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# The height gap in 19th-century America: Net-nutritional advantage of the elite increased at the onset of modern economic growth

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## ABSTRACT

We present evidence on the 19th-century trend in the height of male US passport applicants. These men represent a much wealthier segment of contemporary society than found in most stature samples previously analyzed. The height trend among the wealthy is much more robust in comparison to the average population that experienced a decline in stature. The resulting increase in the ‘height gap’—by roughly 1 in. between cohorts born around 1820 and 1860—is in congruence with evidence on rising wealth inequality and the notion of dietary change in antebellum America.

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## 1. Introduction

How beneficial was the onset of modern economic growth to those populations who experienced it? In the American case, industrialization dates back to the early

19th century, when such innovations as the cotton gin and the steam engine were put to widespread use. There is a consensus that robust economic growth—with annual increase of real output per capita of 1% or above—started between 1820 and 1840. At the same time, however, their health deteriorated: starting with the birth cohort of the 1830s, Americans became shorter than previous generations, even though they remained taller than their counterparts from the Old World.<sup>2</sup>

That ‘biological well-being’ and the material living standard diverged in antebellum America was first noted

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<sup>2</sup> A person’s adult height reflects—apart from genetic traits—the history of the net nutritional status during pregnancy and childhood. Net nutritional status encompasses dietary intake and the energy expenditures of the body used on purposes other than growth, such as basal metabolism, work, fighting off diseases. See Steckel (1995, 2008) for a detailed discussion.

by Fogel et al. (1979) and later referred to as ‘antebellum puzzle’ (Fogel, 1986; Komlos, 1987, 1996; Pope, 1992; A’Hearn, 1998). A considerable body of literature analyzes the source(s) of the stature decline. Most authors regard urbanization as an important element insofar as infectious diseases could spread more easily in densely populated places without adequate sanitary infrastructure. As the growth of cities depended on an inflow of migrants, new diseases could be imported easily. With such a disease-with-urbanization channel in mind, one could rationalize the deterioration of net-nutritional status (through energy claims by infectious diseases) without having to resort to lower food consumption.

In contrast, Komlos (1987, 1996, 1998, 2012) has argued in a series of articles that a declining nutritional content of the American diet is a crucial element of the ‘antebellum puzzle’. He draws a much closer connection from the transformation of the economy to the health of its population inasmuch as the income distribution became more skewed and as prices of food increased relative to prices for non-food products. A typical household that seeks to maximize utility might have curtailed food expenditure, even with average incomes rising. This notion is substantiated by the decline in estimates of per-capita production of calorie and protein (Komlos, 1987; Floud et al., 2011). Such an ‘endogenous’ explanation of the ‘antebellum puzzle’ does not rule out that the incidence of diseases also increased. Disagreement in the literature as to how important these channels are in relative terms persisted until recently, though.

The purpose of the present paper is to discuss the pattern of physical stature of men from 19th-century America’s ‘high society’, based on passport application records. The comparison of the stature trajectories among the richer and poorer segments of contemporary society sheds additional light on the ‘antebellum puzzle’. There are two identifying assumptions behind this argument. First, Logan (2006) shows in his analysis of late 19th-century consumer expenditure surveys that richer households tended to consume more calories and proteins per person, which was most likely also the case in earlier decades. An increase in the price ratio of food relative to other consumer goods would have implied an incentive for all strata to substitute away from expensive food products, but the impact on physical growth would have been negligible or even non-existent in richer families as their rising income would have more than compensated the price effect. Second, exposure to infectious diseases hardly differed by socio-economic status in antebellum America.<sup>3</sup> However, a substantial difference in the epidemiological environment existed between birth places in cities versus

the countryside (Lee, 1997).<sup>4</sup> The reduction in mortality rates was to a considerable extent the result of cleaning up the cities and improving hygienic conditions due to a better understanding of the spread of diseases with the Bacteriological Revolution and the increasing acceptance of the germ theory of disease in late-19th century (Melosi, 2000; Mokyr, 2002).

Economic historians have analyzed various historical samples on American physical stature, most of which refer to the net-nutritional experiences of the “common man” or poorer segments of society, such as soldiers, prisoners, and slaves. However, there are notable exceptions that focus on men of the 19th-century middle and upper classes: students at military academies (Komlos, 1987; Coclanis and Komlos, 1995; Lang and Sunder, 2003), at Harvard University (Komlos, 1987), and John Murray’s work on the stature, mortality, and marriage patterns among students of Amherst college (Murray, 1997, 2000). Lang and Sunder (2003) argue, based on data on West Point cadets, that the height trajectory of cadets from white-collar families differed meaningfully from other cadets. In a paper on the female passport applicants, we showed that women’s heights in the upper socio-economic segment were exempt from the mid-19th century height decline (Sunder, 2011).

## 2. Passport applications sample

In comparison to military and prison records, passport documents of US citizens represent predominantly the upper segment of the contemporary socio-economic spectrum.<sup>5</sup> While Europeans came to America as emigrants, important motives for US citizens to travel abroad were business, tourism, and studying. Leisure trips—the Grand Tour of Europe—became more important with the introduction of luxury steamships in the final decades of the 19th century.<sup>6</sup> Less than 0.2% of the US population engaged in Ocean travel at the turn of the century, but the trend was increasing.<sup>7</sup> The number of passports issued by the Department of State was considerably lower than the number of travelers, but it also increased in the long run (Fig. 1).<sup>8</sup> Quite frequently, one passport covered several travelers (especially if they were members of the same family). Thus, an application represents more than one traveler on average, and male travelers are likely to be

<sup>3</sup> Steckel (1988) and Davin (1993) study the survival chances of children based on linked census manuscript records of 1850 and 1860 and find that household wealth did not predict survival chances. In other words, death was egalitarian in antebellum America.

<sup>4</sup> Only around 1890 did socio-economic status begin to play some role for child survival, but the urban mortality penalty was still the dominant factor for the variation in mortality rates, and it took well into the 20th century for this penalty to disappear (Preston and Haines, 1991; Haines, 2001).

<sup>5</sup> Data from passport records have been used before to study the historical biological standard of living of the Mexican and Colombian elite (López-Alonso and Condey, 2003; Meisel and Vega, 2005).

<sup>6</sup> Dupont et al. (2012) have collected a series of first class transatlantic fares. The deflated series shows considerable decline around 1860, but then increases so that the level just before the outbreak of World War I is similar to the one before the Civil War. This may have been the consequence of a cartel of the major lines with competition in quality rather than in fares (Keeling, 1999).

<sup>7</sup> Until the end of the 19th century, tourism (including domestic destinations) remained an activity of the elite (Weiss, 2004).

<sup>8</sup> Before World War II, US citizens were not required to possess a passport to exit the country, with the exception of the years 1861/1862 and 1918–1921 (Goodman, 1966; National Archives, 2012). Most European destination countries did not require travelers to hold such documents before World War I. The purpose of passports was rather to provide travelers with (a feeling of) protection in foreign lands.

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