

# Are Anarcho-Capitalists Insane? Living Standards under Medieval Icelandic Conflict Institutions

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## Abstract

Medieval Iceland was governed privately. Other territories in medieval Europe were governed partly by government. We exploit that difference to test the conventional wisdom that living standards must be higher under government. Historical data on human height, wages, and population growth measure living standards in Iceland and other territories in medieval Europe. Living standards in those territories do not seem to have been higher than they were in medieval Iceland. Medieval Iceland may be a more impressive example of private governance than is usually believed, and anarcho-capitalists may not be insane to extol it.

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# 1 Introduction

Medieval Iceland is a special arrow in the anarcho-capitalist quiver, and for good reason.<sup>1</sup> Medieval Icelandic conflict institutions “might almost have been invented by a mad economist to test the lengths to which market systems could supplant government in its most fundamental functions” (Friedman 1979: 400). David Friedman introduced medieval Iceland to the economics literature in 1979. For decades, it was one of just two privately governed societies documented in that literature, with the result that it was one of just two real-world examples that anarcho-capitalists could point to as evidence that they might not be insane.<sup>2</sup> The economics literature on privately governed societies has grown substantially in last the 40 years (see, for instance, Benson 1988, 1989, 1991, 2005; Ellickson 1991; Leeson 2007a, 2007b, 2009, 2013; Powell and Stringham 2009; Benson and Siddiqui 2014; Skarbek 2014; Murtazashvili and Murtazashvili 2015; Piano 2017; Richman 2017; Friedman, Leeson, and Skarbek 2019). Still, for many who argue that private institutions might be able to profitably replace government, medieval Iceland remains Exhibit A.

The chief obstacle to persuading others with that exhibit is, well, *medieval Iceland*. Medieval Iceland conjures many things—glaciers, Vikings, volcanoes—but a prosperous society you might want to inhabit is not one of them. The details of medieval Icelandic institutions do not improve that impression: “Killing was a civil offense resulting in a fine paid to the survivors of the victim. Laws were made by a ‘parliament,’ seats in which were a marketable commodity. Enforcement of law was entirely a private affair” (Friedman 1979: 400). Those institutions may have prevented a Hobbesian bloodbath, conventional wisdom claims, but living standards are obviously higher under government.

If the government is contemporary Iceland’s, then conventional wisdom is right. But since medieval Icelanders did not have time machines, that comparison is wrong. Medieval Europeans’ governance possibilities were limited by the governance institutions possible in medieval Europe. Those institutions included the private ones that medieval Icelanders had, the governmental institutions that medieval Icelanders did not have, and a combination of the two, which is what all

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<sup>1</sup> Anarcho-capitalism is a variety of libertarianism according to which all government institutions can and should be replaced by private ones. Less radical varieties of libertarianism maintain that most government institutions can and should be replaced by private ones, but not all of them—for example, law, police, courts, and national defense. Anarcho-capitalism’s most well-known advocates are David Friedman and Murray Rothbard. See, for instance, Friedman (1973) and Rothbard (1973).

<sup>2</sup> The other example being the nineteenth-century American West, introduced to the economics literature by Terry Anderson and P.J. Hill (1979) (though some of its features were analyzed earlier by John Umbeck (1977)).

medieval Europeans except for Icelanders had. They did not, however, include the governments that modern Europeans have, since in the Middle Ages those institutions did not exist. To test the claim that medieval Icelandic living standards would have been higher under government, one must therefore compare medieval Icelandic living standards to living standards under governments in medieval Europe. Was Iceland in the tenth through thirteenth centuries poorer than, say, England during that period?

To find out, we examine historical data on human height, wages, and population growth in Iceland and other territories in medieval Europe. The data are sparse and crude, so the results of our comparison are too. Still, they are instructive. Living standards under governments in medieval Europe do not seem to have been higher than they were in medieval Iceland. Medieval Iceland may not be an underwhelming example of private governance after all, and anarcho-capitalists may not be insane to extol it.

## 2 Human Height

Richer people tend to be better nourished people. And since better nourished people tend to be taller, richer people tend to be taller. “Income is a potent determinant of stature” (Steckel 2008: 136). When data on historical income are unavailable, as they often are for medieval Europe, social scientists thus measure historical living standards with data on historical stature instead (see, for instance, Fogel 1994; Steckel 1995; Komlos and Baten 1998; Steckel and Rose 2002; Heyberger 2011; Steckel et al. 2018). Data on medieval citizens’ average heights across European territories come from medieval citizens’ skeletal remains, dated and measured by archeologists. We use those data to compare living standards across territories in medieval Europe.

Our comparison assumes that individuals’ growth potentials did not differ systematically across the territories we compare. Only a small part of the variation in individuals’ heights is determined by differences in their living standards, mostly in their childhood diets (caloric consumption and quality). The rest is determined by differences in individuals’ genetics. Thus, if groups of individuals with different ancestries have different average growth potentials, differences in their average heights may reflect genetic differences rather than different living standards. Scientists cannot say whether such differences in growth potential exist, but if they do, it seems they are not more than a few centimeters (Steckel 2013: 407). For the comparisons we make, even that possibility is not a concern. The benchmark territories to which we compare

Iceland are, like Iceland, Northern European. Their medieval inhabitants' ancestries were therefore nearly identical. Indeed, medieval Europeans who hailed from two territories we consider—Norway and Britain—*were* medieval Icelanders: Norwegians, Irishmen, and Scots settled Iceland in the ninth century.<sup>3</sup>

Caution is nevertheless warranted when interpreting height differences in our comparison. Average height is a good measure of poverty, but it is a poor measure of wealth. “[O]nce income is sufficient to satisfy caloric requirements, only modest increases [in height] are attainable through change in the diet” (Steckel 2008: 137). Two territories with similar average heights may therefore have dissimilar living standards if living standards in both territories are high enough to satisfy nutritional needs.

A second reason for caution is that average height depends not only on average income but sometimes also on its distribution. Consider two territories, both with two citizens. In the first territory, each citizen's income is just enough to satisfy nutritional needs. In the second territory, one citizen's income is 1.5 times that amount, and his compatriot's income is just half of it. Average income is the same in both territories, but average height is taller in the first. Medieval Iceland was an exceptionally equal society (Friedman 1979; Byock 1988; Miller 1988).<sup>4</sup> The average Icelander might therefore have been taller even if other medieval Europeans were just as rich.<sup>5</sup>

These limitations, however, should not obscure the bigger picture. If medieval Icelandic living standards differed notably from living standards in other territories in medieval Europe, medieval Icelanders would have been notably shorter. Even European territories that were wealthy by medieval standards were quite poor, and height tracks living standards most closely amid poverty.

We collect data on average adult height from Steckel (2004) and on average adult-male height from Cairns (2015). Our data cover various centuries between the tenth and sixteenth for six Northern European territories, four of them Nordic: Denmark, Iceland, Norway, Sweden, England, and Scotland. To supplement our comparison within this benchmark group, we collect

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<sup>3</sup> Norwegians in much larger number than Irishmen or Scots.

<sup>4</sup> Until around the time that Iceland converted to Christianity, Icelandic chieftains who sold governance services (*goðar*) were not much richer than the Icelanders who bought those services (*goðorð*) (Solvason 1990; 1993). Only in the Icelandic Commonwealth's final years does it seem that wealth inequality increased (Byock 1988).

<sup>5</sup> At least, provided that richer citizens in other European territories were rich enough to satisfy nutritional needs.

height data from Cairns (2015) that cover two non-Northern European territories, Germany and Crete/Greece, and height data from Koepke and Baten (2008) that cover two non-Northern European regions, Central-Western Europe and Mediterranean Europe. Table 1 presents our height data.

Among medieval Northern Europeans, Icelanders were probably taller than Englishmen, Norwegians, Scots, and possibly Danes. They were probably shorter than Swedes. Among non-Northern Europeans, Icelanders were probably taller than Mediterranean Europeans and Central-Western Europeans. They were probably shorter than Germans. We say probably since, for most territories, our data cover different centuries. Still, a pattern is clear. Apart from Sweden, average height in medieval Iceland seems to have been close to or taller than elsewhere in medieval Europe. Certainly, it was not notably shorter. Living standards as proxied by height do not seem to have been higher under medieval European governments than they were in medieval Iceland.

### 3 Wages

Wages measure living standards more directly than human height. Unfortunately, data that could be used to estimate and compare real wages across territories in medieval Europe are rare. The richest medieval wage and price data belong to England. England is not a Nordic territory, but it is a Northern European one. As another way to assess relative living standards, we therefore compare estimates of medieval Icelandic and English real wages.

Friedman (1979) uses information on the Icelandic exchange rate between silver and woolen cloth (*vaðmal*) and the productivity of female Icelandic clothmakers to estimate an annual wage for medieval Icelandic women c.1200. His estimate, which assumes an ability to produce 56 centimeters of cloth per day, implies an Icelandic female wage equal to 28.8 grams of silver per year.<sup>6</sup> Recent work suggests that Scandinavian clothmakers were more productive than Friedman

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<sup>6</sup> Friedman estimates a wage of 48 ells of *vaðmal* per year. An ell was equal to one-sixth ounce-units of silver (Dennis et al. 2000a: 253). Between the tenth and thirteenth centuries, the exchange rate between an ounce-unit of silver and an ounce-weight of silver fluctuated (Dennis et al. 2000b: 359-60; Gelsinger 1981: 38), but c.1200, an ounce-unit of silver was equal to 1/7.5 ounce-weights of silver (for further details, see the appendix available at <https://tinyurl.com/t72gvx9>). An ounce-weight of silver was generally equal to 27 grams of silver (Dennis et al. 2000a: 253). Hence, Friedman's estimate implies annual wage of  $(48/6 =) 8$  ounce-units of silver, which is equivalent to  $(8/7.5 =) 1.067$  ounce-weights of silver, which is equivalent to  $(1.067*27=)$  28.8 grams of silver.

assumed: they produced perhaps 70 centimeters per day (Øye 2015: 44). Updating Friedman's estimate, that implies an Icelandic female wage equal to 36 grams of silver per year.<sup>7</sup>

Medieval men earned considerably more than medieval women, and our English wage data are for males. We thus need to estimate Icelandic male wages. Economic historians do not know how much higher men's wages were in medieval Iceland, but they do have an idea of how much higher they were in medieval England: for casual laborers in the thirteenth century, men's wages were 1.33 times higher than women's (Humphries and Weisdorf 2015: 431). If the same gender multiple prevailed in Iceland, that implies an Icelandic male wage equal to 47.88 grams of silver per year.

Humphries and Weisdorf (2019) furnish data on annual male wages in historical England. They assemble those data from yearly contracts for agricultural and farm-making activities. Humphries and Weisdorf's wage estimates reflect the sum of contractually stipulated monetary and in-kind compensation, the latter tallied in money. We use their wage estimate for the 1260s, the closest available years to our Icelandic wage estimate, which is also for the thirteenth century. Humphries and Weisdorf's estimate implies an English male wage equal to 310.73 grams of silver per year.<sup>8</sup>

That is far higher than our estimate for Iceland, but the two wage estimates cannot yet compare living standards since they are nominal, not real. The prices of goods traded internationally converge across countries; the prices of goods traded only domestically do not. Silver was traded internationally, but most of the goods produced in medieval Iceland were traded only there, and also for medieval England. Price levels in England and Iceland therefore differed, which means that the purchasing power of silver did too.

Economic historians' favored solution to this problem is to assemble for each country prices for a shared basket of subsistence goods and then to divide each country's estimated annual wage by the price of its basket (Allen 2001, 2009, Allen et al. 2012). We do not have Icelandic prices for the goods that compose the usual shared basket. But we do have both Icelandic and English prices for several other goods that comprised a substantial share of what medieval

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<sup>7</sup>  $70/56*28.8 = 36$ .

<sup>8</sup> Humphries and Weisdorf estimate a wage of 236 pence per year. A pound sterling, which was equivalent to 240 pence, equaled 316 grams of silver (Clark 2005), based on the market price (Clark reports a small difference of 5.1 grams between the mint and market price). Hence, Humphries and Weisdorf's estimate implies a wage of  $(236/240*316 =)$  310.73 grams of silver per year.

Europeans consumed (Phelps-Brown and Hopkins 1956; Dyer 1989). We therefore create a shared basket composed of those goods and use this basket to compare the purchasing power of estimated medieval Icelandic and English wages.

We assemble Icelandic price data on beef, wool, butter, cheese, suet (tallow), and dried fish c.1200 using information from the second volume of *Grágás*, a collection of laws in medieval Iceland (Dennis et al. 2000b: 210, 358-359; supplemented in the case of beef with data from Hartman et al. 2017: 134).<sup>9</sup> The prices in *Grágás* are for “a cow,” a “load” of wool, of butter, of cheese, of suet, and for 120 dried fish—all in ounce-units of silver. We convert them into prices for a pound of beef, of wool, of butter, of cheese, of suet, and for a single dried fish—all in grams of silver.<sup>10</sup> A “load” equaled 80 pounds (Dennis 2000b: 183). An ounce-unit of silver equaled 3.6 grams of silver (Dennis 2000a: 253). And we assume that a cow weighed 750 lbs. dressed.<sup>11</sup> Table 2 presents our Icelandic price data.<sup>12</sup>

From Clark (2004, 2005, 2010), we collect English price data for the same goods between 1209 and 1260, the closest matching years for which data are available.<sup>13</sup> In Table 3, columns 1 and 3 compare the quantities of each good that a worker’s annual wage could in principle purchase in thirteenth-century England and Iceland, respectively. An Englishman’s wage could purchase substantially more beef, butter, cheese and tallow. An Icelander’s wage could purchase substantially more wool and about the same number of fish.

We are not done, however, for what matters to workers’ living standards is not the quantity of goods their wages can in principle purchase but the quantity of goods their wages can purchase after taxes: their *disposable* real wages. Medieval Icelanders paid their chieftains (*goðar*) for governance services, but the sums they paid were trivial (Byock 1988). In Iceland, “pre-” and “after-tax” wages were therefore about the same. In England they were not. Medieval English workers paid heavy taxes to their feudal lords: between a quarter and half of their gross farm output (see, for example, Postan 1966; Dyer 1989; Rigby 1995; Kitsikopoulos 2000; Hatcher 2015).

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<sup>9</sup> *Grágás* also contains two prices for “meal” (Dennis et al. 2000b: 210, 359), which probably refers to an ingredient for porridge (Skarup 1993: 135-136). The details are unclear, however, so we do not consider meal.

<sup>10</sup> *Grágás* contains two prices for a load of wool, and between *Grágás* and Hartman et al. (2017), we have two prices for a cow. In both cases, we take the price midpoint.

<sup>11</sup> That was the weight of a typical dressed cow in mid-nineteenth century Canada (Lewis and McInnis 1984: 71).

<sup>12</sup> We use the price of prime-age working cows, which were the most valuable cows. Other cows sold at much lower prices. The average price of beef would have been a composite of older cows, oxen and steers. Thus, we believe that our Icelandic beef price is closer to the upper bound of the cost of beef.

<sup>13</sup> Clark’s (2004) fish-price data are for herring only, fresh not dried. To compare with them with our dried fish-price data for Iceland, we multiply Clark’s fresh-fish price by 1.5.

Column 2 in Table 3 uses those tax rates to tabulate disposable real wages in England. Comparing England's wages in column 2 to Iceland's in column 3, England, unsurprisingly, fares worse than before. After taxes, an Englishman's wage could purchase more butter, cheese, and tallow than an Icelander's wage. But an Icelander's wage could purchase more beef, wool, and fish. The result of this contest is ambiguous, but if anything the honor goes to Iceland, whose harsher climate and terrain would have required more productive labor to match real disposable wages in England. Living standards as proxied by disposable real wages do not seem to have been higher under thirteenth-century English government than they were in thirteenth-century Iceland.

## 4 Population Growth

Preindustrial economies were overwhelmingly agricultural, dependent heavily on land, a fixed input. They were also economies in which the rate of productivity improvement, while positive, was very low. If that rate was lower than the rate at which returns to labor diminished, the result was Malthusian: population increased permanently but living standards only temporarily. If, however, the rate of productivity improvement at least equaled the rate at which returns to labor diminished, both population and living standards increased permanently. Economic historians debate whether the latter scenario characterized parts of preindustrial Europe or the former scenario prevailed in all of it (see, for instance, Persson 1988; Clark 2007). In either scenario, however, a preindustrial economy's population would increase—via a rising birth rate, a falling death rate, and/or by attracting immigrants—if its living standards increased even temporarily, and vice versa. To compare changes in living standards in Iceland and other territories in medieval Europe, we thus compare changes in their populations.

Our comparison assumes that if there were exogenous shocks to productivity or population between the tenth and thirteenth centuries, they were common across the territories we compare. That assumption is false, but for our purposes it is acceptable. There were not to our knowledge any important environmental changes or plagues in the tenth through thirteenth centuries affecting the territories we compare. The Little Ice Age did not begin until the fourteenth century, nor did the Black Death. There were, however, important differences in migration policies that affected those territories. To deter his citizens from migrating to Iceland, in the late ninth or early tenth century, Norway's King Harald imposed a tax on Norwegians who departed for Iceland, even just

to visit (Gjerset 1922: 20).<sup>14</sup> That tax, equal to five times our estimated Icelandic annual wage, remained in place until Norway annexed Iceland in 1262 (Gelsinger 1981: 178).<sup>15</sup> Norway's migration policy supports a result from our comparison of living standards as proxied by height in Table 1: Iceland's living standards were probably higher than Norway's. If not, an enormous duty would not have been needed to dissuade Norwegians from moving to Iceland. Norway's migration policy also violates our assumption of shared shocks. But since it will only understate relative improvements in Icelandic living standards as proxied by population growth, that is a violation we can accept.

When land constraints do not bind, population growth may reflect increased land usage instead of increased living standards. Our comparison thus also assumes that land was a binding constraint in the territories we compare. For Iceland, that assumption may seem unreasonable. In the eleventh century, Iceland had an estimated 50,000 people, while the British Isles, for example, had two million. The British Isles have more land area than Iceland, but by a factor of three, not 40. If land was a binding constraint in the British Isles, it thus seems unlikely that it could have also been binding in Iceland. Yet there is a good reason to think it was: Iceland's agriculturally unfavorable, volcanic, and geyser-ridden terrain. Land was much less productive in Iceland than elsewhere in Europe (Hartman et al. 2017; Gelsinger 1981: 5-6; European Soil Data Centre 2005). Hence, in Iceland, diminishing returns diminished much sooner.

Caution is nevertheless warranted when interpreting population growth differences in our comparison. "Most of the [population] figures relating to periods before the middle of the seventeenth century are little more than educated guesses" (Tomasson 1977: 405). Broad trends in population change over the Middle Ages may therefore be discerned, but more than that cannot be.

We tabulate population changes using population data from McEvedy and Jones (1978). Our data cover four territories, two of them Northern European, Iceland and the British Isles, and two of them non-Northern European, France and Germany. Population data are available for

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<sup>14</sup> The precise timing of the tax's imposition is unclear, but King Harald ruled Norway between 872 and 933. The tax must therefore have been introduced in either the late ninth or the early tenth century.

<sup>15</sup> Five ounce-weights of silver.

following years, albeit with holes: 800, 925, 1000, 1100, and 1200. Table 4 presents our population data.<sup>16</sup>

Over the course of the Middle Ages, all four territories' populations grew significantly. But they did not grow equally. Between 925—the first year for which Icelandic data are available—and 1100, Iceland's population grew by a factor of 2.33. Between 800—the first year for which data are available for the British Isles, France, and Germany—and 1100, those territories' populations grew by factors of 2.5, 1.55, and 1.23, respectively. Between 1100 and 1200, Iceland's population did not grow, but populations in the British Isles, France, and Germany did. In all four territories, population grew less in the twelfth century than it had in the eleventh. Still, Iceland's twelfth-century population plateau is a puzzle. It is tempting to resolve that puzzle by recalling Norway's exorbitant tax on migration to Iceland. But since by the twelfth century that tax had been around for two hundred years, the puzzle would become why the tax did not result in stagnating Icelandic population growth sooner.

Between the tenth and twelfth centuries, changes in living standards as proxied by changes in population do not seem to have more positive under European governments than they were in Iceland. Between the twelfth and thirteenth centuries, they do.

## 5 Conclusion

Contrary to conventional wisdom, there is no reason that living standards under government must be higher than living standards under government's absence (Leeson 2007c, 2014). A small but growing empirical literature studies situations where it is not. Leeson (2007), Powell, Ford, and Nowrasteh (2008), and Leeson and Williamson (2009) examine welfare in Somalia before and after its government collapsed. Under anarchy, Somali welfare improved and improved more than welfare in some of Somalia's state-governed neighbors. More recently, Candela and Geloso (2019) compare wealth in the nearly stateless French-Canadian colony of Acadia and in state-governed French-Canadian colonies like Quebec in the seventeenth and eighteenth centuries. Acadia was significantly wealthier than Quebec. Private institutions, most notably for the governance of conflict, were associated with higher living standards, not lower ones.

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<sup>16</sup> The Icelandic figures are conservative. Gelsing (1981: 8) suggests that c.1100 and c.1200, Iceland's population was between 80,000 and 100,000.

Our study contributes to this literature. It tests conventional wisdom in the context of medieval Iceland, a favorite example of anarcho-capitalists because of its private governance institutions. The data available for comparing living standards in Iceland and other territories in medieval Europe—data on human height, wages, and population growth—are sparse, crude, and therefore challenging to interpret. But a basic picture is apparent nonetheless, which suggests a negative conclusion if not a positive one: living standards under governments in medieval Europe do not seem to have been higher than they were in medieval Iceland. Medieval Iceland may be a more impressive example of private governance that is usually believed, and anarcho-capitalists may not be insane to extol it.

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Table 1. Comparative Living Standards Proxied by Human Height

	Average height (cm)	Centuries	Source
Iceland	172.3	9 <sup>th</sup> -11 <sup>th</sup>	Steckel (2004)
	172	11 <sup>th</sup> -12 <sup>th</sup>	Steckel (2004)
	169-176.5	11 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
	175.2	12 <sup>th</sup> -16 <sup>th</sup>	Steckel (2004)
Denmark	172.2	13 <sup>th</sup>	Steckel (2004)
Norway	170-173.3	10 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
	170.2	12 <sup>th</sup>	Steckel (2004)
	172.2	12 <sup>th</sup> -13 <sup>th</sup>	Steckel (2004)
Sweden	176	10 <sup>th</sup> -11 <sup>th</sup>	Steckel (2004)
	174.3	13 <sup>th</sup>	Steckel (2004)
England	167-170	10 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
	171.8	13 <sup>th</sup> -14 <sup>th</sup>	Steckel (2004)
Britain	168.4	12 <sup>th</sup>	Steckel (2004)
Scotland	170-173	10 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
Germany	173.3	10 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
Central-Western Europe	169.7	10 <sup>th</sup>	Koepke and Baten (2008)
Greece/Crete	161-170	10 <sup>th</sup> -14 <sup>th</sup>	Cairns (2015)
Mediterranean Europe	168.4	10 <sup>th</sup>	Koepke and Baten (2008)

Notes: Data from Cairns (2015) are for adult male height; all other data are for adult height. Norwegian data for the twelfth and thirteenth centuries are from skeletal samples of unknown size (Steckel 2004: 215).

Table 2. Prices for Goods in Iceland c.1200

	Price (grams of silver)
Beef/lb.	0.065
Wool/lb.	0.34
Butter/lb.	0.45
Cheese/lb.	0.45
Suet (tallow)/lb.	0.45
Dried fish/unit	0.15

Notes: Prices tabulated using price/units data from Dennis et al. (2000b) and Hartman et al. (2017). For further details, see the online appendix available at: <https://tinyurl.com/t72gvx9>.

Table 3. Comparative Living Standards Proxied by Real Wages

	(1)	(2)	(3)
	English-wage purchasing power, “pre-tax”	English-wage purchasing power, “after-tax”	Icelandic-wage purchasing power
Beef	995.70 lbs.	497.85-746.78 lbs.	738.89 lbs.
Wool	111.06 lbs.	55.53-83.29 lbs.	141.87 lbs.
Butter	269.10 lbs.	134.55-201.82 lbs.	106.40 lbs.
Cheese	519.66 lbs.	259.83-389.75 lbs.	106.40 lbs.
Suet (tallow)	219.50 lbs.	109.75-164.62 lbs.	106.40 lbs.
Dried fish	320.08 fishes	160.04-240.06 fishes	319.20 fishes

Notes: English-wage purchasing power tabulated using English price data from Clark (2004, 2005, 2010) for 1209-1260 and Humphries and Weisdorf’s (2019) English wage estimate for the 1260s. Clark’s (2005) fish price is for fresh herring only; we multiply that price by 1.5 to “convert” it into a dried-fish price. Icelandic-wage purchasing power tabulated using Icelandic price data from Table 2 for c.1200 and our Icelandic wage estimate for c.1200.

Table 4. Comparative Change in Living Standards Proxied by Population Change

	800 AD	925 AD	1000 AD	1100 AD	1200 AD
Iceland pop. (Δ)		30,000	50,000 (+66.67%)	70,000 (+40%)	70,000 (+0%)
British Isles pop. (Δ)	1,000,000		2,000,000 (+100%)	2,500,000 (+25%)	3,500,000 (+40%)
France pop. (Δ)	5,000,000		6,500,000 (+30%)	7,750,000 (+19.23%)	10,000,000 (+29.03%)
Germany pop. (Δ)	3,250,000		3,500,000 (+7.69%)	4,000,000 (+14.29%)	6,000,000 (+50%)

Notes: Population data are from McEvedy and Jones (1978).