U.S. Slaves, U.S. Cotton, and the British Textile Industry 1815-1860: What Can Time Series Tell Us about the "New History of Capitalism?"

Sam Shirazi
SUNY Stony Brook

Abstract: This paper is an attempt at clarifying a basic claim made by scholars of the "New History of Capitalism;" specifically I test the claim that cotton produced in the American south, a slave produced commodity, was in a long-run relationship with British cotton consumption from 1815 to 1860. In elaborating this analysis, I incorporate insights from the Inikori Thesis, that innovation during the British industrial revolution was conditioned on access to slave-produced resources. I use a new method of establishing long-run relationships that uses a bounds testing approach on the long-run multiplier and find that British cotton consumption and imports of U.S. cotton were in a positive, long-run relationship. Additionally, the growth of industrialization and textile exports were positively related to British cotton consumption in the short-run and British imports of cotton from other (non-U.S.) locations during the time had no significant relationship with cotton consumption. This provides support for the Inikori Thesis, that the long-run development of the British textile industry was linked to Imports of U.S. cotton, and innovative industrial processes capitalized on those inputs. Lastly, these results do confirm a central argument of NHC scholars; American slave-produced cotton did play a part in the growth of the British textile industry.

Word count 7,708

Introduction

I would like to begin with a quick sketch of the aim and goals of this paper. I argue that by linking the literature on slavery in the American south with that of the British industrial revolution (BIR), we can expand and link some of the less controversial findings by way of analysis. This paper, then, is an attempt to understand the contours of a central theme in the debate around the role of slave-produced commodities and the growth of a revolutionary sector during the BIR, cotton textiles. The cotton textile sector in Britain has long been touted by economic historians as a "first-mover" in industrial growth, an early adopter of labor-saving technology, and a classic example of technologically-induced, long-run industrial growth (Crafts

1985; Crafts and Harley 1992; Harley 1982; Robson 1957; Wright 1971; Rostow 1960; Deane and Cole 1962; Broadberry, Fremdling, and Solar 2010; O'rourke, Prados de la Escosura, and Daudin 2010; Hobsbawm and Wrigley 1999). Conversely, the "new history of capitalism" (HNC) asserts that slave-produced cotton, imported from the American south, lay at the heart of British textile industry growth, not solely innovation (Baptist 2014, 2016; Beckert 2014; Johnson 2013; Rockman 2006, 2012; Rood 2016; Rosenthal 2016; Kaye 2009; Laviña and Zeuske 2014; Tomich 2018, 1988, 2004). Thus, NHC scholars contend that "in an 'age of industry' predicated on the transformation of slave-grown cotton into textiles, the plantation and the factory must necessarily be discussed together (Beckert and Rockman 2016: 27). This paper, flowing from the above assertions, asks the rather simple question; was there a long-run relationship between cotton imported from the U.S. and cotton consumption in Britain between 1815 and 1860?

I must note that I have, for coherence and convenience, collapsed the NHC literature with that of the "2nd slavery." 2nd slavery argues that the reinvigoration of certain slave systems (Cuba, the American south, Brazil, the Caribbean, numerous locales in West Africa, and the Indian Ocean world) in the late 18th and early 19th century was the result of industrialization and the development of modern economic systems in Europe and North America (Kaye 2009; Laviña and Zeuske 2014; Mathisen 2018; Tomich and Zeuske 2008; Tomich 1988, 2004, 2016a, 2016b, 2017, 2018)[1]. A crucial difference lies with the analytic framework employed by 2nd slavery scholars; they utilize a world-systems approach in formulating the linkage between American slave cotton production and industrial growth (Tomich 2018). The important point of analysis is the description of the interdependence between places in time, not either location in isolation

[1] The 2nd Slavery perspective predates the current spate of NHC studies and originated with Dale W. Tomich and others associated with the Fernand Braudel Center at Binghamton University.

(Wallerstein 2004). NHC studies have tended to focus less on the connections between places and moments and more on descriptions of place over time (Beckert's *Empire of Cotton* is a notable exception), but NHC is beginning to integrate some 2nd slavery modes of analysis (Rood 2016; Rosenthal 2018; Beckert and Rockman 2016). This paper takes the relational approach of the 2nd slavery seriously, and it structures the argument made below.

Of course, in elaborating this argument claims must be clarified and verified at each step, and I analyze each link in turn. I begin with the slave-cotton nexus in south and a discussion of the British textile industry, I then clarify my hypotheses and discuss my measures and method of analysis, finally I report the results of the analysis and offer some concluding remarks.

Cotton in the American south

The first phase of this argument encompasses the cotton fields of the American South. I begin by discussing the not-so-contentious points in this debate. First, cotton production in the American south increased astronomically in the late 18th century and early 19th century; and this increase was primarily due to the shifting locus of production out of the traditional growing areas of the "old south" to new areas that were acquired through purchase, annexation, or conquest, termed the "new south"[2] (Baptist 2014; Johnson 2013; Kaye 2009; Olmstead and Rhode 2008; Wright 1971, 1978). Second, the increase in cotton production in the new south occurred in tandem with an intensification of the interstate (domestic) relocation of slaves from areas in the old south to areas in the new south (Johnson 2004; Pritchett 2001; Steckel and Ziebarth 2013; Baptist 2014, 2016; Danson 1857; Rood 2016). Interstate slave mobility became increasingly

[2] New South = Alabama, Arkansas, Florida, Louisiana, Mississippi, Missouri, Tennessee, Texas, and Kentucky; Old South = Georgia, North Carolina, South Carolina, and Virginia. Except for Tennessee and Kentucky all new south states were only granted statehood after 1812. The areas that comprised the new south were primarily acquired through dispossession of Native land (Baptist 2014; Oakes 2016; Rothman 2005; McMichael 1991).

important as the importation of new slaves into the U.S. was outlawed in 1807. But what was the relationship between cotton production and the slave population?

On this point, the central NHC text is Baptist's *The Half Has Never Been Told* (2014). His claim, along with many other NHC and 2nd slavery scholars, is that there exists a discrepancy between the reality of slavery and common narratives about the incompatibility of slavery with the development of the modern, capitalist economy. As an example, Baptist describes the progressive application of higher cotton-picking quotas for slaves, understood as rational management, in the "new south;" if the quotas were not met, the slave was quickly punished. Baptist sardonically calls this an "innovation" and termed it "the whipping machine." NHC scholars contend that this was indeed a different logic of production, one based in the capitalist world market. As a result, NHC views the 2nd slavery in the late 18th and early-to-mid 19th century as qualitatively different from prior slaveries. It was routinized, rational, factory-esque, and centered around continuous growth; this was coupled with an increasingly instrumental view of slaves and their labor (Baptist 2014; Beckert 2014; Beckert and Rockman 2016; Johnson 2013; Rockman 2006, 2012; Rosenthal 2016; Kaye 2009; Tomich 2018, 2004; McMichael 1991).

These characteristics set it apart from the mode of plantation slavery common in the old south which, while still violent and miserable, was less regimented and growth-oriented (Baptist 2014, 2016). The development of the British textile industry as the primary destination for southern cotton is the assumed catalyst for this new orientation (Baptist 2014; Beckert 2014; Danson 1857; Oakes 2016; Rockman 2006, 2012; Rood 2016; Bailey 1990, 1994; O'rourke, Prados de la Escosura, and Daudin 2010; Wright 1978; Kaye 2009; Mathisen 2018; Tomich 2004; McMichael 1991). This is the crux of NHC claims regarding cotton-slavery in the

American south; it was embedded in, and reflective of, industrial capitalism because of the mutual dependence between cotton producers in the south and factory owners in Liverpool. The uniquely terrible form of slavery in the new south was a reaction to the necessity of commodity exportation and embeddedness in the global cotton trade (Beckert 2014).

This claim has been roundly criticized by economic historians[3]. Critique coming out of economic history offers a compelling counterargument to this narrative (Hilt 2017; Olmstead and Rhode 2018)[4]. Olmstead and Rhode (O&R) (2008) insist that the cause of disproportionate cotton growth was innovation in cotton seed, which allowed improved varieties of cotton to grow in the climate of the new south. These new seed types (upland cotton) yielded plants with larger bolls of cotton than those grown in the old south (sea island cotton); for O&R, it is not the *rate* of picking by slaves that accounts for the increase in production but the increased yield per plant at harvest (Olmstead and Rhode 2008). This thesis is decidedly less slave-centered, and comparing these two explanations of increased cotton productivity, the whipping machine against seed improvement, highlights a tension between economic historians and NHC scholars. Explanations involving innovation and technology often sit at odds with those that prioritize inputs and exploitation. We will return to this.

Table 1 presents the slave population and cotton production decennially for the new and old south regions. Clearly, cotton production and the slave population increased over time in

[3] In addition to a critique of the "torture led" hypothesis advanced by Baptist, O&R (2018) present a litany of specific and detailed criticisms directed at three of the most influential books of the recent NHC literature. They make a compelling case and point to several oversights, most importantly a lack of integration and engagement with research generated by economic historians of the American south and slavery.

[4] One major area of weakness in O&R (2018) is their discussion of the American cotton-British textiles claim. In Figure 2 they, oddly, opt to plot total British cotton imports on a log scale and, on a second scale, plot imports of U.S. cotton as a proportion of total British cotton imports. This figure should be interpreted as "growth of cotton imports was constant, but the proportion of that growth that was due to imports of U.S. cotton increased over time," which is far different from saying there is no association. I contend that the American cotton-British textiles claim is far from refuted.

both the new and old south; but the increase was not uniform. The new south far outpaced the old south in both; of course, a substantial portion of the decrease of the slave population in the old south was due to the relocation of slaves to the new south. This descriptive evidence is compelling, and it leads a central question, was the increase in cotton production in the new south related to the increase in the slave population in the new south?

It is well-beyond the scope of this paper to adjudicate between the competing claims of Baptist and O&R mentioned above[5]. But the O&R – Baptist debate overshadows a larger, more foundational point, which answers the question at hand; cotton needed to be picked, and that picking was done almost entirely by slaves[6]. Thus, cotton was a commodity that was extracted with slave labor. This is the important point; if picking rates remained constant, and cotton yield increase was responsible for the growth of cotton production in the new south, slaves still picked the cotton. If cotton yield stagnated and slaves were compelled to increase their rates of picking by the threat of violence, slaves still picked the cotton. If cotton yield increased *and* slaves were coerced into picking more cotton, slaves still picked the cotton. If there are more slaves in a region, more cotton *could* be picked, after accounting for seasonal shift and the production of staple foods, etc. (Wright 1978, 2006). This point is made clear in the regressions conducted by O&R (2008) that show a positive and statistically significant association between larger numbers of pickers (slaves) and the amount of cotton picked when comparing across plantations and over time (see Table 2 for this effect with upland varieties of cotton and Table 4 for the differential effect of increased pickers in the old and new south)[7]. So, for the purposes of this argument, yes,

---

[5] The cotton productivity debate remains unresolved since new cotton varieties were planted primarily in the new south and calibrated quotas were, according to Baptist, also primarily employed in the new south.
[6] According to Foust, only four percent of cotton was produced by farms without any slaves in 1860 (Foust 1975).
[7] As Baptist points out, the slave population in the old south and new south are not independent of each other, the process of relocation from old to new south areas means the larger slave population in the new south is partly a function of the decrease in the old south.

American cotton is conclusively a slave-produced commodity, regardless of the mode of increase.

The British Industrial Revolution, the Textile Industry, and Cotton

There is broad agreement that the period 1750-1860 showcased increasing industrial growth in Britain (Broadberry, Fremdling, and Solar 2010; Crafts 2014a; Crafts and Harley 1992; Floud and McCloskey 1981; Hartwell 1990; Hobsbawm and Wrigley 1999; Mokyr 2009; Pomeranz 2000)[8]. This "industrial revolution" coincided with an increase in average population wealth, the utilization of technology to produce goods more efficiently, the growth of cities, the rise of industrial labor, and the advent of modern economic growth (Broadberry et al. 2015; Clark 2007; Crafts 1985; McCloskey 2006; Mokyr 1999)[9]. From the perspective of economic historians the cotton textile industry in Britain is an example of how technological innovation can give rise to extraordinary sectoral growth, it is often considered the quintessential growth-spurring industry of the BIR (Hobsbawm and Wrigley 1999; Robson 1957; Crafts 1985; Harley 1999; Deane and Cole 1962; Rostow 1960; Broadberry, Fremdling, and Solar 2010; Broadberry et al. 2015). Meanwhile, consumption of cotton, usually British consumption but to a lesser extent U.S., is at the root of NHC claims surrounding the increase in American cotton production (Bailey 1990, 1994; Inikori 1993; Kaye 2009; Mathisen 2018; Tomich 2004; Baptist 2014, 2016; Oakes 2016; McMichael 1991). The argument is thus, British textiles were a key sector of

---

[8] The growth of industrial sectors in Britain from 1780 to 1860 increased greatly; although there is some debate around whether this growth was confined to a select few "revolutionary" sectors or if it was placed more broadly within the economy, either way the cotton textile sector was implicated (Crafts 1985, 2014a; Harley 1999; Floud and McCloskey 1981; Temin 1997).

[9] Debate around the timing of economic growth has recently re-entered debate with the publication of Broadberry et al.'s (2015) text. Industrial productivity was higher than assumed, due to revised employment estimates presented in Broadberry et al. However, recent research has shown the "slow growth" interpretation of the industrial revolution is still most plausible, coterminous with the gradual, but exceptional, growth of cotton textiles up to 1860 (Crafts 2014b; Crafts and Mills 2017; Williamson 2016).

industrial growth, and that sector depended on U.S. slave-produced cotton; therefore, slavery had a material role in the growth of the British textile industry.

The linking of slavery and industrialization is not necessarily a new line of argumentation, and NHC and 2nd slavery scholars were not the first to link slave-produced goods to the rise of the industrial economy in Britain and Europe. Caribbean scholars writing around the time of the 2nd world war explicitly linked economic growth in Britain and Europe to slavery in the western hemisphere (Cox 1948; James 1938; Williams 1944). Although the mechanisms and causal trajectories of these studies were not uniform, the arguments generally centered around the role of slave-produced inputs (primarily sugar) in Atlantic trade. The influential Williams (1944) Thesis, which defines profits from the British sugar trade as the factor leading to investment and industrial growth, has been rebuffed by economic historians as too narrow in scope (only dealing with sugar) and ignoring the importance of trade with British North America (later the U.S.) (Eltis and Engerman 2000; Harley 2013; Mokyr 1999). However, the Williams Thesis has spurred subsequent scholars, including NHC, to further interrogate the input-led argument, it continues to motivate the study of slavery with development. Economic historians see the genesis of industrialization and British economic growth very differently.

The literature on the origins of the industrial revolution is voluminous, and over the last 35 years two schools of thought within economic history have debated (in a way) the catalyst. Endogenous growth, or "home grown," scholars view the industrial revolution as a consequence of factors considered unique to Britain, such as the spread of basic education, patent laws (leading to technological innovation), or even "culture" and "values" (Clark 2007; Landes 1998; McCloskey 2006; Mokyr 1990, 2009, 2017; Crafts 1995). It is understood that the growth-spurring advances that led to the industrial revolution were located completely within Britain and

British society (or sometimes Western Europe more generally). This view stands in contrast to the more traditional growth accounting, or neoclassical, school. This group also places technology and innovation at the heart of British industrialization. Specifically, they treat innovation as an input, but passively measure it as the byproduct (the residual) in output after accounting for capital and labor; this calculation inherently acknowledges the possibility of exogenous technological change (Crafts 1995, 2014a; Crafts and Mills 1997; Greasley and Oxley 1997a, 1997b; Mills and Crafts 1996). The growth accounting view assumes technological change may be responsive to, or perhaps even conditional on, exogenous factors, such as capital and labor; which differs markedly from assumptions around innovation stemming from endogenous growth theory. A full discussion of the assumptions and implications of the debate between these schools is well-beyond the scope of this study; suffice it to say, however technology is operationalized, it is considered the catalyst of economic growth and industrialization in Britain.

I mention this debate because it highlights a central antagonism between economic historians and NHC scholars, one mentioned above; explanations involving innovation and technology often sit at odds with those that prioritize inputs and exploitation, and *vice-versa*. The predominant view of industrialization in Britain, out of economic history, sees the process of production as the "black box." Variables associated with productivity and output (usually innovation) are considered important, while those relating to inputs may be less interesting, there are assumed alternatives to inputs (Clark, O'Rourke, and Taylor 2008; Mokyr 1990). Meanwhile, few NHC scholars elaborate on the relationship between material capital and the process of production, preferring to identify important inputs in a burgeoning supply chain, and taking productivity as a given. The origin and process of extraction take pride of place in analysis, not necessarily the measurable contribution of these inputs to industrial growth.

Inikori (2002) provides us with a demand-side conceptualization of the often-invoked relationship between slave-sourced inputs and industrial growth. In so doing he provides a much-needed corrective to claims made by earlier scholars, specifically the input-led school. Inikori argues that raw inputs, generated by Africans (and African slaves), were imported into Britain, where technological innovation was able to capitalize on these available materials, which yielded goods to be traded back into the Atlantic economy. The catalyst of growth is external demand for trade goods, but the necessary component in satisfying this demand is the availability of African and slave-produced inputs. This account is compelling and is certainly a rejection of the "home grown" perspective (though not strictly an endorsement of the growth accounting perspective either). Importantly, the Inikori Thesis acknowledges the role of both raw imports and the diffusion of industrial technology in the development of industrial growth. It serves almost as a middle-ground between the standard account of the industrial revolution (innovation/technology) and the NHC view (slave-produced inputs). Although, endogenous growth scholars may take issue with both perspectives. The current analysis owes much of its formulation to the Inikori argument, and I place this analysis firmly within the trade-input-innovation-trade framework.

Drawing in the above sections, I contend that we need to come to a firm conclusion about the relationship between slave-produced inputs, specifically cotton, in the industrial growth process in Britain. So, this study fills this gap by testing NHC's motivating assumption, that slave-produced U.S. cotton was integral to the growth of the British textile industry. Specifically, I test the contention that British imports of U.S. cotton, a slave-produced input, is in a long-run relationship with British cotton consumption. I use British cotton consumption for two reasons.

First, NHC, and Inikori to a lesser extent, locate the link between slavery and the textile industry within the production process. For NHC it is a matter of volume, for Inikori it is a matter of resource availability which allows for the diffusion of innovative practices that exploit the resource (Bailey 1994; Inikori 1993, 2002; Baptist 2014, 2016; Beckert 2014; Kaye 2009; McMichael 1991; Tomich 2004). I argue that the relevant measure for analysis in both cases is the volume of cotton consumed. The price of cotton would not be appropriate since British demand for cotton was largely inelastic, indicating demand was a result of consumption, not price (Wright 1971). Output of cotton textiles is also not an appropriate dependent variable, unless we could include an annual series of cotton textile productivity (which to the author's knowledge has not yet been constructed). Without a textile productivity series, the inputs would overstate the real contribution of slave inputs over time. Second, the Inikori Thesis assumes innovative production processes come online in the context of increased availability of slave-inputs (resources); these combine to satisfy export demand (Inikori 2002). This means, theoretically, that inputs drive textile production (through cotton consumption). So, if inikori is correct, the long-run trajectory of the British cotton consumption series should be linked with slave-produced, U.S. cotton.

Data

British Cotton Consumption – This variable is the amount of cotton consumed in Britain in millions of lbs. (logged) annually, from 1815 to 1860. This data comes from Mitchell's *British Historical Statistics*, table "Textiles 2," on page 332 (Mitchell 1988).

Cotton Imports from the U.S. – This variable is the amount of cotton imported into Britain from the U.S. in millions of lbs. (logged) annually, from 1815 to 1860. This data comes from Mitchell's *British Historical Statistics*, table "Textiles 3," on page 334 (Mitchell 1988).

Cotton Imports from Non-U.S. Sources – This variable is the amount of cotton imported into Britain from non-U.S. sources in millions of lbs. (logged) annually, from 1815 to 1860. This data comes from Mitchell's *British Historical Statistics*, table "Textiles 3," on page 334 (Mitchell 1988). It is the difference between total cotton imports and imports from the U.S.

Price of Cotton in Liverpool – This variable is the average annual price[10] of cotton per lb. (in pence) in Liverpool, UK (logged) annually, from 1815 to 1860. This data comes from James (1908), table "Cotton Crops of the United States 1790-1908," on page 29.

British Cotton Textile Exports – This variable is the volume of cotton piece-goods exported out of Britain, in millions of yards (logged) annually, from 1815 to 1860. This data comes from Mitchell's *British Historical Statistics*, table "Textiles 16," on page 356 (Mitchell 1988).

British Industrial Output – This variable is an index of industrial output (logged) in Britain (indexed at 1700 = 100). It is an index of overall British industrial output, so it represents the growing intensity of industrialization in Britain, which is a proxy for the growth of industrial technology. This variable is calculated annually, from 1815 to 1860 and comes from Broadberry et al.'s (2015) appendix 5.3. Cotton textile output (or productivity) would be a much better measure here, but the author is not aware of the existence of either as an annualized series.

Method

This study uses the general error correction model (GECM), which is a reparameterization of the autoregressive distributed lag model, to implement a new method of testing for long-run relationships using small-T (small number of time points) series. The GECM

[10] 1815-1819 uses the highest rate instead of the average, as that is the only price data available for those years.

commonly employed method when estimating long run relationships (LRRs), and it is an attractive modeling choice when a researcher suspects two (or more) series are cointegrated, meaning they are in a long-run, equilibrium relationship[11] (DeBoef and Keele 2008; Engle and Granger 1987; Engle and Granger 1991; Murray 1994). The GECM allows the researcher to estimate an error correction (EC) term, which gives the speed of re-equilibrium between cointegrated series after a shock has separated them (if the series are cointegrated) (Philips 2018). The equation for the simple bivariate GECM is:

$$\Delta Y_t = \alpha_0 + \alpha_1^* Y_{t-1} + \beta_0^* \Delta X_t + \beta_1^* X_{t-1} + e_t \qquad (1)$$

where ΔY_t is the change in *Y* between its current and past value, α_1^* is the error correction term, β_0^* is the standard unit-change, short run effect of *X* on *Y*, and β_1^* is the distributed effect of *X* on *Y* and, e_t is an i.i.d. error process at time *t*.

Figure 1 about here

However, valid inference using the GECM rests on one decision, whether our series are stationary or nonstationary (at the very least for the dependent variable) (Banerjee et al. 1993; Pesaran and Shin 1998; DeBoef and Keele 2008; Enders 2015; Enns et al. 2016; Keele, Linn, and Webb 2016; Enns et al. 2017; Philips 2018). Stationary series are characterized by low levels of autocorrelation, the series does not "retain" shocks indefinitely, or very long. A disturbance corrects quickly and has only an immediate impact on a series' deviation from equilibrium. Conversely, if the trajectory of a series is a stochastic, or random, process without predictable

[11] The GECM assumes weak exogeneity of independent variables (DeBoef and Keele 2008; Enders 2015; Grant and Lebo 2016; Lebo and Kraft 2017). A set of bivariate vector-autoregressions was performed on the level series and it was determined that all independent variables "granger cause" consumption except industrial output, which was granger-caused by consumption. Fortunately, after entering U.S. cotton imports into the VAR with industrial output the only measure that was significant was U.S. imports.

oscillations or trend components then the series is classified as nonstationary (also termed a unit-root processes, “random walk,” or “long-memory” series)[12]. With nonstationary series, shocks build (and possibly decay) as they work through the series over time, but there is no natural point of equilibrium to which the series returns. A shock in the series has some permanent effect on its trajectory.

When using small-T series, deciding whether series are “stationary” or “nonstationary” is quite difficult. Generally, the researcher applies a battery of test to decide the order of integration of each series; if we are confident in the type of series, we can decide the appropriate modeling strategy (Dickey and Fuller 1979; Phillips and Perron 1988; Elliott, Rothenberg, and Stock 1992; Kwiatkowski et al. 1992). Unfortunately, there are several inadequacies associated with these tests, and each has its own idiosyncrasies and null hypotheses that vary with the inclusion/exclusion of trends and/or intercepts (Arltová and Fedorová 2016; Grant and Lebo 2016; Lebo and Grant 2016; Lebo and Kraft 2017; Webb, Linn, and Lebo 2019). Having confidence in the results of stationarity tests is especially difficult with the small/short-T series common with historical data. Stationarity tests are notorious for having low-power to detect nonstationary in small/short-T series (Blough 1992; DeJong et al. 1992; Elliott, Rothenberg, and Stock 1992; Hendry 2010; Choi 2015; Enders 2015)

Table 2 about here

[12] A third classification is possible, an order of integration that lies somewhere between 0 and 1; this situation is referred to as fractional integration (DeBoef and Granato 1997; Esarey 2016; Grant and Lebo 2016; Helgason 2016; Lebo and Grant 2016). The series examined in this paper contain too few timepoints to reliably test and implement fractional cointegration techniques (Grant and Lebo 2016; Keele, Linn, and Webb 2016). Fortunately, the method of inference implemented in this article (discussed below) accounts for fractional integration/cointegration (Webb, Linn, and Lebo 2019, Forthcoming).

This issue is clear from the results in Table 2. For example, the results for cotton consumption are unclear and contradictory. Even if we prioritize the tests that include a trend (which after inspecting Figure 1, we should prefer) we see that the Phillips-Perron test emphatically indicates consumption is trend stationary while the augmented Dickey-Fuller test insists that after including lag one the series is likely a unit-root with drift, and both ADF-GLS and KPSS tests find that consumption is nonstationary (up to three lags). Which is correct? How can we be sure? If it is not possible to be certain of the univariate dynamics of variables included in analysis, then we cannot conclude our results are reliable. The researcher should employ a method that allows for this uncertainty. It is this point that Webb, Linn, and Lebo (2019; Forthcoming) (WLL) encourage researchers to take seriously, and it is the development of this method that allows us to reliably test for LRRs using these historical data series.

Due to the pitfalls discussed above, WLL advocate a new method of testing for LRRs that incorporates the inherent uncertainty that stems from determining the order of integration of the variables included in a GECM. WLL bypass this problem by utilizing a bounds approach to inference on the long-run multiplier (LRM) for each predictor, which borrows conceptually from the bounds approach to inference on cointegration pioneered by Pesaran and co-authors (Pesaran and Shin 1998; Pesaran, Shin, and Smith 2001). Bounds tests yield one of three outcomes; a test statistic that is below a lower bound value (conclude no LRR is present), above an upper bound value (conclude LRR is present), or between the upper and lower bounds (an indeterminate result) in which case the researcher must definitively determine the orders of integration of the two variables to reach a conclusion (Webb, Linn, and Lebo 2019, Forthcoming). The order of integration of the variables does not have to be determined before inference, a significant test indicates the presence of a LRR between the predictor and dependent variable. Equation (2) provides the LRM calculation from the GECM, equation (1):

$$LRM = -\frac{\beta_1^*}{\alpha_1^*} \quad (2)$$

where β_1^* is the coefficient on the lagged value of *X* (the cumulative effect of *X* on *Y*) and α_1^* is the error correction term (the coefficient on the lagged value of *Y*). The LRM is the total, cumulative effect of *X* on *Y* over time.

The calculation of the LRM is straight-forward once the model is estimated; the computation of the standard error of the LRM is more complicated. The standard error must be calculated using the delta method or *via* the Bewley transformation of the GECM model used to estimate the LRM (Bewley 1979; Banerjee et al. 1993; DeBoef and Keele 2008; Esarey 2016; Webb, Linn, and Lebo 2019)[13]. Once the standard error is retrieved the researcher simply divides the LRM by the standard error to obtain the LRM bounds test statistic, the absolute value of the test statistic is compared to the critical values calculated by WLL, and finally a decision is made regarding the presence of a LRR[14].

WLL's LRM bounds test is based on critical values derived from stochastic simulations comprised of different combinations of variables (with and without cointegrated *X*, fractionally/near-integrated series, with/without a deterministic trend, and with/without a constant) and establishes that *some* form of LRR exists if the LRM test statistic lies above the bounds. Additionally, when utilizing a multivariate framework, the WLL method frees the

---

[13] The Bewley transformation for the GECM in equation (1) is given by: $Y_t = \phi_0 - \phi_1 \Delta Y_t + \psi_0 X_t - \psi_1 \Delta X_t + \mu_t$, where $\phi_0 = -\frac{\alpha_0}{\alpha_1^*}$, $\phi_1 - \frac{\alpha_1^* + 1}{\alpha_1^*}$, $\psi_0 = \beta_1^*$, $\psi_1 = -\frac{\beta_1^*}{\alpha_1^*}$, $\mu = -\frac{e}{\alpha_1^*}$ (Bewley 1979; DeBoef and Keele 2008; Webb, Linn, and Lebo 2019).

[14] For this analysis our T=46, therefore to make our tests more stringent we use the T=25 critical values from Table 2 in WLL (Forthcoming); although it should be noted that the substantive results are identical if the bounds derived for T=50 are used.

researcher from relying on the EC term exclusively to deduce which variable(s) may be in a LRR with the dependent variable. However, there is one drawback of the WLL LRM bounds test. If the null hypothesis of "no LRR" is rejected, the presence of a LRR is established, but the nature of the LRR is uncertain (Webb, Linn, and Lebo 2019, Forthcoming). The LRR may be a cointegrating relationship, which is the case when both series are *I(1)* and cointegrated, or the relationship may be a conditional equilibrium relationship (*Y* is stationarity, but through its relationship with *X*). As a result, when conducting the LRM bounds test with the GECM the EC term should not be interpreted in the traditional way (two series closing the space between each other after a shock), unless the researcher is somehow sure the variables in the LRR are both *I(1)*.

Results

The models presented in Tables 3 and 4 below include a trend term; this is because 1) after inspecting Figure 1 there is visual evidence that consumption trends steadily upward, and 2) the BIC strongly prefers the models with the trend included over those that do not (see appendix 1 and 2 for replications of models in Tables 3 and 4 without a trend, the results for imports of U.S. cotton do not change substantively). An additional consideration is a potential trend-break at 1846, due to a drop in U.S. cotton production from a very poor harvest. A dummy was included for the years around and including 1846, the dummy never reached significance. This is also evident from Figure 1, there is a noticeable dip in consumption at 1846, but it corrects after 3 years. Interested readers should see Appendices 3 and 4 for cumulative sum plots of residuals (CUSUM) for the models presented in Tables 3 and 4 (Brown, Durbin, and Evans 1975). The results indicate no significant deviations from parameter stability for models in Table 3 and only very slight and temporary deviations for models in Table 4.

To mitigate concerns around over-fitting (especially with so few time points), analysis begins with a naïve model and adds parameters (Keele, Linn, and Webb 2016). The goal of this approach is to discern whether results change with the addition of relevant variables and constraints; if results are inconsistent and varied then the models may be unstable, poorly

Table 3 about here

specified, and overfit. The results are largely consistent across models and the CUSUM plots provide further evidence that the parameter estimates are sound. However, by model 5 we are potentially stretching our degrees of freedom beyond the limit (Babyak 2004; Keele, Linn, and Webb 2016; Pickup and Kellstedt 2018).

We begin by discussing the results in Table 3. Model 1 tests the relationship between U.S. imports and British consumption, with no controls. Panel A gives the GECM results, and we can interpret the first difference in the normal, unit-change sense. The elasticity (coefficient) for the first difference is positive and statistically significant, indicating that a one percent increase in imports of U.S. cotton is associated with a 0.30 percent increase in British cotton consumption on a year-to-year basis. For the long-run, or cumulative, effect of U.S. imports we need to look at the LRM in Panel B, which also presents the results from the LRM bounds test. The LRM is statistically significant, meaning the obtained LRM test statistic lies *above* the upper bound; thus, we conclude consumption and U.S. imports are in a LRR. The implication from this result is that the long-term trajectory and development of cotton consumption in Britain is conditioned on U.S. cotton imports. Furthermore, a one percent increase in imports from the U.S. is associated with a total 0.52 percent increase in British cotton consumption over the course of the series. Panel C provides relevant model diagnostics. Importantly, we see that the RESET test reaches significance, meaning our model is likely not well-specified (this is also likely the cause of the other problematic diagnostics).

Model 2 adds the price variable to model 1. The short-run effect is statistically significant, but quite small. A one percent increase of the price of cotton in Liverpool yields an increase in consumption of about 0.10 percent. This has been documented before, price was not a very important determinant in structuring British demand for cotton (Wright 1971). The LRM bounds test yields an indeterminant result, we cannot be sure of the existence of a LRR between consumption and price, the obtained t statistic is between the critical bounds. The observed significant short and long-run relationships between U.S. imports and consumption from model 1 is reproduced in model 2. However, cotton price is certainly an important control, the diagnostics in panel C are much improved, indicating the importance of price in the model.

Model 3 adds textile exports to model 2. This is an important control, it is the important output of the production process identified by Inikori, the satisfaction of foreign demand for exports. The short-run effects from models 1 and 2 are extended, and the elasticity for textile exports is also significant and positively signed; a one percent increase in textile exports increases consumption by a little less than one-third of a percent, which is comparable to the short-run effect of U.S. cotton imports. The LRM bounds test is inconclusive for textile exports, and the indeterminate result for price in model 2 now drops below the lower bound of the LRM bounds test, indicating no LRR between price and consumption after accounting for textile export volume. The LRR between U.S. cotton imports and British consumption observed in models 1 and 2 remains. After controlling for price and volume of textile exports we again conclude a LRR between imports of U.S. cotton and British cotton consumption.

Table 4 about here

Model 4 replaces textile exports with industrial output, the proxy for industrial technological progress. The immediate (short run) elasticity for output is positive and statistically significant, and is, relatively, quite large. A one percent increase in industrial output is associated with a 0.64 percent increase in cotton consumption. While there is a substantial short-run effect, we are unsure of the existence of a LRR; the LRM bounds test statistic lies between the bounds. After accounting for industrial output there is still a LRR between cotton imports from the U.S. and British cotton consumption. This provides some evidence for the Inikori thesis, when applied to cotton textiles.

Finally, model 5 includes all variables. We do not see any substantive differences in relation to prior models. Short-run effects reach significance for all measures, but the only LRR we observe is the one between cotton imports from the U.S. and British cotton consumption. From this we can extend the Inikori Thesis, innovation does increase consumption, but the pattern of consumption is structured through imports of U.S. cotton. Thus, innovative potential may, in part, depend on access to slave-produced inputs. Further analysis is needed to further clarify this relationship, but that is beyond the purview of this article.

These results beg the question, was it U.S. cotton that was linked to textile industry growth, or would any old cotton do? A number of scholars contend that it did not have to be U.S. cotton that was implicated in the growth of the British textile industry; that indeed, it could have come from anywhere (Eltis and Engerman 2000; Clark, O'Rourke, and Taylor 2008; Harley 2013). We can test this assumption with the data from the time. We need not rely on hypotheticals, "what-ifs," and simulations. Table 4 replicates all the models from Table 3, but with cotton from all non-U.S. sources. This, literally, removes U.S. cotton from the equation. Panel B in Table 4 shows that we cannot conclude any LRR exists between British cotton consumption and any of the variables included in analysis. Furthermore, the diagnostics do not look good, likely indicating a poorly specified model (probably because we have omitted U.S. cotton). Lastly, it is perhaps useful to compare the adjusted R-squares between tables. For example, model 1 in Table 3 reports and adjusted R-square of around 0.69, while the R-square from model 1 in Table 4 is around 0.23. The only difference between these two models is the source of cotton, and that matters a great deal.

Conclusion

It is apparent that U.S. cotton was driving the consumption process in Britain, not cotton from other locales. This likely has to do with various grades of cotton produced in different areas and the institutional linkages and networks of buyers and sellers responsible for securing cotton supplies. But it also points to the importance of volume. The American south produced huge quantities of cotton during this time, this likely had an impact on the relative importance of U.S. cotton to the British consumption. This analysis is the first to quantitatively parse out the short and long-run effects of slave-produced cotton on cotton consumption in Britain, and we can conclude two new pieces of information. 1) Innovation and trade were important short-run determinants of cotton consumption and 2) the trajectory and long-run development of cotton consumption in Britain depended on imports of U.S. cotton, specifically. This should allow for a new round of dialogue between NHC scholars and economic historians. Furthermore, we need to take the Inikori Thesis seriously as it provides much needed context and nuance to discussions around the relationship between slave-inputs and innovative growth during the industrial revolution.

However, several questions and caveats remain. The most important one is that of timeframe. This analysis covers the years 1815-1860; this is well after the birth of the cotton textile industry. It takes time for industries to mature, innovation to diffuse, and demand to solidify (Mokyr 1990, 2009). Indeed, the cotton textile industry did not hit its stride until after 1800 (Crafts 1995, 2014a). That being said, NHC claims that American cotton was necessary for the birth of the British cotton textile industry are not accurate (Baptist 2014, 2016; Johnson 2013). Questions remain about the role of other slave-inputs as catalysts for the industry, primarily Brazilian and Caribbean cotton, but U.S. cotton does not figure into the birth of the British textile industry (Inikori 1993, 2002; Inikori and Engerman 1992; Pereira 2018a, 2018b). So, future research should more clearly interrogate the ebb and flow of cotton inputs during the birth of the cotton textile industry. We have the tools to make these exchanges more fruitful.

Table 1: Cotton Production and Slave Population by Old and New South Region

Pounds of Cotton Grown (Millions) 3-year Average[a]

Year	1820	1830	1840	1850	1860	Avg. Decennial % Change
Old South	114.56	180.01	239.95	377.64	486.52	44.16%
New South	68.48	167.59	481.01	761.99	1672.61	127.42%

Slave Population (Thousands)[b]

Year	1820	1830	1840	1850	1860	Avg. Decennial % Change
Old South	1040.05	1249.30	1304.16	1527.74	1686.53	13.01%
New South	362.38	644.78	1086.40	1579.96	2175.00	57.38%

Old South = Georgia, North Carolina, South Carolina, and Virginia; New South = Alabama, Arkansas, Florida, Kentucky, Louisiana, Mississippi, Missouri, Tennessee, Texas. a=1860 is the average of 1859 and 1860, data is from the state tables in Watkins (1908); b=data from Gibson and Jung (2002).

Figure 1: Series Used in Analysis (all logged)

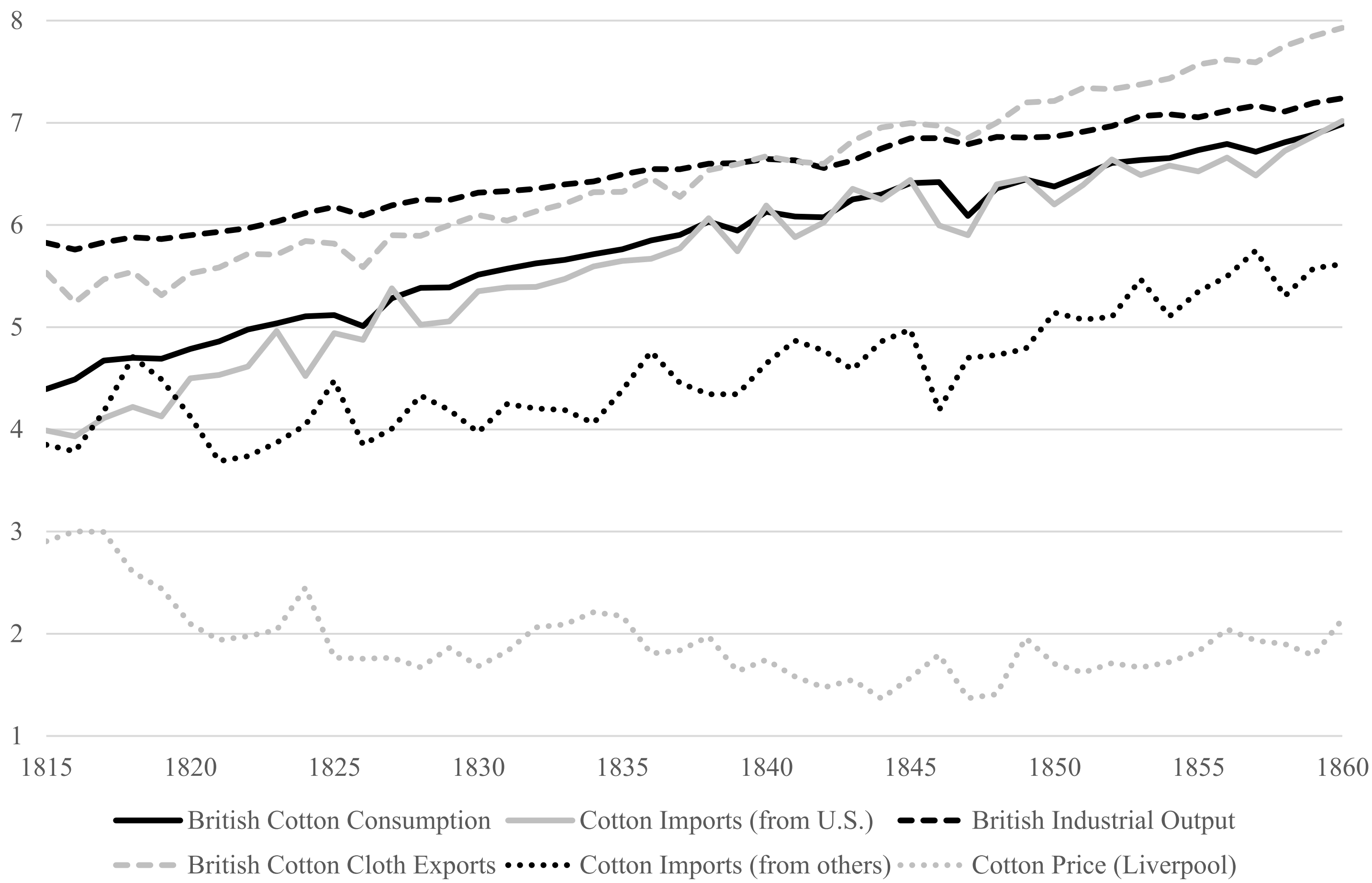


Table 2: Stationarity tests (all variables logged)

Test	British Cotton Consumption	Cotton Imports (from U.S.)	Cotton Imports (non-U.S.)	Cotton Price (Liverpool)	British Cotton Cloth Exports	British Industrial Output	Null and Alternative Hypotheses
AD-F (no constant)	CRN	CRN	CRN	CRN	CRN	CRN	
AD-F (no constant, lag 1)	CRN	CRN	CRN	CRN	CRN	CRN	H_0 = random walk without drift, H_1 = stationary
AD-F (no constant, lag 2)	CRN	CRN	CRN	CRN	CRN	CRN	
AD-F (no trend)	CRN	CRN	CRN	**RN**	CRN	CRN	
AD-F (no trend, lag1)	CRN	CRN	CRN	**RN**	CRN	CRN	H_0 = random walk without drift, H_1 = mean stationary
AD-F (no trend, lag2)	CRN	CRN	CRN	**RN**	CRN	CRN	
AD-F (trend)	**RN**	**RN**	**RN**	CRN	**RN**	**RN**	
AD-F (trend, lag1)	CRN	CRN	**RN**	CRN	**RN**	**RN**	H_0 = random walk, possibly with drift, H_1 = trend stationary
AD-F (trend, lag2)	CRN	CRN	CRN	CRN	**RN**	CRN	
P-P (no constant)	CRN	CRN	CRN	CRN	CRN	CRN	
P-P (no constant, lag1)	CRN	CRN	CRN	CRN	CRN	CRN	H_0 = random walk without drift, H_1 = stationary
P-P (no constant, lag2)	CRN	CRN	CRN	CRN	CRN	CRN	
P-P (no trend)	CRN	CRN	CRN	**RN**	CRN	CRN	
P-P (no trend, lag1)	CRN	CRN	CRN	**RN**	CRN	CRN	H_0 = random walk without drift, H_1 = mean stationary
P-P (no trend, lag2)	CRN	CRN	CRN	**RN**	CRN	CRN	
P-P (trend)	**RN**	**RN**	**RN**	CRN	**RN**	**RN**	
P-P (trend, lag1)	**RN**	**RN**	**RN**	CRN	**RN**	**RN**	H_0 = random walk, possibly with drift, H_1 = trend stationary
P-P (trend, lag2)	**RN**	**RN**	**RN**	CRN	**RN**	**RN**	
AD-F GLS (no trend)	CRN	CRN	CRN	CRN	CRN	CRN	H_0 = random walk without drift, H_1 = mean stationary
AD-F GLS (trend)	CRN	CRN	**RN**	CRN	CRN	**RN**	H_0 = random walk, possibly with drift H_1 = trend stationary
KPSS (no trend)	RN	RN	RN	RN	RN	RN	H_0 = level (mean) stationary, H_1 = random walk without drift
KPSS (trend)	RN	RN	RN	RN	RN	RN	H_0 = trend stationary, H_1 = random walk

Notes: T = 44-46, "RN" = Reject Null, "CRN" = Cannot Reject Null, **Bolded** = conclude some form of stationarity, "AD-F" = Augmented Dickey-Fuller, "AD-F GLS" = GLS modified AD-F test, "KPSS" = Kwiatkowski-Phillips-Schmidt-Shin, "P-P" = Phillips-Perron

Table 3: General Error Correction Results - DV is British Cotton Consumption-logged (first difference)

Panel A - Models	Model 1[c]	Model 2	Model 3	Model 4[c]	Model 5
British Cotton Consumption – log (lagged)[a]	-0.854**	-0.759**	-0.672**	-0.727*	-0.729*
	0.121	*0.120*	*0.112*	*0.125*	*0.120*
Imports of U.S. Cotton - log (1st difference)	0.300***	0.336***	0.282***	0.263***	0.244***
	0.047	*0.046*	*0.046*	*0.051*	*0.047*
Imports of U.S. Cotton - log (lagged)	0.442***	0.458***	0.382***	0.339**	0.325***
	0.101	*0.079*	*0.075*	*0.098*	*0.078*
Price of Cotton (Liverpool, pence) - log (1st difference)	---	0.111**	0.089*	0.111**	0.089*
	---	*0.038*	*0.036*	*0.032*	*0.036*
Price of Cotton (Liverpool, pence) - log (lagged)	---	0.071	0.027	0.037	0.013
	---	*0.036*	*0.038*	*0.036*	*0.037*
Yards of Cotton Cloth Exported - log (1st difference)	---	---	0.283**	---	0.233*
	---	---	*0.090*	---	*0.108*
Yards of Cotton Cloth Exported - log (lagged)	---	---	0.214	---	0.155
	---	---	*0.122*	---	*0.130*
Industrial Output - log (1st difference)	---	---	---	0.639**	0.457*
	---	---	---	*0.231*	*0.211*
Industrial Output - log (lagged)	---	---	---	0.287	0.408
	---	---	---	*0.216*	*0.227*
Trend Term	0.018***	0.013**	-0.001	0.009	-0.004
	0.004	*0.005*	*0.008*	*0.005*	*0.010*
Intercept	2.066***	1.416**	0.344	0.187	-1.179
	0.456	*0.438*	*0.708*	*0.948*	*1.334*
T =	45	45	45	45	45
Adjusted R-Squared	0.6933	0.7437	0.7895	0.7915	0.8089
Panel B - LRM Bounds Test[b]					
Long-run Multiplier - Imports of U.S. Cotton	0.518	0.603	0.568	0.465	0.446
	0.044	*0.081*	*0.083*	*0.081*	*0.086*
Test statistic	11.77**	7.44**	6.84**	5.74*	5.19*
Long-run Multiplier - Price of Cotton	---	0.094	0.040	0.051	0.018
	---	*0.049*	*0.056*	*0.050*	*0.051*
Test statistic	---	1.92◊	0.71	1.02	0.35
Long-run Multiplier - Cotton Cloth Exported	---	---	0.318	---	0.213
	---	---	*0.192*	---	*0.179*
Test statistic	---	---	1.66◊	---	1.19
Long-run Multiplier - Industrial Output	---	---	---	0.395	0.560
	---	---	---	*0.264*	*0.285*
Test statistic	---	---	---	1.50◊	1.96◊
Panel C - Diagnostics					
Shapiro-Wilk Test (null=normality of ε)	p = .001**	p = .037*	p = .302	p = .404	p = .722
Breusch-Godfrey Test (null=no serial correlation in ε)	0.226	3.408	2.445	1.027	0.262
Engle's LM Test (null=no ARCH effects)	0.44	0.24	2.69	0.27	1.35
Breusch-Pagan Test (null=ε is linear-homoskedastic)	6.31*	1.81	2.03	4.70*	3.46
White's Test (null=ε is homoskedastic)	11.48	26.57	45.00	45.00	45.00
Ljung-Box Test (null=ε is a white noise process)	11.71	15.80	13.44	15.84	17.03
RESET test (null=no omitted variables)	3.21*	2.25	2.24	2.84	2.90

Notes: standard errors are italicized; ***=p<0.001, **=p<0.01, *=p<0.05, a=critical values calculated using MacKinnon (2010), b=S.E. calculated using Bewely IV regression, c=robust S.E.s reported (due to heteroskedasticity) except on ECM, ◊=between critical bounds (inconclusive result)

Table 4: General Error Correction Results - DV is British Cotton Consumption-logged (first difference)

Panel A - Models	Model 1	Model 2[c]	Model 3[c]	Model 4[c]	Model 5[c]
British Cotton Consumption – log (lagged)[a]	-0.521*	-0.529	-0.403	-0.563	-0.537
	0.121	*0.123*	*0.107*	*0.123*	*0.116*
Imports of Non-U.S. Cotton - log (1st difference)	-0.054	0.051	0.028	-0.032	-0.009
	0.052	*0.051*	*0.035*	*0.038*	*0.037*
Imports of Non-U.S. Cotton - log (lagged)	-0.090	0.011	0.039	0.003	0.033
	0.059	*0.089*	*0.068*	*0.054*	*0.055*
Price of Cotton (Liverpool, pence) - log (1st difference)	---	0.126	0.091	0.102*	0.089*
	---	*0.077*	*0.056*	*0.049*	*0.044*
Price of Cotton (Liverpool, pence) - log (lagged)	---	-0.098*	-0.103*	-0.067	-0.079
	---	*0.048*	*0.046*	*0.037*	*0.041*
Yards of Cotton Cloth Exported - log (1st difference)	---	---	0.467*	---	0.279
	---	---	*0.189*	---	*0.154*
Yards of Cotton Cloth Exported - log (lagged)	---	---	0.207	---	0.063
	---	---	*0.197*	---	*0.157*
Industrial Output - log (1st difference)	---	---	---	1.243**	0.953**
	---	---	---	*0.369*	*0.320*
Industrial Output - log (lagged)	---	---	---	0.417	0.585
	---	---	---	*0.350*	*0.333*
Trend Term	0.031***	0.025***	0.005	0.015	0.003
	0.008	*0.006*	*0.015*	*0.008*	*0.015*
Intercept	2.751***	2.651***	0.918	0.338	-1.141
	0.687	*0.492*	*1.261*	*1.711*	*2.054*
T =	45	45	45	45	45
Adjusted R-Squared	0.2294	0.3680	0.5633	0.6165	0.6666
Panel B - LRM Bounds Test[b]					
Long-run Multiplier - Imports of Non-U.S. Cotton	-0.173	0.021	0.097	0.005	0.061
	0.107	*1.69*	*0.179*	*0.096*	*0.104*
Test statistic	1.62◊	0.12	0.54	0.05	0.59
Long-run Multiplier - Price of Cotton	---	-0.185	-0.256	-0.119	-0.147
	---	*0.082*	*0.118*	*0.066*	*0.078*
Test statistic	---	2.26◊	2.17◊	1.80◊	1.88◊
Long-run Multiplier - Cotton Cloth Exported	---	---	0.514	---	0.117
	---	---	*0.521*	---	*0.283*
Test statistic	---	---	0.97	---	0.41
Long-run Multiplier - Industrial Productivity	---	---	---	0.741	1.085
	---	---	---	*0.518*	*0.479*
Test statistic	---	---	---	1.43◊	2.27◊
Panel C - Diagnostics					
Shapiro-Wilk Test (null=normality of ε)	p = .000***	p = .002**	p = .497	p = .096	p = .248
Breusch-Godfrey Test (null=no serial correlation in ε)	1.398	2.126	0.453	1.957	2.27
Engle's LM Test (null=no ARCH effects)	0.09	0.17	0.315	0.68	1.32
Breusch-Pagan Test (null=ε is linear-homoskedastic)	2.13	4.89*	5.12*	7.41**	5.43*
White's Test (null=ε is homoskedastic)	29.77	40.41*	45.00	45.00	45.00
Ljung-Box Test (null=ε is a white noise process)	21.02	40.41**	33.04*	41.53**	43.15**
RESET test (null=no omitted variables)	0.40	2.36	4.90**	3.39*	3.56*

Note: standard errors are italicized; ***=p<0.001, **=p<0.01, *=p<0.05, a=critical values calculated using MacKinnon (2010), b=S.E. calculated using Bewely IV regression, c=robust S.E.s reported (due to heteroskedasticity), ◊=between critical bounds (inconclusive result)

Appendix 1: General Error Correction Results - DV is British Cotton Consumption-logged (first difference)

Panel A - Models	**Model 1[c]**	**Model 2**	**Model 3**	**Model 4[c]**	**Model 5**
British Cotton Consumption – log (lagged)[a]	-0.491**	-0.526*	-0.673**	-0.708*	-0.729**
	0.09	*0.092*	*0.101*	*0.126*	*0.118*
Imports of U.S. Cotton - log (1st difference)	0.356***	0.391***	0.281***	0.278***	0.241***
	0.058	*0.044*	*0.045*	*0.054*	*0.046*
Imports of U.S. Cotton - log (lagged)	0.413**	0.469***	0.382***	0.339**	0.324***
	0.012	*0.085*	*0.074*	*0.099*	*0.077*
Price of Cotton (Liverpool, pence) - log (1st difference)	---	0.139**	0.089*	0.116**	0.092*
	---	*0.04*	*0.035*	*0.032*	*0.034*
Price of Cotton (Liverpool, pence) - log (lagged)	---	0.107**	0.027	0.044	0.017
	---	*0.036*	*0.036*	*0.038*	*0.034*
Yards of Cotton Cloth Exported - log (1st difference)	---	---	0.282***	---	0.206**
	---	---	*0.069*	---	*0.075*
Yards of Cotton Cloth Exported - log (lagged)	---	---	0.211**	---	0.117
	---	---	*0.061*	---	*0.073*
Industrial Output - log (1st difference)	---	---	---	0.745**	0.466*
	---	---	---	*0.224*	*0.206*
Industrial Output - log (lagged)	---	---	---	0.525**	0.367
	---	---	---	*0.181*	*0.193*
Intercept	0.562**	0.247	0.361**	-1.279*	-0.754
	0.167	*0.134*	*0.116*	*0.518*	*0.586*
T =	45	45	45	45	45
Adjusted R-Squared	0.5875	0.6995	0.7952	0.7851	0.8137
Panel B - LRM Bounds Test[b]					
Long-run Multiplier - Imports of U.S. Cotton	0.841	0.892	0.568	0.479	0.444
	0.024	*0.027*	*0.076*	*0.096*	*0.085*
Test statistic	35.04**	33.04**	7.47**	4.99*	5.22*
Long-run Multiplier - Price of Cotton	---	0.203	0.040	0.062	0.023
	---	*0.062*	*0.054*	*0.054*	*0.047*
Test statistic	---	3.27◊	0.74	1.15	0.49
Long-run Multiplier - Cotton Cloth Exported	---	---	0.314	---	0.160
	---	---	*0.072*	---	*0.100*
Test statistic	---	---	4.36*	---	1.60◊
Long-run Multiplier - Industrial Output	---	---	---	0.742	0.503
	---	---	---	*0.172*	*0.236*
Test statistic	---	---	---	4.31*	2.13◊
Panel C - Diagnostics					
Shapiro-Wilk Test (null=normality of ε)	p = .045*	p = .768	p = .303	p = .600	p = .576
Breusch-Godfrey Test (null=no serial correlation in ε)	0.345	3.248	2.388	0.312	0.272
Engle's LM Test (null=no ARCH effects)	0.67	0.65	2.70	0.13	1.49
Breusch-Pagan Test (null=ε is linear-homoskedastic)	9.39**	0.92	2.06	3.98*	3.83
White's Test (null=ε is homoskedastic)	14.51	19.10	41.71	42.54	45.00
Ljung-Box Test (null=ε is a white noise process)	12.48	13.68	13.44	17.95	17.25
RESET test (null=no omitted variables)	5.08**	2.43	2.24	2.71	3.08*

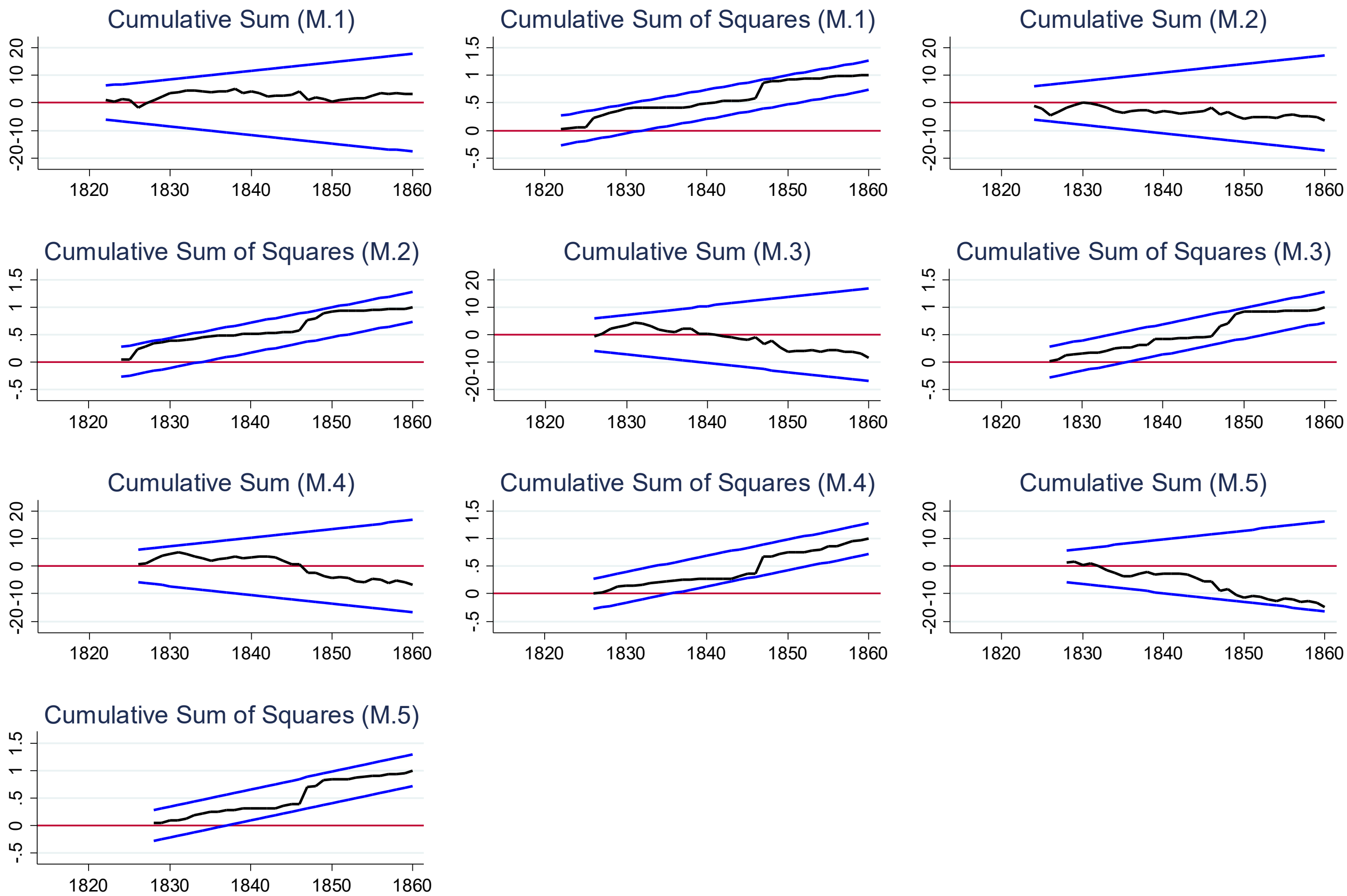
Note: standard errors are italicized; ***=p<0.001, **=p<0.01, *=p<0.05, a=critical values calculated using MacKinnon (2010), b=S.E. calculated using Bewely IV regression, c=robust S.E.s reported (due to heteroskedasticity) except on ECM, ◊=between critical bounds (inconclusive result)

Appendix 2: General Error Correction Results - DV is British Cotton Consumption-logged (first difference)

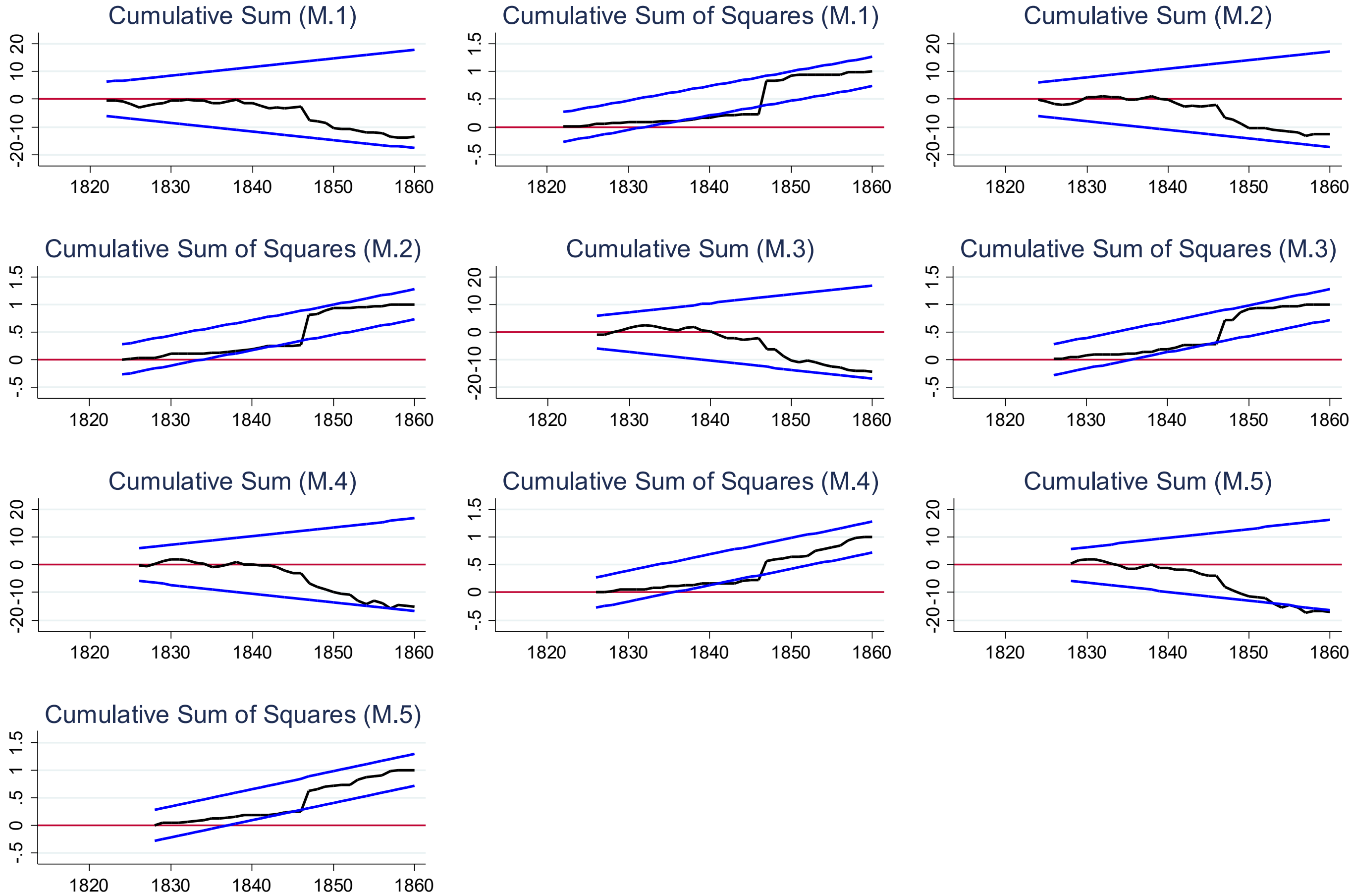
Panel A - Models	Model 1[c]	Model 2[c]	Model 3	Model 4[c]	Model 5[c]
British Cotton Consumption – log (lagged)[a]	-0.047	-0.151	-0.381	-0.555*	-0.540
	0.041	*0.055*	*0.094*	*0.126*	*0.114*
Imports of Non-U.S. Cotton - log (1st difference)	0.002	0.114*	0.027	-0.011	-0.008
	0.050	*0.049*	*0.049*	*0.037*	*0.035*
Imports of Non-U.S. Cotton - log (lagged)	0.037	0.126	0.044	0.040	0.036
	0.075	*0.078*	*0.052*	*0.048*	*0.050*
Price of Cotton (Liverpool, pence) - log (1st difference)	---	0.172*	0.087	0.108*	0.087
	---	*0.070*	*0.051*	*0.048*	*0.048*
Price of Cotton (Liverpool, pence) - log (lagged)	---	-0.104	-0.112*	-0.078	-0.084*
	---	*0.063*	*0.046*	*0.041*	*0.034*
Yards of Cotton Cloth Exported - log (1st difference)	---	---	0.508***	---	0.300**
	---	---	*0.085*	---	*0.095*
Yards of Cotton Cloth Exported - log (lagged)	---	---	0.272**	---	0.089
	---	---	*0.097*	---	*0.089*
Industrial Output - log (1st difference)	---	---	---	1.437***	0.949**
	---	---	---	*0.320*	*0.322*
Industrial Output - log (lagged)	---	---	---	0.804**	0.618*
	---	---	---	*0.227*	*0.235*
Intercept	0.162	0.556*	0.488**	-2.032*	-1.459
	0.101	*0.259*	*0.170*	*0.751*	*0.756*
T =	45	45	45	45	45
Adjusted R-Squared	-0.0268	0.2020	0.5729	0.5969	0.6757
Panel B - LRM Bounds Test[b]					
Long-run Multiplier - Imports of Non-U.S. Cotton	0.787	0.834	0.115	0.072	0.067
	0.727	*0.184*	*0.145*	*0.091*	*0.096*
Test statistic	1.09	4.53*	0.79	0.79	0.70
Long-run Multiplier - Price of Cotton	---	-0.689	-0.294	-0.141	-0.156
	---	*0.300*	*0.100*	*0.08*	*0.074*
Test statistic	---	2.30◊	2.94◊	1.76◊	2.11◊
Long-run Multiplier - Cotton Cloth Exported	---	---	0.714	---	0.165
	---	---	*0.123*	---	*0.166*
Test statistic	---	---	5.80*	---	0.99
Long-run Multiplier - Industrial Productivity	---	---	---	1.449	1.144
	---	---	---	*0.147*	*0.298*
Test statistic	---	---	---	9.86**	3.84*
Panel C - Diagnostics					
Shapiro-Wilk Test (null=normality of ε)	p = .016*	p = .327	p = .714	p = .097	p = .230
Breusch-Godfrey Test (null=no serial correlation in ε)	5.084*	7.28*	0.441	1.430	2.290
Engle's LM Test (null=no ARCH effects)	3.25	2.05	0.767	0.04	1.26
Breusch-Pagan Test (null=ε is linear-homoskedastic)	4.98*	0.64	3.79	4.53*	4.99*
White's Test (null=ε is homoskedastic)	21.48*	36.31*	40.87	41.56	45.00
Ljung-Box Test (null=ε is a white noise process)	29.53	38.16**	32.73*	21.86	42.09**
RESET test (null=no omitted variables)	8.56***	5.40**	3.92*	2.17	3.07*

Note: standard errors are italicized; ***=p<0.001, **=p<0.01, *=p<0.05, a=critical values calculated using MacKinnon (2010), b=S.E. calculated using Bewely IV regression, c=robust S.E.s reported (due to heteroskedasticity), ◊=between critical bounds (inconclusive result)

Appendix 3: Stability Plots - Table 2



Appendix 4: Stability Plots - Table 3



Works Cited:

Arltová, Markéta, and Darina Fedorová. 2016. 'Selection of unit root test on the basis of length of the time series and value of AR (1) parameter', *Statistika*, 96: 3.

Babyak, Michael A. 2004. 'What You See May Not Be What You Get: A Brief, Nontechnical Introduction to Overfitting in Regression-Type Models', *Psychosomatic Medicine*, 66: 411-21.

Bailey, Ronald. 1990. 'The Slave(ry) Trade and the Development of Capitalism in the United States: The Textile Industry in New England', *Social Science History*, 14: 373-414.

———. 1994. 'The Other Side of Slavery: Black Labor, Cotton, and Textile Industrialization in Great Britain and the United States', *Agricultural History*, 68: 35-50.

Banerjee, Anindya, Juan J Dolado, John W Galbraith, and David Hendry. 1993. 'Co-integration, error correction, and the econometric analysis of non-stationary data', *OUP Catalogue*.

Baptist, Edward E. 2014. *The half has never been told : slavery and the making of American capitalism* (Basic Books, a member of the Perseus Books Group: New York).

———. 2016. 'Toward a Political Economy of Slave Labor: Hands, Whipping-Machines, and Modern Power.' in Sven Beckert and Seth Rockman (eds.), *Slavery's Capitalism : a new history of American economic development* (University of Pennsylvania Press: Philadelphia).

Beckert, Sven. 2014. *Empire of cotton : a global history* (Alfred A. Knopf: New York).

Beckert, Sven, and Seth Rockman. 2016. *Slavery's capitalism : a new history of American economic development* (University of Pennsylvania Press: Philadelphia).

Bewley, R. A. 1979. 'The direct estimation of the equilibrium response in a linear dynamic model', *Economics Letters*, 3: 357-61.

Blough, Stephen R. 1992. 'The relationship between power and level for generic unit root tests in finite samples', *Journal of applied econometrics*, 7: 295-308.

Broadberry, S. N., B. M. S. Campbell, Alexander Klein, Mark Overton, and Bas van Leeuwen. 2015. *British economic growth, 1270-1870* (Cambridge University Press: New York).

Broadberry, S. N., R. Fremdling, and P. Solar. 2010. 'Industry.' in Stephen Broadberry and Kevin H. O'Rourke (eds.), *The Cambridge Economic History of Modern Europe: Volume 1: 1700-1870* (Cambridge University Press: Cambridge).

Brown, Robert L, James Durbin, and James M Evans. 1975. 'Techniques for testing the constancy of regression relationships over time', *Journal of the Royal Statistical Society: Series B (Methodological)*, 37: 149-63.

Choi, In. 2015. *Almost All about Unit Roots: Foundations, Developments, and Applications* (Cambridge University Press: Cambridge).

Clark, Gregory. 2007. *A farewell to alms : a brief economic history of the world* (Princeton University Press: Princeton).

Clark, Gregory, Kevin H. O'Rourke, and Alan M. Taylor. 2008. 'Made in America? The New World, the Old, and the Industrial Revolution', *American Economic Review*, 98: 523-28.

Cox, Oliver C. 1948. *Caste, class, & race; a study in social dynamics* (Doubleday: Garden City, N.Y.,).

Crafts, N. F. R. 1985. *British economic growth during the industrial revolution* (Oxford University Press: Oxford Oxfordshire).

———. 1995. 'Exogenous or Endogenous Growth? The Industrial Revolution Reconsidered', *The Journal of Economic History*, 55: 745-72.

———. 2014a. 'Industrialization: Why Britain Got There First', *CAGE Online Working Paper Series*: Competitive Advantage in the Global Economy (CAGE).

———. 2014b. 'Productivity Growth during the British Industrial Revolution: Revisionism Revisited', *CAGE Online Working Paper Series*: Competitive Advantage in the Global Economy (CAGE).

Crafts, N. F. R., and C. K. Harley. 1992. 'Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View', *The Economic History Review*, 45: 703-30.

Crafts, N. F. R., and Terence C. Mills. 1997. 'Endogenous Innovation, Trend Growth, and the British Industrial Revolution: Reply to Greasley and Oxley', *The Journal of Economic History*, 57: 950-56.

———. 2017. 'Six centuries of British economic growth: a time-series perspective', *European Review of Economic History*, 21: 141-58.

Danson, John. 1857. 'On the Existing Connection between American Slavery and the British Cotton Manufacture', *Quarterly Journal of the Statistical Society (currently: Journal of the Royal Statistical Society)*, 20: 1-21.

Deane, Phyllis, and W. A. Cole. 1962. *British economic growth, 1688-1959: trends and structure* (University Press: Cambridge Eng.).

DeBoef, Suzanna, and Jim Granato. 1997. 'Near-Integrated Data and the Analysis of Political Relationships', *American Journal of Political Science*, 41: 619-40.

DeBoef, Suzanna, and Luke Keele. 2008. 'Taking Time Seriously: Dynamic Regression', *American Journal of Political Science*, 52: 184-200.

DeJong, David N., John C. Nankervis, N. E. Savin, and Charles H. Whiteman. 1992. 'The power problems of unit root test in time series with autoregressive errors', *Journal of econometrics*, 53: 323-43.

Dickey, David A, and Wayne A Fuller. 1979. 'Distribution of the estimators for autoregressive time series with a unit root', *Journal of the American statistical association*, 74: 427-31.

Elliott, Graham, Thomas J Rothenberg, and James H Stock. 1992. "Efficient tests for an autoregressive unit root." In.: National Bureau of Economic Research Cambridge, Mass., USA.

Eltis, David, and Stanley L. Engerman. 2000. 'The Importance of Slavery and the Slave Trade to Industrializing Britain', *The Journal of Economic History*, 60: 123-44.

Enders, Walter. 2015. *Applied econometric time series* (Wiley: Hoboken, NJ).

Engle, R. F., and C. W. J. Granger. 1991. *Long-run economic relationships : readings in cointegration* (Oxford University Press: Oxford ; New York).

Engle, Robert F, and Clive WJ Granger. 1987. 'Co-integration and error correction: representation, estimation, and testing', *Econometrica: journal of the Econometric Society*: 251-76.

Enns, Peter K, Nathan J Kelly, Takaaki Masaki, and Patrick C Wohlfarth. 2016. 'Don’t jettison the general error correction model just yet: A practical guide to avoiding spurious regression with the GECM', *Research & Politics*, 3: 2053168016643345.

Enns, Peter K., Nathan J. Kelly, Takaaki Masaki, and Patrick C. Wohlfarth. 2017. 'Moving forward with time series analysis', *Research & Politics*, 4: 1-7.

Esarey, Justin. 2016. 'Fractionally Integrated Data and the Autodistributed Lag Model: Results from a Simulation Study', *Political Analysis*, 24: 42-49.

Floud, Roderick, and Deirdre N. McCloskey. 1981. *The Economic history of Britain since 1700* (Cambridge University Press: Cambridge Eng. ; New York).

Foust, James D. 1975. *The yeoman farmer and westward expansion of U.S. cotton production* (Arno Press: New York).

Grant, Taylor, and Matthew J Lebo. 2016. 'Error correction methods with political time series', *Political Analysis*, 24: 3-30.

Greasley, David, and Les Oxley. 1997a. 'Endogenous Growth or "Big Bang": Two Views of the First Industrial Revolution', *The Journal of Economic History*, 57: 935-49.

———. 1997b. 'Endogenous Growth, Trend Output, and the Industrial Revolution: Reply to Crafts and Mills', *The Journal of Economic History*, 57: 957-60.

Harley, C. K. 1982. 'British Industrialization Before 1841: Evidence of Slower Growth During the Industrial Revolution', *The Journal of Economic History*, 42: 267-89.

———. 1999. 'Reassessing the Industrial Revolution: a Macro View.' in Joel Mokyr (ed.), *The British Industrial Revolution: An Economic Perspective* (Westview Press: Oxford: UK).
———. 2013. "Slavery, the British Atlantic Economy and the Industrial Revolution." In *Discussion Papers in Economic and Social History*, edited by University of Oxford.
Hartwell, R. M. 1990. 'Was There an Industrial Revolution?', *Social Science History*, 14: 567-76.
Helgason, Agnar Freyr. 2016. 'Fractional Integration Methods and Short Time Series: Evidence from a Simulation Study', *Political Analysis*, 24: 59-68.
Hendry, David F. 2010. 'Equilibrium-correction models.' in Steven N. Durlauf and Lawrence E. Blume (eds.), *Macroeconometrics and Time Series Analysis* (Palgrave Macmillan UK: London).
Hilt, Eric. 2017. 'Economic History, Historical Analysis, and the "New History of Capitalism"', *The Journal of Economic History*, 77: 511-36.
Hobsbawm, E. J., and Chris Wrigley. 1999. *Industry and empire : from 1750 to the present day* (New Press ; Distributed by W.W. Norton: New York).
Inikori, J. E. 1993. *Slavery and the rise of capitalism* (Dept. of History, the University of the West Indies: Mona, Jamaica).
———. 2002. *Africans and the industrial revolution in England : a study in international trade and economic development* (Cambridge University Press: New York).
Inikori, J. E., and Stanley L. Engerman. 1992. *The Atlantic slave trade : effects on economies, societies, and peoples in Africa, the Americas, and Europe* (Duke University Press: Durham).
James, Cyril Lionel Robert. 1938. *The black Jacobins* (The Dial press: New York,).
Johnson, Walter. 2004. *The Chattel Principle : Internal Slave Trades in the Americas* (Yale University Press: New Haven, CT).
———. 2013. *River of dark dreams : slavery and empire in the cotton kingdom* (Belknap Press of Harvard University Press: Cambridge, Massachusetts).
Kaye, Anthony E. 2009. 'The Second Slavery: Modernity in the Nineteenth-Century South and the Atlantic World', *The Journal of Southern History*, 75: 627-50.
Keele, Luke, Suzanna Linn, and Clayton McLaughlin Webb. 2016. 'Treating Time with All Due Seriousness', *Political Analysis*, 24: 31-41.
Kwiatkowski, Denis, Peter CB Phillips, Peter Schmidt, and Yongcheol Shin. 1992. 'Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?', *Journal of econometrics*, 54: 159-78.
Landes, David S. 1998. *The wealth and poverty of nations : why some are so rich and some so poor* (W.W. Norton: New York).
Laviña, Javier, and Michael Zeuske. 2014. *The second slavery : mass slaveries and modernity in the Americas and in the Atlantic Basin* (Lit: Zürich ; Berlin).
Lebo, Matthew J, and Taylor Grant. 2016. 'Equation balance and dynamic political modeling', *Political Analysis*, 24: 69-82.
Lebo, Matthew J., and Patrick W. Kraft. 2017. 'The general error correction model in practice', *Research & Politics*, 4: 2053168017713059.
Mathisen, Erik. 2018. 'The Second Slavery, Capitalism, and Emancipation in Civil War America ', *The Journal of the Civil War Era*, 8: 677-99.
McCloskey, Deirdre N. 2006. *The bourgeois virtues : ethics for an age of commerce* (University of Chicago Press: Chicago).
McMichael, Philip. 1991. 'Slavery in Capitalism: The Rise and Demise of the U. S. Ante-Bellum Cotton Culture', *Theory and Society*, 20: 321-49.
Mills, Terence C., and N. F. R. Crafts. 1996. 'Trend Growth in British Industrial Output, 1700–1913: A Reappraisal', *Explorations in Economic History*, 33: 277-95.

Mitchell, B. R. 1988. *British historical statistics* (Cambridge University Press: Cambridge Cambridgeshire ; New York).
Mokyr, Joel. 1990. *The lever of riches : technological creativity and economic progress* (Oxford University Press: New York).
———. 1999. 'Editor's Introduction: The New Economic History and the Industrial Revolution.' in Joel Mokyr (ed.), *The British Industrial Revolution : An Economic Perspective* (Westview Press: Boulder, CO).
———. 2009. *The enlightened economy : an economic history of Britain, 1700-1850* (Yale University Press: New Haven).
———. 2017. *A culture of growth : the origins of the modern economy* (Princeton University Press: Princeton, NJ).
Murray, Michael P. 1994. 'A drunk and her dog: an illustration of cointegration and error correction', *The American Statistician*, 48: 37-39.
O'rourke, K. H., L. Prados de la Escosura, and G. Daudin. 2010. 'Trade and Empire.' in Stephen Broadberry and Kevin H. O'Rourke (eds.), *The Cambridge Economic History of Modern Europe: Volume 1: 1700–1870* (Cambridge University Press: Cambridge).
Oakes, James. 2016. 'Capitalism and Slavery and the Civil War', *International Labor and Working-Class History*, 89: 195-220.
Olmstead, Alan L., and Paul W. Rhode. 2008. 'Biological Innovation and Productivity Growth in the Antebellum Cotton Economy', *The Journal of Economic History*, 68: 1123-71.
———. 2018. 'Cotton, slavery, and the new history of capitalism', *Explorations in Economic History*, 67: 1-17.
Pereira, Thales Augusto Zamberlan. 2018a. 'Poor Man's Crop? Slavery in Brazilian Cotton Regions (1800-1850)', *Estudos Econômicos (São Paulo)*, 48: 623-55.
———. 2018b. 'The Rise of the Brazilian Cotton Trade in Britain during the Industrial Revolution', *Journal of Latin American Studies*, 50: 919-49.
Pesaran, M Hashem, and Yongcheol Shin. 1998. 'An autoregressive distributed-lag modelling approach to cointegration analysis', *Econometric Society Monographs*, 31: 371-413.
Pesaran, M Hashem, Yongcheol Shin, and Richard J Smith. 2001. 'Bounds testing approaches to the analysis of level relationships', *Journal of applied econometrics*, 16: 289-326.
Philips, Andrew Q. 2018. 'Have Your Cake and Eat It Too? Cointegration and Dynamic Inference from Autoregressive Distributed Lag Models', *American Journal of Political Science*, 62: 230-44.
Phillips, Peter CB, and Pierre Perron. 1988. 'Testing for a unit root in time series regression', *Biometrika*, 75: 335-46.
Pickup, Mark, and Paul M Kellstedt. 2018. 'Balance as a Pre-Estimation Test for Longitudinal Analysis'.
Pomeranz, Kenneth. 2000. *The great divergence : China, Europe, and the making of the modern world economy* (Princeton University Press: Princeton, N.J.).
Pritchett, Jonathan B. 2001. 'Quantitative Estimates of the United States Interregional Slave Trade, 1820-1860', *The Journal of Economic History*, 61: 467-75.
Robson, R. 1957. *The Cotton Industry in Britain* (Macmillan: London).
Rockman, Seth. 2006. 'The Unfree Origins of American Capitalism.' in Cathy D. Matson (ed.), *The Economy of Early America : historical perspectives & new directions* (The Pennsylvania State University Press: University Park, Pa.).
———. 2012. 'Slavery and Capitalism', *The Journal of the Civil War Era*, 2: 5-10.
Rood, Dan. 2016. "Beckert is Liverpool, Baptist Is New Orleans: geography returns to the history of capitalism.(Empire of Cotton: A Global History)(The Half Has Never Been Told: Slavery and the Making of American)(Book review)." In, 151-67. University of Pennsylvania Press.

Rosenthal, Caitlin. 2016. 'Slavery's Scientific Management: Masters and Managers.' in Sven Beckert and Seth Rockman (eds.), *Slavery's capitalism : a new history of American economic development* (University of Pennsylvania Press: Philadelphia).

———. 2018. *Accounting for slavery : masters and management* (Harvard University Press: Cambridge, Massachusetts).

Rostow, W. W. 1960. *The process of economic growth* (Clarendon Press: Oxford Eng.).

Rothman, Adam. 2005. *Slave country : American expansion and the origins of the Deep South* (Harvard University Press: Cambridge, Mass.).

Steckel, Richard H., and Nicolas Ziebarth. 2013. 'A Troublesome Statistic: Traders and Coastal Shipments in the Westward Movement of Slaves', *The Journal of Economic History*, 73: 792-809.

Temin, Peter. 1997. 'Two Views of the British Industrial Revolution', *The Journal of Economic History*, 57: 63-82.

Tomich, Dale W. 1988. 'The ‘Second Slavery’: Bonded Labor and the Transformation of the Nineteenth-Century World Economy.' in Francisco O. Ramirez (ed.), *Rethinking the nineteenth century : contradictions and movements* (Greenwood Press: New York).

———. 2004. *Through the prism of slavery : labor, capital, and world economy* (Rowman & Littlefield: Lanham).

———. 2016a. *New frontiers of slavery* (Suny Press: New York).

———. 2016b. *The politics of the second slavery* (State University of New York Press: Albany).

———. 2017. *Slavery and historical capitalism during the nineteenth century* (Lexington Books, an imprint of Rowman & Littlefield Publishing Group, Inc.: Lanham, Maryland).

———. 2018. 'The Second Slavery and World Capitalism: A Perspective for Historical Inquiry', *International Review of Social History*, 63: 477-501.

Tomich, Dale W., and Michael Zeuske. 2008. 'Introduction, the Second Slavery: Mass Slavery, World-Economy, and Comparative Microhistories', *Review (Fernand Braudel Center)*, 31: 91-100.

Wallerstein, Immanuel Maurice. 2004. *World-systems analysis : an introduction* (Duke University Press: Durham).

Webb, Clayton, Suzanna Linn, and Matthew Lebo. 2019. 'A Bounds Approach to Inference Using the Long Run Multiplier', *Political Analysis*, 27: 281-301.

———. Forthcoming. 'Beyond the Unit Root Question: Drawing Inferences about Long Run Relationships Given Uncertain Univariate Dynamics', *American Journal of Political Science*.

Williams, Eric Eustace. 1944. *Capitalism & slavery* (Univ. of North Carolina Press: Chapel Hill,).

Williamson, Jeffrey G. 2016. 'Review Essay on "British Economic Growth, 1270-1870" by Stephen Broadberry, Bruce M. S. Campbell, Alexander Klein, Mark Overton, and Bas van Leeuwen', *Journal of Economic Literature*, 54: 514-21.

Wright, Gavin. 1971. 'An Econometric Study of Cotton Production and Trade, 1830-1860', *The Review of Economics and Statistics*, 53: 111-20.

———. 1978. *The political economy of the cotton South : households, markets, and wealth in the nineteenth century* (Norton: New York).

———. 2006. *Slavery and American economic development* (Louisiana State University Press: Baton Rouge).