errors at the parish level reduces degrees of freedom below an acceptable level, rendering t statistics unreliable. As such standard errors are not clustered.

<sup>57</sup> Due to the information bias described in Section 2, this share is considerably higher when observed at the family-level; Men who married and had children have more chances of their occupation being recorded.

<sup>58</sup> Goldberg and Moeller, 'Automatisierte Identifikation und Lemmatisierung historischer Berufsbezeichnungen in deutschsprachigen Datenbeständen', sec. 2.3; Leeuwen, *HISCO*.

<sup>59</sup> The Ontologie historischer, deutschsprachiger Berufs- und Amtsbezeichnungen was developed by scholars at the University of Halle-Wittenberg and draws upon the occupational classification scheme of the German Federal Office for work. Moeller, Müller, and Nasarek, 'Ontologie Historischer, Deutschsprachiger Berufs- Und Amtsbezeichnungen'.

from class schemes that assign occupations to social groups based on the *post factum* conceptualisation of status. The recommended universal HISCAM scale was used since the German-specific one relies on a too small sample.<sup>60</sup>

Second, occupations were sorted into status categories. A set of discrete categories allows for more flexibility than a continuous scale such as HISCAM, where the position of every occupation must be defined in relation to all other occupations. The primary coding, I pursue is a variation of the seven wealth/status categories defined by Clark and Hamilton.<sup>61</sup> Here, groups are based on wealth categories derived from probate records for England and the *Tables des Successions et Absences* for France. One downside is that I do not observe wealth and can hence not check whether the groups align as they do in England and France.<sup>62</sup> Still, given their tested applicability to different European contexts and the comparability to other studies they enable, they are the preferred measure of status in this paper. Table 2 reports the social structure of Wittgenstein according to the seven-level scale.

Some individuals have multiple recorded occupations. This is the result of occupational mobility, differing occupational names being used, or people pursuing multiple occupations.<sup>63</sup> Throughout, to account for this mobility, I use the highest status occupation recorded. Results were replicated using the lowest status occupation, but since this did not affect estimates, this replication is not reported.

**Table 2**

Summary statistics of the 7-rank class scheme (based on Clark & Cummins [2015])

Rank	Occupational Group	N	HISCAM (out of 100)	Skill-level (out of 5)
7	<i>Gentry/High Executive Officials/Officers</i>	133	95.4	3.88
6	<i>Professionals/Academics</i>	681	75.3	3.54
5	<i>Farmers</i>	20	59.2	3.30
4	<i>Traders/ Clerks/Supervisors</i>	541	59.9	3.11
3	<i>Craftsmen</i>	1,330	52.4	2.45
2	<i>Workers</i>	1,259	49.9	2.10
1	<i>Labourer/Servants</i>	551	46.6	1.88
-	<i>Unobserved</i>	3,984	-	-

**Note:**

Summary statistics are reported at the household level.

Both HISCAM status-scores and OhdAB skill-levels are calculated as the mean score amongst all households in the Occupational Group. Here too, where multiple occupations are listed the highest status occupation was used.

<sup>60</sup> Lambert et al., ‘The Construction of HISCAM’.

<sup>61</sup> Clark and Hamilton, ‘Survival of the Richest’.

<sup>62</sup> Another source currently held by the Archive of North Rhein-Westphalia may solve this problem. A collection of *Weinkaufbriefe* (marriage contracts) from 1728 to 1819 observe the wealth at marriage for a substantial number of grooms. Exploiting this source in the future could yield a more precise approximation of the Malthusian checks; Landesarchiv NRW, Abteilung Westfalen, E 701 / Grafschaft Wittgenstein, Nr. I 1-22.

<sup>63</sup> Thiehoff, *Ländlicher Lebensstandard und demographische Reaktionen auf kurzfristigen ökonomischen Stress: Eine Event History Analysis von Fertilität in Wittgenstein (Westfalen) im 19. Jahrhundert*.

Turning to the estimands, when testing for the status-gradient in mortality,  $Y_{i,t,p}$  denotes the proportion of adjusted under-15 mortality. One problem when estimating child mortality from family reconstitution data is that infant deaths often went unreported in parish registries. To account for this, mortality is adjusted using a repeated-naming strategy.<sup>64</sup> In pre-modern Europe, when a child died, the subsequent same-sex child was often given the same forename. Hence, where a child has a subsequent sibling of the same forename and is not linked to a burial record, it is assumed to have died as an infant. This is the basis for the adjusted measure for child mortality as defined by Cummins (2020).<sup>65</sup>

When testing for the status-gradient in fertility,  $Y_{i,t,p}$  denotes gross marital fertility. I account for the extensive margin of fertility by estimating equation (3) at the family level for childlessness and at the individual level for celibacy. An individual observation is deemed celibate if I observe their birth and death in the county but no marriage or out-of-wedlock births. Celibacy is evaluated separately for women and men. To elucidate the mechanics of the preventive check, I estimate regressions where  $Y_{i,t,p}$  denotes mother's age at marriage (*starting*) – expected to be significant and negative; mother's age at last birth (*stopping*) – expected to be insignificant; and the average birth interval (*spacing*) – also expected to be insignificant.<sup>66</sup>

Prior studies restrict their sample to complete marriages, where both spouses survived to 50.<sup>67</sup> This excludes the births of women who died prematurely or whose reproductive period was cut short by the death of their partner. Since I am interested in outcomes by class, this would distort estimates, since births in incomplete marriages still contribute to the overall reproductive success of groups. Further, conditioning on complete marriages truncates the data and may introduce further bias if adult mortality varied by class, as it appears to do. As such I do not condition on complete marriages.<sup>68</sup>

If not otherwise stated, regressions were estimated using ordinary least squares. When  $Y_{i,t,p}$  is a binary variable, regressions were specified using a logistic model and estimated using maximum-likelihood. To account for the discrete count nature of births per family, regressions pertaining to fertility were also specified using negative binomial and poisson models. However, since this did not affect the results, only results using OLS estimations will be reported.

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<sup>64</sup> Houdaille, 'La fécondité des mariages de 1670 à 1829 dans le quart nord-est de la France'; Cummins, 'The Micro-Evidence for the Malthusian System. France, 1670–1840'.

<sup>65</sup> See Appendix A4 for calculation.

<sup>66</sup> When estimating the gradient in stopping and spacing the sample is conditioned on complete marriages since both measures depend chiefly on the latter years of the reproductive period.

<sup>67</sup> Boberg-Fazlic, Sharp, and Weisdorf, 'Survival of the Richest?'

<sup>68</sup> To alleviate concerns that the reported associations are driven by the inclusion of incomplete marriages regressions were also estimated using only complete marriages. Since this did not affect coefficients, these results go unreported.

## IV. RESULTS

*Malthusian Checks* – First, I test for the positive check by estimating equation (3) for adjusted under-15 mortality.<sup>69</sup> Columns (1) and (2) of Table 2 reports estimates for association between status and the adjusted under-15 mortality at the family level expressed as proportion of children dying.<sup>70</sup>

**Table 3**  
Status-gradient in fertility and mortality

<i>Estimand:</i>	Positive Check		Preventive Check	
	<i>Proportion dead under-15</i>		<i>Gross Marital Fertility</i>	
	(1)	(2)	(3)	(4)
HISCAM	0.0506 (0.0324)		0.0123*** (0.00381)	
Unobserved		2.120 (1.396)		0.504*** (0.136)
Workers		1.220 (1.526)		0.666*** (0.151)
Craftsmen		2.825* (1.517)		0.638*** (0.148)
Traders/Clerks/Supervisors		2.825* (1.805)		0.874*** (0.189)
Farmers		6.127 (8.592)		-0.422 (0.775)
Professionals/Academics		0.591 (1.657)		1.006*** (0.174)
Gentry/High Executives Officials/Officers		7.930*** (2.699)		1.197*** (0.329)
<i>Constant</i>	15.71*** (3.672)	21.52*** (3.484)	3.915*** (0.470)	3.473*** (0.397)
Marriage Period FE	(Y)	(Y)	(Y)	(Y)
Parish FE	(Y)	(Y)	(Y)	(Y)
<i>F statistics</i>	3.500	2.997	2.816	5.424
R <sup>2</sup>	0.0179	0.0168	0.0276	0.0309
N	4099	7729	4475	8443

**Note:**

Columns (1) – (4) were estimated using OLS.

Robust standard errors in parentheses. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Omitted Category is Labourers/Servants.

Columns (1) and (2) are conditional on the birth of at least one child. Columns (3) and (4) also include childless families.

Here, the only statistically significant coefficient points in the wrong direction. In families of the highest rank (*Gentry/High Executives Officials/Officer*) a larger proportion of children died before turning fifteen. Re-estimating the regression for under-5 and under-10

<sup>69</sup> Results are robust to using unadjusted, as well as under-5, under-10 mortality, see Table A1.

<sup>70</sup> Results are robust to using an alternative status coding, as well as the lowest status occupations, see Appendix A5.



mortality reveals that this association persists (Table A1). The data allows for little but speculation about the origins of this association. Potential explanations include higher rates of inbreeding amongst a small rural elite, or some form of selection bias induced by sorting, whereby healthier families were more likely to emigrate, or send their healthy children to be educated outside of Wittgenstein. However, if the latter was the case, this should also be observed amongst families of rank 6. Given the absence of any discernible evidence for a status-gradient in mortality – with the only statistically significant coefficient pointing in the wrong direction – the existence of a positive check at the individual-level can be rejected.<sup>71</sup> Although higher mortality amongst high status families appears to be a curiosity of the Wittgenstein case-study, the absence of a discernible status-gradient in mortality is consistent with evidence for France and England.<sup>72</sup>

To test for the preventive check I estimate the association between status and gross marital fertility. The estimates reported in columns (3) and (4) of Table 3 are conditional on marriage, but not on the birth of a child. De la Croix, Schneider, and Weisdorf (2020) show that conditioning on both marriage and the birth of a child obscures the true status gradient by ignoring the extensive margin.<sup>73</sup> By conditioning only on marriage, I can account for childlessness and thus for part of the extensive margin. Here, both HISCAM and the seven status categories show a pronounced status-gradient in fertility. Notably, in contrast to findings for England, including childlessness does not mute the status-gradient for the upper-classes. Instead, conditioning on the birth of a child only affects differences amongst the middle-classes, muting differences between ranks three through five, whilst leaving the difference to ranks six and seven unchanged.<sup>74</sup>

Across all specifications, the only occupational categories not statistically distinct from *Servants/Labourers* are *Farmers*. This is unsurprising, given the structure of agricultural ownership in Wittgenstein (see Section 2). The small size of the *Farmer* category makes it difficult to precisely estimate their fertility behaviour. Further, given the relevance of inheritance laws to farmers and their reliance on the size and quality of their landholdings for subsistence, farmers tend to constitute an outlier group in demographic studies – both generally and pertaining to Westphalia specifically.<sup>75</sup>

Although both HISCAM and the status categories indicate a status-gradient in fertility, the shape of this gradient is unclear based on the status categories. Although the

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<sup>71</sup> This result is replicated at the individual level, see column (1) and (2) of Table A2.

<sup>72</sup> Cummins, ‘The Micro-Evidence for the Malthusian System. France, 1670–1840’; Clark and Cummins, ‘Malthus to Modernity’.

<sup>73</sup> Boberg-Fazlic, Sharp, and Weisdorf, ‘Survival of the Richest?’; de la Croix, Schneider, and Weisdorf, ‘Childlessness, Celibacy and Net Fertility in Pre-Industrial England’.

<sup>74</sup> See columns (3) and (4) of Table A2.

<sup>75</sup> Fertig, ‘Beyond the Niche Hypothesis. Property, Marriage, and the Onset of Familial Reproduction in Rural Northwest Germany, 1820–1866’; de la Croix, Schneider, and Weisdorf, ‘Childlessness, Celibacy and Net Fertility in Pre-Industrial England’, p. 233.

estimated fertility for ranks two through four is above that of the lowest, and below that of the two highest ranks, I observe no statistically significant gradient across these groups. This does not necessarily imply the absence of a gradient amongst lower status groups. Instead, it may indicate that the occupational categories do not align with the actual occupational structure of Wittgenstein. All three categories encompass considerable variation in occupational status as measured by HISCAM.<sup>76</sup> For example, amongst Craftsmen variation is large both within trades (apprentice vs master) and between trades (grain miller vs court gunsmith). To test whether a stricter sorting by skill requirement affects the trend, I divide the groups by OhdAB skill level. Occupations with an above-median skill-level are sorted into new categories. Given these additional categories, a clearer status-gradient emerges, with skilled-Workers now ranked above *Traders/Clerks/Supervisors* but below *Professionals/Academics*.<sup>77</sup> Given the above results, it appears that HISCAM and the occupational coding capture the general trend in fertility but fail at identifying differences at a more granular level.

Still, consistently higher levels of gross marital fertility amongst the two uppermost ranks and the positive and significant coefficient for HISCAM support the presence of a preventive check in Wittgenstein, with ranks six and seven having on average one extra child when compared to the lowest rank.

*Extensive Margin* – However, even if a population exhibits a strong status-gradient in fertility, this does not produce the anticipated outcomes if the extensive margin of fertility runs counter to the preventive check. This appears to be the case in England, where higher rates of celibacy and childlessness amongst the upper-classes of society mute the preventive check.<sup>78</sup> Although columns (3) and (4) of Table 3 provide some evidence that this was not the case in Germany, it is important to further elucidate how celibacy and childlessness varied with status.

In Table 3, the status-gradient in childlessness is obscured since it is combined with the general gradient in gross marital fertility. To isolate the gradient in childlessness, I estimate equation (1) using a logistic model for a dummy variable denoting whether a family remained childless. To ensure in-migrants do not bias estimates, only families where the birth of both spouses is observed in Wittgenstein are included. Given this inclusion restriction, 6,258 families remain, of which 9.05 *per cent* were childless. The results reported in Table A4 imply that there was no status gradient in childlessness. Although, *Workers, Craftsmen, and Professionals/Academics* all have a lower probability of remaining childless when compared to the base category of *Labourer/Servant*, differences between groups are minor. Fitted probabilities at the mean reveal that for all categories but farmers, the probability of remaining

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<sup>76</sup> See Figure A1.

<sup>77</sup> See Table A3.

<sup>78</sup> de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England'.

childless hovers around 0.07-0.10.<sup>79</sup> The considerably higher probability amongst *Farmers* (0.29) comes as no surprise. Given the small sample size of farmers, even just a few childless families can severely impact estimates. Further, little available agricultural land made neo-locality untenable for subsequent generations, and the low quality of agricultural land made it difficult to support multiple families on the production of one farm. This likely acted as a deterrent to procreation amongst farmers.

Having established that there was no status gradient in childlessness, I turn to celibacy. Naturally, celibacy cannot be estimated at the family-level. Instead, I look at the life courses of all children born in Wittgenstein. To ensure that celibacy is not biased upwards for more mobile classes, only individuals whose burial is recorded in Wittgenstein are included. Further, to include only individuals that were at risk of marriage, all that died prior to 15 are excluded. I estimate the status-gradient in celibacy for women and men separately. For both women and men status is proxied by the occupational status of their father. For men, I use father's status since, given the information bias described in section II, men who remained celibate are much less likely to have had their occupation recorded.<sup>80</sup>

For both men and women, there is no evidence of a status-gradient in celibacy. Still, for men, some categories have statistically different odds of being celibate. Although this does not follow a clear status-gradient it could be a manifestation of dynamics described by Guinnane and Ogilvie (2014), whereby certain groups of men were excluded from the marriage market.<sup>81</sup> This is supported by higher rates of celibacy amongst men (24.72 *per cent*) when compared to women (16.84 *per cent*). For women the probability of celibacy is statistically indistinguishable across all categories. Contrary to le Croix, Schneider, and Weisdorf's (2020) findings for England, I discover that controlling for the extensive margin of fertility has no countervailing effect on the status-gradient in fertility as measured at the intensive margin. In terms of childlessness, *Farmers* are an outlier group. However, this appears to be a product of the specific agricultural context in Wittgenstein.

*Starting, Stopping and Spacing* – Having established the presence of the preventative check, I turn to its inner workings. Gross fertility for a couple is a function of when reproductive behaviour begins (*starting*), when reproductive behaviour ceases (*stopping*), and how frequently births occur within this period (*spacing*).<sup>82</sup> Assuming that couples begin reproductive behaviour upon marriage, starting is measured by *mother's age at marriage*. Following Knodel, the attempt to stop reproductive behaviour is measured by *mother's age at last birth*. Measuring deliberate spacing is

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<sup>79</sup> See Figure A2

<sup>80</sup> This is confirmed by the data: of celibate men only, 16.0 *per cent* have a recorded occupation, compared to 53.8 *per cent* of all families.

<sup>81</sup> Guinnane and Ogilvie, 'A Two-Tiered Demographic System'.

<sup>82</sup> Knodel, 'Starting, Stopping, and Spacing During the Early Stages of Fertility Transition', p. 143.

complicated since it is subject to a plethora of nonvolitional factors (e.g. infant feeding practices).<sup>83</sup> However, since the Malthusian system is defined by outcomes more so than by the underlying causes, this is a smaller problem.<sup>84</sup> To observe differences in birth spacing – irrespective of whether they are a product of deliberate fertility control – I measure spacing using the *average birth interval*. Here, I control for mother’s age at marriage since birth intervals tend to increase with age.<sup>85</sup>

**Table 4**  
Mechanics of the Preventive Check

<i>Estimand:</i>	Starting		Stopping		Spacing	
	<i>age at marriage</i>		<i>age at last birth</i>		<i>average birth interval - days</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
HISCAM	-0.0469*** (0.00832)		-0.00610 (0.00723)		-2.166*** (0.628)	
Unobserved		-3.153*** (0.342)		0.328 (0.293)		-31.52 (32.62)
Workers		-2.407*** (0.377)		0.512 (0.324)		-24.60 (36.95)
Craftsmen		-2.658*** (0.371)		0.461 (0.318)		-43.56 (35.25)
Traders/Clerks/Supervisors		-3.129*** (0.459)		0.585 (0.390)		-89.51** (38.90)
Farmers		1.038 (2.039)		0.366 (1.821)		-298.9*** (47.05)
Professionals/Academics		-3.913*** (0.413)		0.221 (0.355)		-62.42 (39.86)
Gentry/High Executives Officials/Officers		-4.190*** (0.666)		0.124 (0.608)		-130.8*** (50.50)
<i>Constant</i>	28.35*** (1.002)	29.63*** (0.959)	40.76*** (0.925)	39.78*** (0.755)	1069.9*** (71.77)	1056.1*** (62.47)
Marriage Period FE	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>
Parish FE	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>
Age at marriage	(N)	(N)	(N)	(N)	<b>(Y)</b>	<b>(Y)</b>
<i>F statistics</i>	4.818	8.462	1.689	1.687	5.003	4.747
R <sup>2</sup>	0.0434	0.0547	0.0174	0.0169	0.0347	0.0178
N	4475	8443	3046	5802	2824	5418

**Note:**

Columns (1) – (6) are estimated using OLS.

Robust standard errors in parentheses. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Omitted Category is Labourers/Servants.

Spacing calculated conditional on having a gross marital fertility greater than two.

Table 4 supports a Malthusian interpretation, whereby birth limitation operated chiefly through delaying marriage. Columns (1) and (2) report statistically significant coefficients for the associations between mother’s age at marriage and husband’s status. In

<sup>83</sup> Knodel, p. 153.

<sup>84</sup> Cummins, ‘The Micro-Evidence for the Malthusian System. France, 1670–1840’, p. 8.

<sup>85</sup> Knodel, ‘Starting, Stopping, and Spacing During the Early Stages of Fertility Transition’, p. 147.

Families of the highest rank, women married four years prior to their compatriots of the lowest rank. Although less pronounced, this is replicated when status is proxied by the occupational status of the bride's father.<sup>86</sup>

Turning to the effect of status on mother's age at last birth, I find no evidence for a status-gradient in stopping. As evident in columns (3) and (4), all categories appear to end their reproductive period around age 40. The absence of control through stopping is consistent with Knodel's findings.<sup>87</sup> The story regarding spacing is somewhat more complicated. The coefficient for HISCAM in column (5) is statistically significant at the 99 *per cent* level. However, the seven status categories do not support a clear status gradient. Families of rank four and six have significantly shorter birth intervals, but no general gradient emerges. Still, even this murky relationship between status and birth spacing, runs counter to Malthus articulation of natural fertility. Similarly, it also clashes with Knodel's finding that, spacing – and even more so deliberate spacing – cannot be identified in pre-industrial Germany.<sup>88</sup> Here the distinction between deliberate and non-deliberate spacing is of relevance. As stated above, birth spacing is subject to a cornucopia of nonvolitional factors. Even under natural fertility, variation in any one of these factors across social groups could explain the significant coefficients in columns (5) and (6). For example, this could be the product of different breastfeeding practices, or nutrition effects during periods of economic stress.<sup>89</sup>

The prevalence of starting as the primary dynamic underpinning the preventive check concurs with findings for pre-industrial England and France.<sup>90</sup> This is reaffirmed by controlling for mothers age at marriage when estimating the status-gradient in fertility. Status – both measured by HISCAM and the classes – is rendered insignificant, while age at marriage remains highly significant.

*Temporal Trends* – Beyond identifying the presence of the preventive and absence of the positive check in Wittgenstein, it is worth evaluating whether these associations are static across time. To study change over time, I disaggregate the reconstitution into six periods by marriage date. Given lower data availability, the first period subsumes all observations prior to 1725. Thereafter, the dataset is divided at 25-year intervals. Since the sample size becomes small, temporal variation should be interpreted with caution.

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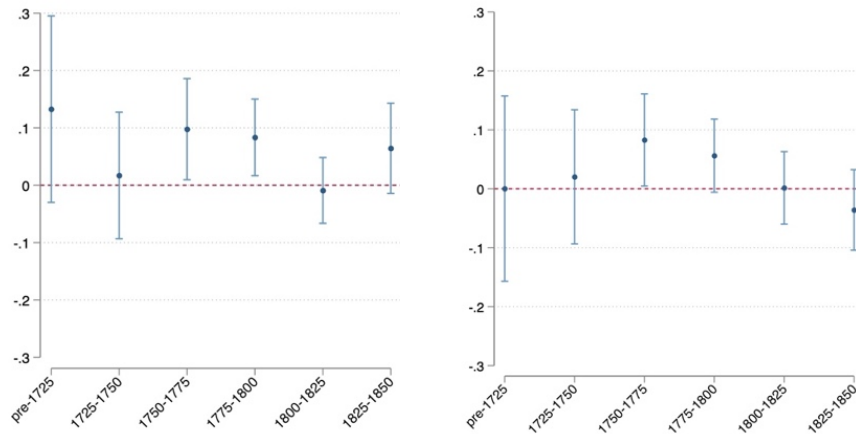
<sup>86</sup> See Table A5

<sup>87</sup> Knodel, 'Starting, Stopping, and Spacing During the Early Stages of Fertility Transition', p. 157.

<sup>88</sup> Knodel, p. 157.

<sup>89</sup> Jaadla et al., 'Infant and Child Mortality by Socio-Economic Status in Early Nineteenth-Century England'; Thiehoff, *Ländlicher Lebensstandard und demographische Reaktionen auf kurzfristigen ökonomischen Stress: Eine Event History Analysis von Fertilität in Wittgenstein (Westfalen) im 19. Jahrhundert*.

<sup>90</sup> Cummins, 'The Micro-Evidence for the Malthusian System. France, 1670–1840'; Clark and Cummins, 'Malthus to Modernity'.



**Figure 2** Normalised coefficient (95 per cent confidence interval) for HISCAM (Z) and demographic outcomes by sub-period. (left) gross marital fertility; (right) proportion under-15 mortality.

First, I plot the coefficient of the primary specifications testing the positive and preventive check using normalised HISCAM scores. Across the board, confidence intervals are large, making it difficult to discern any clear temporal trends. For the positive check, the coefficient is not statistically different from zero in any sub-period. This is reaffirmed by estimating the primary specification by sub-period using the seven status categories.<sup>91</sup> For the preventive check, as measured using HISCAM, it is impossible to discern any clear temporal trend, and the coefficient is only significant at the 95 *per cent* level in two periods. When I estimate the primary specification by sub-period using the seven status categories, a status-gradient in fertility re-emerges for the first four periods (Table 5). Still, although there is evidently some relationship between status and fertility, evidence for the preventive check becomes more tenuous when disaggregated into sub-periods.

The coefficient for the highest rank is small and insignificant prior to 1750, and fertility levels across lower-class and middle-class ranks are statistically indistinguishable. Around 1800 most remnants of a preventive check disappear. This does not necessarily refute the status-gradient in fertility identified when using the pooled sample. When estimating the status-gradient by sub-period, estimates are much more volatile due to the small group sizes (only 17 families of rank seven are observed prior to 1725). To gain a comprehensive understanding of the temporal variation of the Malthusian checks would require a larger dataset. The disappearance of the preventive check around 1800 could be a product of the chosen status classification, failing to accurately account for occupational change after 1800. This is partially affirmed by the coefficients reported when using HISCLASS, which do not show the clear break around 1800.<sup>92</sup>

<sup>91</sup> See Table A5.

<sup>92</sup> See Appendix A5.

**Table 5**  
Preventive Check by Sub-period

<i>Estimand:</i>	Gross Marital Fertility					
	Pre-1725	1725-1750	1750-1775	1775-1800	1800-1825	1825-1850
	(1)	(2)	(3)	(4)	(5)	(6)
Unobserved	2.028*** (0.410)	0.934** (0.428)	0.996** (0.400)	0.518* (0.311)	0.151 (0.277)	0.227 (0.255)
Workers	1.707** (0.708)	1.204** (0.548)	1.308*** (0.462)	0.577* (0.343)	0.285 (0.292)	0.394 (0.258)
Craftsmen	2.551*** (0.665)	1.212** (0.534)	1.291*** (0.450)	0.764** (0.353)	0.208 (0.287)	0.246 (0.253)
Traders/Clerks/Supervisors	2.702*** (0.745)	1.069* (0.588)	0.947* (0.497)	0.940** (0.446)	0.644* (0.372)	0.783** (0.382)
Farmers	-0.00724 (2.117)	-2.687*** (0.887)		1.357 (1.657)	-0.00549 (2.113)	-0.820 (1.004)
Professionals/Academics	2.821*** (0.529)	1.693*** (0.486)	1.581*** (0.449)	0.748** (0.368)	0.302 (0.403)	0.889* (0.489)
Gentry/High Executives Officials/Officers	2.958** (1.221)	-0.231 (0.768)	2.752*** (0.863)	2.081*** (0.592)	-0.182 (0.559)	2.088 (1.416)
Constant	1.797** (0.880)	1.693*** (0.459)	3.939*** (0.480)	3.806*** (0.646)	3.697*** (0.591)	3.990*** (0.420)
Marriage Parish FE	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>	<b>(Y)</b>
F statistics		7.093	3.325	2.614	2.674	1.806
R <sup>2</sup>	0.220	0.0878	0.0395	0.0269	0.0171	0.0227
N	433	916	1612	1926	2207	1349

**Note:**

Columns (1) – (6) are specified using a logistic model and estimated using maximum likelihood.

Robust standard errors in parentheses. \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Omitted Category is Labourers/Servants.

Still, it is noteworthy that disaggregation into sub-periods reveals a trend akin to what Clark and Cummins (2015) identify for England; overall marital fertility remains unchanged (around 3.80), but the fertility of the highest status groups decreases, while that of lower status groups increases to compensate.<sup>93</sup> This disintegration of the preventive check – more than a century before German society underwent the fertility transition, and in the absence of any discernible social, cultural or economic change in Wittgenstein – posits pertinent questions for future research.<sup>94</sup> Identifying what led to non-Malthusian behaviour amongst elites across these three different cases may prove vital to understanding the origins of fertility decline in Europe.

<sup>93</sup> Clark and Cummins, ‘Malthus to Modernity’.

<sup>94</sup> Knodel, *The Decline of Fertility in Germany, 1871-1939*; Clark and Cummins, ‘Malthus to Modernity’; Cummins, ‘Marital Fertility and Wealth during the Fertility Transition’.

## V. MIGRATION

As noted, migration-induced censoring is the biggest source of bias when working with family reconstitutions. This censoring can become problematic via two related, albeit distinct routes. First, if the demographic behaviour of the uncensored subset of the population, is not representative of the general population, results are subject to *selection bias*. This does not only apply to migration; associations could be different for the under-sampled Jewish or Catholic minorities. However, since out-migrants are the largest excluded group, they are also the greatest potential source of bias. Second, if migration is a function of both the exposure and outcome – e.g. if celibacy *and* low status are associated with greater rates of emigration – this introduces *collider bias* since the inclusion restrictions condition the sample on migration.<sup>95</sup> Although both biases are introduced by the exclusion of out-migrants, they operate independent from one another. Ergo, if either (1) out-migrants behaved differently to the general population, or (2) the decision to migrate is a function of demographic outcomes and socio-economic status, the results presented in section 4 are subject to migration-induced bias.

Migration is not the only inclusion restriction. However, for other inclusion restrictions, I can observe the demographic outcomes for the excluded subset of the population to test whether my results are robust to including them. Given the nature of family reconstitution data, it is impossible to observe whether demographic outcomes vary for out-migrants. Still, by inferring the migration status of individuals and families from the absence of baptism and burial records, I can somewhat illuminate the nexus of migration, status, and demographic outcomes. At the family level I sort all families whose marriage is observed in Wittgenstein into three groups; in-migrants (baptism unobserved for one or both spouses), out-migrants (burial unobserved for one or both spouses), and non-migrants (all baptisms and burials observed). Figure 3 plots the change over time in the proportion of these groups. Although short-distance migrants – lost in reconstitutions of singular parishes – are included as non-migrants, the share of migrants in the sample is still substantial.

While the lack of infrastructural integration, and the limited permeability of sovereign borders, increases the cost of migrating, the absence of economic opportunity in Wittgenstein invited considerable emigration. Rates of immigration were also significant. Following the demographic devastation of the 30-year war, the counts of Wittgenstein offered immigrants different incentives to encourage population growth and the expansion of agriculture.<sup>96</sup> The latter period of our study (1800-1850) were likely marked by increasing emigration, with the

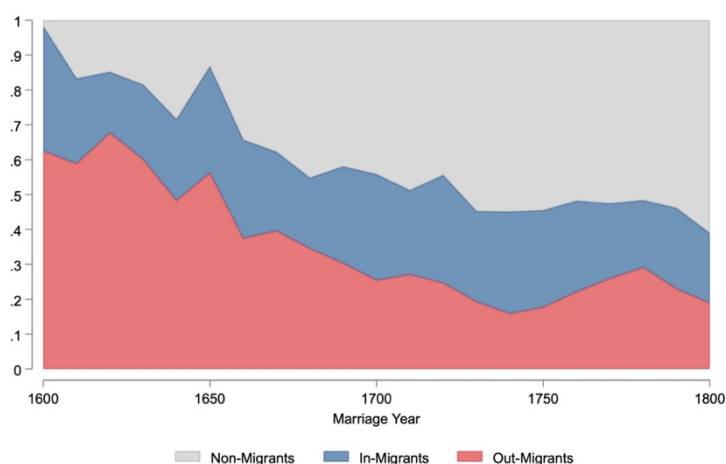
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<sup>95</sup> See Figure A3. For a more thorough description of collider bias through migration see: Schneider, 'Collider Bias in Economic History Research', sec. 3.3.

<sup>96</sup> Klein, *Studien Zur Wirtschafts-Und Sozialgeschichte Der Grafschaft Sayn-Wittgenstein-Hohenstein Vom 16. Bis Zum Beginn Des 19. Jahrhunderts*, p. 82.



incorporation of Wittgenstein into Prussia reducing barriers to migration. However, with the end of reliable parish records in the 1870s it is impossible to infer emigration rates from burial records after 1800. Further it is important to note that the large share of out-migrants early in the period, is partially driven by false positives. The deprivation and death toll brought to Wittgenstein by the 30-year war did not only increase out-migration, but also led to the loss of records, and underreporting of burials prior to 1650.



**Figure 3** Share of Marriages by migration status over time.

Even with these caveats, Figure 3 reveals the substantial size of the excluded sub-population. This is only problematic in-terms of selection bias if the demographic behaviour of out-migrants diverges from the observed subset. To circumvent the imperceptibility of out-migrant outcomes de la Croix, Schneider, and Weisdorf suggest looking at the differences between in-migrants and non-migrants. This test for selection bias is contingent on the assumption that the unobserved out-migrants (who likely immigrate to a similar nearby parish) are virtually the same group as observed in-migrants (who likely emigrated from such a parish).<sup>97</sup> In the Wittgenstein reconstitution, where short-distance migrants are observed as non-migrants, this appears unlikely. Since equivalence between in- and out-migrants cannot be assumed, I am unable to follow de la Croix, Schneider, and Weisdorf approach and proxy out-migrant with in-migrant behaviour. However, a comparison between the two groups still yields some insights, albeit with a different premise. If the preventive and positive checks do not vary across the observed migrant categories (in and non), the same may be true for the unobserved out-migrants. Estimating the primary specification for in- and non-migrants, reveals that the status-gradient does not vary.<sup>98</sup> Although this does not imply that out-migrants do not display distinct associations, it lends some support to the robustness of my findings.

<sup>97</sup> de la Croix, Schneider, and Weisdorf, 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England', p. 246.

<sup>98</sup> See Tables A7 and A8.

**Table 7**  
Summary statistics by migration Category

Migration Category	N	HISCAM (out of 100)	99 per cent Confidence Interval	
<i>Out-Migrants</i>	7,070	55.01	54.53	55.50
<i>In-Migrants</i>	3,515	57.63	56.76	58.49
<i>Non-Migrants</i>	8,915	57.95	57.36	58.53

**Note:**

Summary statistics are reported at the household level using a sample containing all families for which a marriage was observed in the core parishes of the reconstitution (N=10,557).

To evaluate whether collider bias effects my results I need to evaluate whether migration is a function of both status and demographic outcomes. Although demographic outcomes are unobservable, occupational status is known for those that left the county at some point after marriage. Table 7 reveals that there is some heterogeneity in status across the migration groups. The average status for out-migrants is lower than that of in- and non-migrants. A multinomial logistic regression, estimating the effect of occupational status on the likelihood of being either a non-, in-, or out-migrant, reveals that the observed heterogeneity is driven by a lower propensity to migrate (both in and out) amongst the two uppermost ranks.<sup>99</sup> This result is buttressed by an individual-level logistic regression, estimating the effect of father's occupational status on the choice to emigrate for all children born in Wittgenstein.<sup>100</sup> Here again the two uppermost ranks have a lower propensity to migrate.

This relationship between occupational status and migration choices comes as no surprise. Importantly, it only biases results if migration is also affected by the demographic outcome in question. Turning to the example of celibacy, if rates of out-migration are greater amongst celibate women – to migrate to an urban centre with a larger marriage market, for example – the results reported in Table 4 likely underestimate rates of celibacy amongst women with lower social status since these are *a priori* more likely to be part of the excluded group. For such an association to drive results, the demographic outcomes would have to be a central driver of migration decisions. Since it is impossible to verify whether the outcome affects migration, all results presented in section 4 need to be interpreted under the identifying assumption of no such association between the two. This assumption is more likely to hold for some results than for others. While it is likely that celibacy is associated with greater rates of out-migration, the same does not necessarily apply to fertility or mortality.

<sup>99</sup> See Table A9.

<sup>100</sup> See Table A10.

## VI. DISCUSSION

Prior to 1800, Wittgenstein was clearly subject to some Malthusian forces. Although one could cite the absence of a positive check at the individual-level as evidence to the contrary, Malthus allows for the ascendancy of the preventive over the positive check.<sup>101</sup> The argument that the preventive and positive check must act in tandem, maintaining some Malthusian equilibrium, is more expressive of the mechanical model built by neo-Malthusian authors than the *Principles* described by Malthus.<sup>102</sup> Although the laws of population condemned the lower classes to a life of distress and precarity, if the preventive check was sufficiently strong, mortality could be avoided, with the positive check acting only as a “last most dreadful resource of nature”.<sup>103</sup>

Here, my individual-level findings align closely with population-level studies of the Malthusian checks in Germany. Pfister and Fertig test for the short- and long-run associations between vital rates and real wages. Akin to the status-gradient in fertility, their findings support a structural relationship between birth rates and real wages that disappeared around 1800. Regarding the preventive check, they find no evidence for a structural relationship between death rates and real wages. This concurs with the absence of a status-gradient in mortality. Although they find no long-run association, they discover that the death rate reacts strongly to negative income shocks.<sup>104</sup> This is consistent with the positive check only being active close to subsistence through “pestilence and famine”.<sup>105</sup> Although my findings here are tentative, the similitude of the disappearance of Malthusian dynamics at the individual- and population-level is notable. The observed decline of fertility amongst the upper ranks of society – likely also underpinning the weakening of the preventive check at the population-level – transpired in the absence of increasing rates of technological change. Mirroring Pfister and Fertig's (2020) conclusion, these developments appear to be the consequence of some change at the turn of the century that we are yet to identify.<sup>106</sup> Controlling for observations from the small urban settlements in Wittgenstein provides some preliminary evidence that increasing urbanisation over the 18<sup>th</sup> century may have contributed to this development.<sup>107</sup>

As discussed in section 2, although the individual-level assumptions I test underpin Malthus analysis, they are even more pivotal to neo-Malthusian arguments. While population-level responses to changing living standards are not contingent on the individual-level relationships, the Malthusian-Darwinian synthesis that posits ‘survival of the richest’ as a

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<sup>101</sup> Wrigley, ‘Elegance and Experience: Malthus at the Bar of History’, p. 44.

<sup>102</sup> Wrigley, pp. 54–55; Clark, *A Farewell to Alms*; Malthus, *An Essay on the Principle of Population*.

<sup>103</sup> Malthus, *An Essay on the Principle of Population*.

<sup>104</sup> Pfister and Fertig, ‘From Malthusian Disequilibrium to the Post-Malthusian Era’.

<sup>105</sup> Malthus, *An Essay on the Principle of Population*.

<sup>106</sup> Pfister and Fertig, ‘From Malthusian Disequilibrium to the Post-Malthusian Era’.

<sup>107</sup> See Table A11

fundamental cause of modernisation and growth is. Here, the argument goes, differential rates of reproductive success endow low mortality/high fertility groups – such as the wealthy – with an evolutionary advantage. This selection mechanism leads to the promulgation of the behavioural traits associated with these groups. Galor and Moav (2002) amend the earlier framework of Unified growth theory, to argue that the *prima causa* of modern economic growth was the income induced reproductive advantage of families that favoured quality (high human capital) over quantity (low human capital) children, spurring further technological progress and eventually modern growth. Although quantity families had more children initially, ‘survival of the richest’ induced the slow restructuring of society, with quality families earning more, and therefore procreating more.<sup>108</sup> By a similar mechanism, according to Clark (2007), the industrial revolution originates in the growth-inducing *je ne sais quoi* of the rich.<sup>109</sup>

Turning first to theories that locate the source of modern growth in the Malthusian era, but not necessarily in Malthusian population dynamics; Unified Growth Theory – without its Darwinian amendments – is not supported by my results. Although I observe declining fertility among the upper-classes, this happens in the absence of any discernible change to the parental incentive structure. Technological progress had clearly not affected the economy of Wittgenstein during the last decades of the 18<sup>th</sup> century. One caveat to this is that within half a century of the weakening of the preventive check, the cost of migration fell substantially as Wittgenstein was incorporated into Prussia. Here, incentives may have changed in response to economic opportunity elsewhere. However, given the time gap, lower rates of out-migration, and late industrialisation in Germany generally, this theory does not hold up to scrutiny in the context of Wittgenstein.<sup>110</sup> Similarly, regarding the broad EMP literature my findings support the conclusion reached by Dennison and Ogilvie (2014). Although Wittgenstein exhibits the traits associated with the EMP, it enjoyed no apparent economic advantages.<sup>111</sup>

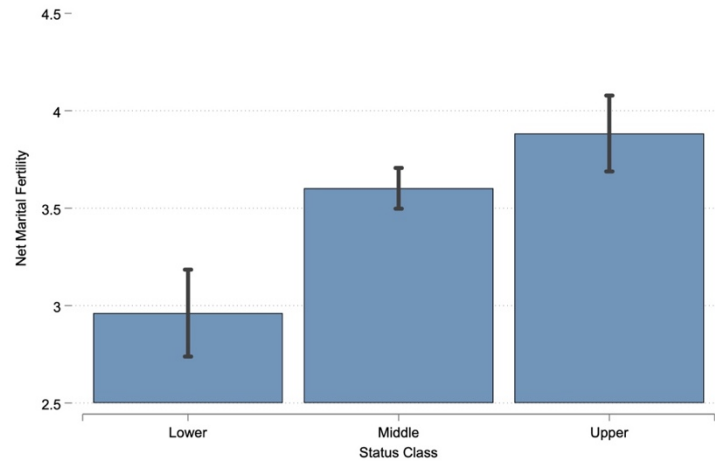
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<sup>108</sup> Galor and Weil, ‘Population, Technology, and Growth’; Galor and Moav, ‘Natural Selection and the Origin of Economic Growth’.

<sup>109</sup> Clark, *A Farewell to Alms*; Clark, ‘In Defense of the Malthusian Interpretation of History’.

<sup>110</sup> Wolf and Rosés, *The Economic Development of Europe’s Regions*; Lee, ‘The Paradigm of German Industrialisation’.

<sup>111</sup> Dennison and Ogilvie, ‘Does the European Marriage Pattern Explain Economic Growth?’



**Figure 4** Predicted Net Marital Fertility by three status groups. (see Table A12 for underlying regression)

Neo-Malthusian interpretations, that emphasis differential reproductive success, on the other hand, appear to be supported by my findings (see Figure 4). Although child mortality is greater amongst the highest rank, the rich – here proxied by occupational status – were clearly the most reproductively successful group. Predicted net marital fertility reveals that families of the two uppermost ranks, have around one extra child when compared to Labourers/Servants. This finding is robust to alternative status specifications, and coding families with unobserved occupation as low-status.<sup>112</sup>

However, greater reproductive success alone is necessary but not sufficient proof for the theories of Clark, Galor and Moav. Their mechanism rests upon the strong persistence – either genetically or culturally – of traits across generations.<sup>113</sup> A glance at our data reveals that the rich in “survival of the richest” do not remain rich.<sup>114</sup> Regardless of their reproductive success, the share of the upper-most ranks does not increase across periods. Since the two uppermost ranks were less likely to migrate, this is not the product of greater emigration. For the mechanism of ‘survival of the richest’ to operate, pro-growth traits would have to persist across generations amongst families in lower socio-economic classes. Such long-term persistence of behavioural traits appears unlikely.<sup>115</sup>

My findings present another challenge to the ‘survival of the richest’ thesis. If the reproductive advantage of the upper strata of society is promulgated as the *prima causa* of the Industrial Revolution in England, how come it is consistently replicated for other study areas that industrialised later? Edwards and Ogilvie (2019) make a similar point in critiquing Foreman-Peck and Zhou (2018). The latter argue that late age of marriage uniquely

<sup>112</sup> See Appendix A5.

<sup>113</sup> Bowles, ‘Genetically Capitalist?’

<sup>114</sup> See Figure A4.

<sup>115</sup> Dohmen et al., ‘The Intergenerational Transmission of Risk and Trust Attitudes’; Bowles, Gintis, and Osborne Groves, *Unequal Chances: Family Background and Economic Success*.

contributed to English growth but choose to ignore later ages of marriage in European countries that industrialised much later.<sup>116</sup>

Here, Cummins and Clark (2022) offer one potential caveat. Based on 1.7 million marriage certificates they find that for England, assortment in marriage and intergenerational *immobility* were considerably higher than conventionally thought.<sup>117</sup> Perhaps the combination of ‘survival of the richest’ with these high rates of assortment is unique to the English context. In line with this interpretation, Clark and Cummins present a model that elaborates how, by counteracting societal regression to the mean, marital sorting leads to a greater share of people at the upper tail-end of the skill/status distributions. Paired with ‘survival of the richest’ this could be a powerful promulgator of growth-inducing traits, making demography a central driver of English exceptionalism. However, here again, England is not unique. I replicate Clark and Cummins empirical strategy for Wittgenstein. Intergenerational immobility and marital assortment were high – with the correlations of status for groom and bride (0.83 vs 0.90) and father and son (0.80 vs 0.80) resembling those for England.<sup>118</sup>

Another candidate explanation, identifying ‘survival of the middle-class’ instead of ‘survival of the richest’ could offer a better explanation for the early industrialisation of England. De la Croix, Schneider and Weisdorf observe that the extensive margin counteracts high fertility at the intensive margin amongst the topmost ranks. If this is a unique feature of the British demographic system, this could displace ‘survival of the richest’ and the EMP as an explanation for English growth. Still, regardless of this critique of ‘survival of the richest’ as an explanation for England’s early growth, the pairing of ‘survival of the richest’, marital assortment, and intergenerational immobility, appears to be unique to north-western Europe, offering a potential (albeit partial), explanation for the unique development trajectory of this region.

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<sup>116</sup> Edwards and Ogilvie, ‘What Can We Learn from a Race with One Runner?’; Foreman-Peck and Zhou, ‘Late Marriage as a Contributor to the Industrial Revolution in England’.

<sup>117</sup> Clark and Cummins, ‘Assortative Mating and the Industrial Revolution’.

<sup>118</sup> See Table A13.

## CONCLUSION

Concurring with Wrigley's (1986) evaluation, I too find that “in the main Malthus stands to test well”.<sup>119</sup> By drawing upon the intensive case study of the rural county of Wittgenstein, I was able to show that prior to 1800, at the individual-level the demographic regime in parts of pre-industrial Germany was subject to Malthusian forces. A strong preventive check, operating chiefly through mother's age at marriage, prevailed over the positive check. In contrast to England, the extensive margin of fertility does not affect this gradient. Although the status-gradient in under-15 mortality provides no indication of a positive check on population, I argue that the absence of a preventive check is accordant with a close reading of Malthus. While my results support the presence of Malthusian forces, they do not lend credibility to neo-Malthusian theories that posit a strict homeostatic equilibrium between the preventive and positive check. Further, contextual evidence from Wittgenstein and the comparison to the English context argue against the growth inducing properties of both the EMP and ‘survival of the richest’. Although this paper draws upon only one county, the compatibility of my results to those drawing upon aggregate-level time series for Germany lends some support to the external validity of findings from Wittgenstein. One notable exception here are the trends identified amongst Farmers. Not only was this group too small to yield any convincing results, but the agricultural context of Wittgenstein was distinct from many other areas in Germany. Nonetheless, although Wittgenstein is reasonably representative of rural Germany, a broader study drawing upon multiple one-place studies would be an important step towards verifying the associations this paper identifies. The wealth of hitherto unexploited sources available for the study of German demographic history contained in one-place studies could also contribute to illuminating the disappearance of the preventive check around 1800. Although the falsity of Malthus's claim regarding the ‘arithmetic growth of subsistence’ is historically apparent, why, and how the preventive check weakened and then disappeared across Europe within a relatively small timespan remains unanswered and constitutes a pressing question for future research.

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<sup>119</sup> Wrigley, ‘Elegance and Experience: Malthus at the Bar of History’, p. 46.

## Bibliography

- Alter, G.C. 'The Evolution of Models in Historical Demography'. *The Journal of Interdisciplinary History* 50 (2019), pp. 325–62.
- Alter, G., G. Newton, and J. Oeppen. 'Re-Introducing the Cambridge Group Family Reconstitutions'. *Historical Life Course Studies* 9 (2020), pp. 24–48.
- Anderson, M. 'The Social Implications of Demographic Change'. *The Cambridge Social History of Britain, 1750–1950*, (Cambridge, 1990), 2:pp. 1–70.
- Blanc, G. 'Crowdsourced Genealogies', 2023.  
<https://www.guillaumeblanc.com/crowdsourced.html>.
- Boberg-Fazlic, N., P. Sharp, and J. Weisdorf. 'Survival of the Richest? Social Status, Fertility and Social Mobility in England 1541-1824'. *European Review of Economic History* 15 (2011), pp. 365–92.
- Bowles, S. 'Genetically Capitalist?' Edited by Gregory Clark. *Science* 318 (2007), pp. 394–96.
- Bowles, Samuel, Herbert Gintis, and Melissa Osborne Groves, eds. *Unequal Chances: Family Background and Economic Success*, (Princeton, NJ, 2005).
- Brown, J.C. and T.W. Guinnane. 'Infant Mortality Decline in Rural and Urban Bavaria: Fertility, Economic Transformation, Infant Care, and Inequality in Bavaria and Munich, 1825–1910†'. *The Economic History Review* 71 (2018), pp. 853–86.
- Campbell, C.D. 'Demographic Techniques: Family Reconstitution'. *International Encyclopedia of the Social & Behavioral Sciences*, Second Edition., (2015), 6:pp. 138–42.
- Campbell, C. and J. Lee. 'State Views and Local Views of Population: Linking and Comparing Genealogies and Household Registers in Liaoning, 1749–1909'. *History and Computing* 14 (2002), pp. 9–29.
- Clark, G. *A Farewell to Alms: A Brief Economic History of the World*, (Princeton ;, 2007).
- . 'In Defense of the Malthusian Interpretation of History'. *European Review of Economic History* 12 (2008), pp. 175–99.
- Clark, G. and N. Cummins. 'Assortative Mating and the Industrial Revolution: England, 1754-2021'. SSRN Scholarly Paper, (Rochester, NY, 2022).  
<https://papers.ssrn.com/abstract=4069865>.
- . 'Malthus to Modernity: Wealth, Status, and Fertility in England, 1500-1879'. *Journal of Population Economics* 28 (2015), pp. 3–29.
- Clark, G. and G. Hamilton. 'Survival of the Richest: The Malthusian Mechanism in Pre-Industrial England'. *The Journal of Economic History* 66 (2006), pp. 707–36.
- Clark, P. 'Migration in England during the Late Seventeenth and Early Eighteenth Centuries'. *Past & Present* 83 (1979), pp. 57–90.
- Crafts, N. and T.C. Mills. 'From Malthus to Solow: How Did the Malthusian Economy Really Evolve?' *Journal of Macroeconomics* 31 (2009), pp. 68–93.
- Croix, D. de la, E.B. Schneider, and J. Weisdorf. 'Childlessness, Celibacy and Net Fertility in Pre-Industrial England: The Middle-Class Evolutionary Advantage'. *Journal of Economic Growth (Boston, Mass.)* 24 (2019), pp. 223–56.
- Cummins, N. 'Marital Fertility and Wealth during the Fertility Transition: Rural France, 1750-1850'. *The Economic History Review* 66 (2013), pp. 449–76.
- . 'The Micro-Evidence for the Malthusian System. France, 1670–1840'. *European Economic Review* 129 (2020), p. 103544.
- De Moor, T. and J.L. Van Zanden. 'Girl Power: The European Marriage Pattern and Labour Markets in the North Sea Region in the Late Medieval and Early Modern Period1'. *The Economic History Review* 63 (2010), pp. 1–33.
- Dennison, T. and S. Ogilvie. 'Does the European Marriage Pattern Explain Economic Growth?' *The Journal of Economic History* 74 (2014), pp. 651–93.
- Dohmen, T., A. Falk, D. Huffman, and U. Sunde. 'The Intergenerational Transmission of Risk and Trust Attitudes'. *The Review of Economic Studies* 79 (2012), pp. 645–77.
- Dribe, M. and F. Scalone. 'Social Class and Net Fertility before, during, and after the Demographic Transition: A Micro-Level Analysis of Sweden 1880–1970'. *Demographic Research* 30 (2014), pp. 429–64.



- Edwards, J. and S. Ogilvie. ‘What Can We Learn from a Race with One Runner? A Comment on Foreman-Peck and Zhou, “Late Marriage as a Contributor to the Industrial Revolution in England”’. *The Economic History Review* 72 (2019), pp. 1439–46.
- Ehrlich, P.R. *The Population Bomb*. Reprint edition., (Cutchogue, New York, 1995).
- Feng, W., J. Lee, and C. Campbell. ‘Marital Fertility Control among the Qing Nobility: Implications for Two Types of Preventive Check’. *Population Studies* 49 (1995), pp. 383–400.
- Fernihough, A. ‘Malthusian Dynamics in a Diverging Europe: Northern Italy, 1650-1881’. *Demography* 50 (2013), pp. 311–32.
- Fertig, G. ‘Beyond the Niche Hypothesis. Property, Marriage, and the Onset of Familial Reproduction in Rural Northwest Germany, 1820–1866’. *Historical Life Course Studies* 8 (2019), pp. 73–95.
- Fertig, G., C. Schlöder, R. Gehrmann, C. Langfeldt, and U. Pfister. ‘Population and Vital Rates in Germany during the Post-Malthusian Era, 1815–1871’. *VSWG: Vierteljahrschrift Für Sozial- Und Wirtschaftsgeschichte* 105 (2018), pp. 6–33.
- Fertig, G., R. Stelter, and C. Boose. ‘Ortsfamilienbücher – eine exzellente Forschungsgrundlage für die Geschichts-, Wirtschafts- und Sozialwissenschaften’. *Verein für Computergenealogie e.V. (CompGen)* (blog), 2022. <https://www.compgen.de/2022/10/ortsfamilienbuecher-eine-exzellente-forschungsgrundlage-fuer-die-geschichts-wirtschafts-und-sozialwissenschaften/>.
- Foreman-Peck, J. and P. Zhou. ‘Late Marriage as a Contributor to the Industrial Revolution in England’. *The Economic History Review* 71 (2018), pp. 1073–99.
- Galor, O. and O. Moav. ‘Natural Selection and the Origin of Economic Growth’. *The Quarterly Journal of Economics* 117 (2002), pp. 1133–91.
- Galor, O. and D.N. Weil. ‘Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond’. *The American Economic Review* 90 (2000), pp. 806–28.
- Gesetz über die Beurkundung des Personenstandes und die Eheschließung, Pub. L. No. 1040, 4 Deutsches Reichsgesetzblatt Band 1875 23 (1875).
- Göbel, G. *Bevölkerung Und Ökonomie. Historisch-Demographische Untersuchung Des Kirchspiels Siegen in Der Nassau-Oranischen Zeit (1742-1806)*, (St Katharinen, 1988).
- Goldberg, J.M. and K. Moeller. ‘Automatisierte Identifikation und Lemmatisierung historischer Berufsbezeichnungen in deutschsprachigen Datenbeständen’, 2022.
- Guinnane, T.W. ‘The Historical Fertility Transition: A Guide for Economists’. *Journal of Economic Literature* 49 (2011), pp. 589–614.
- Guinnane, T.W. and S. Ogilvie. ‘A Two-Tiered Demographic System: “Insiders” and “Outsiders” in Three Swabian Communities, 1558-1914’. SSRN Scholarly Paper, (Rochester, NY, 2013). <https://doi.org/10.2139/ssrn.2222932>.
- Hajnal, J. ‘European Marriage Patterns in Perspective’. *Population in History*, (1965).
- Henrich, J., S.J. Heine, and A. Norenzayan. ‘The Weirdest People in the World?’ *Behavioral and Brain Sciences* 33 (2010), pp. 61–83.
- Henry, L. and J. Houdaille. ‘Fécondité Des Mariages Dans Le Quart Nord-Ouest de La France de 1670 a 1829’. *Population (French Edition)* 28 (1973), pp. 873–924.
- Houdaille, J. ‘La fécondité des mariages de 1670 à 1829 dans le quart nord-est de la France’. *Annales de démographie historique* 1976 (1976), pp. 341–91.
- Imhof, A. *Lebenserwartungen in Deutschland Vom 17. Bis 19. Jahrhundert*, (Weinheim, 1990).
- Jaadla, H., E. Potter, S. Keibek, and R. Davenport. ‘Infant and Child Mortality by Socio-Economic Status in Early Nineteenth-Century England’. *The Economic History Review* 73 (2020), pp. 991–1022.
- Kelly, M. and C. Ó Gráda. ‘Living Standards and Mortality since the Middle Ages: Living Standards and Mortality’. *The Economic History Review* 67 (2014), pp. 358–81.
- Klein, E. *Studien Zur Wirtschafts-Und Sozialgeschichte Der Grafschaft Sayn-Wittgenstein-Hohenstein Vom 16. Bis Zum Beginn Des 19. Jahrhunderts*, Schriften Des Instituts Für Geschichtliche Landeskunde von Hessen Und Nassau 13, (Marburg, 1936).
- Knodel, A.J. *The Decline of Fertility in Germany, 1871-1939*, (1974).

- Knodel, J. 'Starting, Stopping, and Spacing During the Early Stages of Fertility Transition: The Experience of German Village Populations in the 18th and 19th Centuries'. *Demography* 24 (1987), pp. 143–62.
- Knodel, J.E. *Demographic Behavior in the Past: A Study of Fourteen German Village Populations in the Eighteenth and Nineteenth Centuries*, 6, (2002).
- Knodel, J. and R. Shorter. 'The Reliability of Family Reconstitution Data in German Village Genealogies (Ortssippenbücher)'. *Annales de Démographie Historique* 1976 (1976), pp. 115–54.
- Kumon, Y. and M. Saleh. 'The Middle-Eastern Marriage Pattern? Malthusian Dynamics in Nineteenth-century Egypt'. *The Economic History Review* 76 (2023), pp. 1231–58.
- Lambert, P.S., R.L. Zijdeman, M.H.D. Van Leeuwen, I. Maas, and K. Prandy. 'The Construction of HISCAM: A Stratification Scale Based on Social Interactions for Historical Comparative Research'. *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 46 (2013), pp. 77–89.
- Lee, J. and W. Feng. 'Malthusian Models and Chinese Realities: The Chinese Demographic System 1700–2000'. *Population and Development Review* 25 (1999), pp. 33–65.
- Lee, R. and M. Anderson. 'Malthus in State Space: Macro Economic-Demographic Relations in English History, 1540 to 1870'. *Journal of Population Economics* 15 (2002), pp. 195–220.
- Lee, S. and J.H. Park. 'Quality over Quantity: A Lineage-Survival Strategy of Elite Families in Premodern Korea'. *Social Science History* 43 (2019), pp. 31–61.
- Lee, W.R. 'The Paradigm of German Industrialisation: Some Recent Issues and Debates in the Modern Historiography of German Industrial Development'. *German Industry and German Industrialisation*, (1991).
- Leeuwen, M.H.D. van. *HISCO: Historical International Standard Classification of Occupations*, (Leuven, Belgium, 2002).
- Malthus, T.R. *An Essay on the Principle of Population*, Oxford World's Classics, (Oxford ; New York, 2008).
- Mehldau, J.K. 'Wittgensteiner Familiendatei. Eine Datenbank Zur Familiengeschichtsforschung', (Köln, 2011). GESIS Datenarchiv.
- Moeller, K., A. Müller, and R. Nasarek. 'Ontologie Historischer, Deutschsprachiger Berufs- Und Amtsbezeichnungen', (Wittenberg, 23 March 2023).
- Patten, J. 'Patterns of Migration and Movement of Labour to Three Pre-Industrial East Anglian Towns'. *Journal of Historical Geography* 2 (1976), pp. 111–29.
- Pedersen, M., C. Riani, and P. Sharp. 'Malthus in Preindustrial Northern Italy?' *Journal of Population Economics* 34 (2021), pp. 1003–26.
- Pfister, U. and G. Fertig. 'From Malthusian Disequilibrium to the Post-Malthusian Era: The Evolution of the Preventive and Positive Checks in Germany, 1730–1870'. *Demography* 57 (2020), pp. 1145–70.
- Schneider, E.B. 'Collider Bias in Economic History Research'. *Explorations in Economic History* 78 (2020), p. 101356.
- Thiehoff, S. *Ländlicher Lebensstandard und demographische Reaktionen auf kurzfristigen ökonomischen Stress: Eine Event History Analysis von Fertilität in Wittgenstein (Westfalen) im 19. Jahrhundert*, (Westfaelische Wilhelms-Universitaet Muenster, 2015).
- Voigtländer, N. and H.-J. Voth. 'How the West "Invented" Fertility Restriction'. *American Economic Review* 103 (2013), pp. 2227–64.
- Weir, D.R. 'Family Income, Mortality, and Fertility on the Eve of the Demographic Transition: A Case Study of Rosny-Sous-Bois'. *The Journal of Economic History* 55 (1995), pp. 1–26.
- . 'Life Under Pressure: France and England, 1670-1870'. *The Journal of Economic History* 44 (1984), pp. 27–47.
- Winch, D. 'Introduction'. *An Essay on the Principle of Population, or, A View of Its Past and Present Effects on Human Happiness: With an Inquiry into Our Prospects Respecting the Future Removal or Mitigation of the Evils Which It Occasions*, Cambridge Texts in the History of Political Thought, (Cambridge [England] ; New York, NY, USA, 1992).

- Wolf, Nikolaus, and Joan Ramón Rosés, eds. *The Economic Development of Europe's Regions: A Quantitative History since 1900*, (London, 2018).
- Wrigley, E.A. 'Elegance and Experience: Malthus at the Bar of History'. in D. A. Coleman and R. S. Schofield, eds., *The State of Population Theory: Forward from Malthus to Modern Times*, (Oxford, 1986), pp. 46–64.
- Wrigley, E.A. and R. Schofield. *The Population History of England, 1541-1871: A Reconstruction*, (Cambridge [England, 1981).