



Market potential and the rise of US productivity leadership



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ABSTRACT

Today's globalization, driven by lower barriers to trade, has increased market potential for many nations and led to gains in GDP per capita. We test whether this was true in the first wave of globalization by constructing market potential measures for a sample of 27 countries in 1900 and 1910 based on a general equilibrium model of production and trade. Cross-sectional estimates suggest that market potential was an economically significant determinant of GDP per capita at this time. To assess welfare effects, we then study the general equilibrium impact of raising market potential by eliminating international borders in a quantitative counterfactual calculation for 1900. There are significant gains in real income per capita for all nations. We use US per capita output as a benchmark, since it attained leadership in this variable from the late 19th century and the literature frequently attributes this to its relatively large domestic market – a market unconstrained by trade costs associated with international borders. Because market potential was already near that of the US, the largest European countries do not entirely close their per capita income gaps with the US after removing all border barriers to trade within Europe or even globally. On the other hand, many small European countries could have done so.

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1. Introduction

Market potential is an important determinant of incomes according to a large literature covering the experience of the past several decades. Our primary aim in this paper is to provide quantitative evidence on how market potential mattered for the cross-country income distribution circa 1900. We begin by following in the footsteps of Redding and Venables (2004) who show how a gravity model of international trade generates a data-based measure of market potential consistent with theoretical models from the new economic geography (e.g., Fujita, Krugman and Venables, 1999). We then tie this approach together with the methodology used to study border effects. Market potential depends on trade costs, and the international border imposes a notoriously large trade cost. Therefore, international borders may

strongly limit market potential. This observation allows us to address a substantive and interesting historical debate with implications for long-run economic growth. In particular, we attempt to assess the long-standing claim in the historical growth literature that the US obtained worldwide productivity leadership in the 19th century because it was uniquely endowed with a large domestic market.

This view features prominently in the long-run growth literature. Paul Romer (1996) suggests that the sizeable internal market of the US and its natural resources allowed the US to overtake the UK in terms of GDP per capita by the late 19th century. Romer echoes a large tradition in economic history which attributes US dominance in income per capita to its market size. Abramovitz and David (1996), Engerman and Sokoloff (2002), Rosenberg (1963, 1981), and Sokoloff (1988), among many others, have argued that a large market incentivized inventive activity ostensibly leading to productivity advance and higher wages. These scholars follow earlier observations by Marshall (1920) that market size mattered. Even earlier, Andrew Carnegie (1902) held that European incomes were lower than in the US due to smaller internal markets and the inability to rely on foreign

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demand. The preponderance of international trade costs for European nations, with international borders primary among them, acted to limit trade and they impinged negatively on economic performance.¹

Of course, a large modern literature, along with a smaller historical one, argues that borders limit market potential and impose significant barriers to trade due to trade policy, contracting issues, regulatory differences, cultural factors, social networks, etc. (e.g., McCallum, 1995 and Wolf, 2009).² Anderson and van Wincoop (2001) show that removing borders in OECD countries could be associated with welfare gains in terms of real consumption of up to 37%. It therefore seems plausible that a century ago borders might have acted in the same way and been partially responsible for the observed average 30% gap in real GDP per capita between the US and Europe. But did the US really have an advantage in market size? While the US avoided the costs associated with borders by trading relatively more with itself, the US faced large internal distances raising the cost of domestic trade. Hannah (2008) claims that in the late 19th century, European nations transacted at low cost with neighboring countries along dense transportation networks despite international borders. Another feature of the data is the strong productivity growth and high standards of living in northwestern Europe in the late 19th century, especially when compared to other parts of Europe and other areas of the world. Contrary to earlier views espoused in the historical literature, the latter two observations imply that domestic market size was not all that small and markets were not all that segmented across international borders in Europe circa 1900.

We proceed in three steps. First, based on a newly compiled and comprehensive historical data set, we provide a theoretically consistent measure of market potential for 27 representative countries for two benchmark years 1900 and 1910.³ Market potential can be split into domestic and foreign market potential. This exercise therefore offers a theoretically consistent means of verifying if the claim that the American domestic market was large relative to countries in Europe was true. To build our measures of market potential, we pair a theoretical model of international trade and geography with new historical bilateral trade data. For theory, we rely on Fujita, Krugman, and Venables (1999) and Anderson and van Wincoop (2003). For data, we have added here significantly to the trade data underlying Jacks, Meissner, and Novy (2011), so that for the years 1900 and 1910 our dyadic data are the most complete currently available to researchers in digital format.

Next, we use our measures of market potential to estimate the cross-sectional equilibrium relationship between income per capita and market potential. We find that market potential is a robust and statistically significant determinant of income per capita in the early 20th century.

¹ “The American has constantly expanding home demand...justifying costly improvements and the adoption of new processes...a Continent under one government...it is free unrestricted trade in everything under the same conditions, same laws, same flag, and free markets everywhere. The European manufacturer finds obstacles to such varied expansion, in a continent divided into hostile and warring States, with different laws and exactions and tariffs at every boundary” Carnegie (1902). Note that Carnegie’s observation also invokes the dynamics of the home–market effect. We do not delve into this issue due to data constraints. We focus largely on a static equilibrium and the comparative statics of such an equilibrium leaving out location decisions by limiting free mobility of labor across borders.

² The economic history literature on trade and growth has largely focused on the relationship between incomes and tariff policy. See for instance: Bairoch (1972); O’Rourke (2000); Vamvakidis (2002); Clemens and Williamson (2004b); Jacks (2006); Tena (2010); Schularick and Solomou (2011).

³ We use the term countries even though in our sample the Australian colonies (Western Australia, South Australia, Queensland, New South Wales, Victoria, and Tasmania), New Zealand, India, Ceylon, Indonesia, the Philippines, and Canada were all colonies. We also combine the Australian colonies into one unit called Australia which roughly conforms to modern boundaries and our data on national GDP. The set of countries we look at are Argentina (ARG), Austria–Hungary (AUH), Australia (AUS), Belgium (BEL), Brazil (BRA), Canada (CAN), Denmark (DEN), France (FRA), Germany (GER), Greece (GRE), India (IND), Indonesia (INN), Italy (ITA), Japan (JAP), Mexico (MEX), Netherlands (NET), New Zealand (NEW), Norway (NOR), the Philippines (PHI), Portugal (POR), Spain (SPA), Ceylon (SRI), Sweden (SWE), Switzerland (SWI), the UK, Uruguay (URU), the USA. For our income regressions, we drop Ceylon and the Philippines due to a lack of income data.

The regression-based elasticity suggests that market size can account for an economically sizable amount of the variation in output per person. However, the findings from such a cross-sectional analysis do not provide a meaningful way to evaluate the welfare impact in general equilibrium when there are changes in market potential associated with changes in borders. Strong general equilibrium effects make the welfare impact of changes in borders and market potential very heterogeneous. Welfare gains depend in a complicated way on baseline country characteristics such as population size and geography.

We therefore build a link between studies which measure the welfare consequences of border barriers (e.g., Anderson and van Wincoop, 2001) and the market potential literature. We simulate a counterfactual within the general equilibrium model we rely on in order to gauge the welfare consequences of international borders. If the domestic market matters, it should be the case that removing international borders brings about large welfare gains for those unfortunate to have been trapped behind national frontiers in the world’s smallest countries. Our findings here demonstrate that this is indeed the case—especially for the smallest countries in Europe.

Our bottom line from this exercise is twofold. First, lower barriers to trade and higher market potential are associated with higher levels of real income per capita. In line with the consensus from the literature on the recent period of globalization, nations that in the past could more easily engage in trade—domestic or foreign—were able to achieve higher incomes. Second, the majority of the productivity gap between the US, and the larger European nations such as the UK, Germany, and France cannot be explained by differences in market potential. As a matter of fact, all of these countries had fairly similar levels of market potential circa 1900. On the other hand, real incomes in many smaller European nations might have been very close to those in the US circa 1900 had they achieved better access to international markets.

Our paper is closest in methodology to both Redding and Venables (2004) and Hanson (2005), although the contemporary literature on income and market potential is quite large.⁴ We also follow in the footsteps of Anderson and van Wincoop (2001) who study the general equilibrium welfare implications of removing the border. Finally, our work is related to a large debate on tariff protection and the historical origins of economic success. The high tariffs in this period (e.g., in the US, several other new-world nations, and in some European cases) potentially raised domestic market potential but often also raised the cost of sourcing inputs and finished imports. Irwin (2002) and Irwin and Terviö (2002) find trade openness and low tariffs to be associated with higher incomes circa 1900. Lehmann and O’Rourke (2011) disagree, finding evidence consistent with the idea that industrial tariffs actually raised growth rates of GDP per capita. Clemens and Williamson (2004b) suggest that tariffs might have raised incomes but only when a nation had a large domestic market and possessed other institutional foundations for industrial growth.

While we have taken a first attempt at assessing the explanatory power of market potential for incomes in the early 20th century, we have little to say about the precise channels by which market potential matters. Mainstream theoretical models in international trade and new economic geography predict several channels through which market potential can affect incomes. Higher market potential allows firms to sell more output at a given price, which raises payments to all factors of production. Market potential also allows firms to decrease production

⁴ The historical literature on market potential and incomes is significantly smaller and often studies countries in isolation. Schulze (2007) studies the Habsburg Empire in the 19th century and finds only limited evidence that the Harris measure of market potential mattered for regional income per capita. Mitchener and McLean (2003) find that access to a waterway is positively related to state level per capita incomes in the 19th century. Crafts and Venables (2003) provided early evidence consistent with that here, but do not estimate any particular model. Tirado, Pons, Paluzie, and Martínez Galarraga (2013) find that market potential helps explain the regional wage gradient in Spain between 1914 and 1930. Donaldson (forthcoming) provides strong support for the idea that market potential was positively related to real incomes of regions in India in the 19th century.

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