

One Giant Leap: Emancipation and Aggregate Economic Gains*

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Abstract

We re-visit the literature on American slavery to emphasize that emancipation generated substantial aggregate economic gains. Slavery was not only theft, but inefficient theft, imposing immense costs on enslaved people beyond what enslavers received. Costs of enslavement are inherently difficult to quantify, which leads to a wide range of potential estimates, but we calculate that emancipation generated aggregate economic gains worth a 4%–35% increase in US aggregate productivity (7–60 years of technological innovation). Emancipation decreased output but decreased costs substantially more, unleashing substantial aggregate economic gains and illustrating the scope for substantial gains in the presence of severe misallocation.

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The widespread enslavement of Black people in the United States is universally recognized to have been morally wrong, but there is an enduring view of slavery as “economically productive.” American slavery produced high crop yields and generated substantial income for enslavers (Conrad and Meyer, 1958; Yasuba, 1961; Bergstrom, 1971; Fogel and Engerman, 1974; Baptist, 2014; Berry, 2017; Hilt, 2020). Some views emphasize the “efficiency” of markets during enslavement, in which enslaved labor was traded and allocated across tasks and locations to achieve high levels of output per worker (Fogel and Engerman, 1977; Beckert, 2014; Naidu, 2020). After emancipation, there were substantial declines in crop yields and output value as production in the South adapted to the change in labor institutions and social structure (Ransom and Sutch, 1977; Litwack, 1979).

This narrative has neglected a central feature of the institution of slavery, which created a massive externality whose implications have been under-explored: enslavers considered their own benefits and costs of slave labor when making production decisions in the antebellum era, but they did not internalize the costs slavery imposed on enslaved people. The literature has focused on how much less enslaved people received than they produced, but the tremendous aggregate inefficiency of slavery is that the value extracted by enslavers was substantially less than the costs imposed on enslaved people. Slavery was therefore a market failure in addition to a moral failure.

We show that emancipation generated substantial aggregate economic gains. While output declined after emancipation, input costs declined substantially more, which increased aggregate economic surplus: the total value of output minus total costs incurred to produce it. Emancipation reduced input costs that were not paid under slavery, due to coercion, but were still incurred by enslaved people. Given approximately 4 million enslaved people in the United States on the eve of the Civil War, 13% of the total population, the costs of enslavement are substantial relative to the overall economy.

The aggregate economic gains from emancipation are similar to the effects of technological innovation or total factor productivity growth, but accrue from an institutional innovation that reduces misallocation in the economy. We calculate that emancipation generated economic gains that are comparable to those from the largest increases in aggregate productivity in American history. These aggregate economic gains are closely related to aggregate productivity growth and aggregate welfare (Solow, 1957; Weitzman, 1976; Basu and Fernald, 2002), but we do not impose a social welfare function that would weight the well-being of enslavers and the enslaved. Aggregate economic surplus is denominated in dollars, which sum across people, and is distinct from aggregate welfare or morality.

We are not the first to note that slavery was detrimental to enslaved people, but prior focus on the “disutility” of enslavement becomes mired in well-known problems of social wel-

fare aggregation (discussed by David and Temin, 1974). In shifting the focus from aggregate welfare to aggregate economic surplus, we clarify how the costs incurred by enslaved people reduced the aggregate economic performance of the United States. Slavery may also have reduced economic dynamism and lowered output, as in Bleakley and Rhode (2024), but we focus on the losses from distorted labor markets.

We calculate substantial aggregate economic gains from emancipation under a range of parameter values, and we report a wide range of estimates because the costs of enslavement are inherently difficult to assess. These costs are the most relevant economic feature of enslavement, however, and we show how different assumed costs influence the aggregate gains from emancipation. While emancipation naturally raised the welfare of enslaved people, it is not a truism that emancipation increased the aggregate performance of the US economy. Slavery could have been efficient, in principle, if it had been more effective: if enslavers had extracted more value, captured in higher market valuations of enslaved people, then enslavement could have been largely a transfer to enslavers from the enslaved. But we find that slavery was not only theft, it was *inefficient* theft that lost substantial economic value in the process.

Prior economic history literature on slavery has looked to characterize various aspects of the slave economy. This analysis and discussion has largely conflated the “economics of slavery” with the “business of slavery.” This literature correctly emphasizes the economic gains to enslavers, disputing an earlier view of slavery as a stagnant means of social control rather than source of economic rents. But this focus on enslavement as a business enterprise misses the aggregate economic implications from the costs imposed on enslaved people. We emphasize that prior focus on the trees has missed the forest: inefficiently high costs imposed on enslaved people, which were corrected through emancipation that dramatically increased the social value of production minus the social costs of production (i.e., aggregate economic surplus).

The costs to enslaved people are inherently difficult to conceptualize and calculate, but hesitancy to consider approximate magnitudes for the all-encompassing costs of enslavement has obscured the net aggregate economic impact of enslavement and emancipation. The horrors of American chattel slavery were not hypothetical, so difficulties in measuring these costs should not preclude seriously considering their aggregate implications.

We report a range of estimates that quantify the costs of enslavement based on: (1) the needed wage premium to compensate people for working under the gang labor system (Seagrave, 1971); (2) the value of their time (Craemer et al., 2020); or (3) the value of statistical life (VSL). This third estimates draws on a more holistic measure, associated with people’s valuation of mortality risk, rather than attempt to aggregate the costs of each

particular aspect of slavery. Our use of VSL aligns with a humanistic characterization of slavery as “social death” (Patterson, 1982), which is not a quantitative statement, but reflects the complete debasement of enslavement and separation from mainstream society. We do not assume that people would often prefer death to enslavement, but that people often risk death for freedom from such conditions. The inherent challenges in putting a cost on enslavement are related to the inherent challenges in putting a cost on mortality risk. Enslaved people were assigned a market value, but this reflected only the value extracted by enslavers rather than further costs imposed on enslaved people, such that the value of enslaved people’s lives to themselves would be notably larger than their market value. For this third calculation, the “value of statistical life” could well overstate or understate magnitudes, based on how different people value their lives and avoiding enslavement, but our conceptual point comes through also when assuming the lower costs in each of the first two cases.

We calculate that emancipation generated aggregate economic gains from institutional innovation that were worth 7 – 60 years of technological innovation in that era. Our smallest estimated gains, worth 4% of GDP, imply aggregate economic gains from emancipation that exceed earlier estimates of the aggregate economic gains from the railroads (Fogel, 1964; Donaldson and Hornbeck, 2016). This 4% gain comes from considering only the wage premium associated with the gang labor system, setting aside broader costs of enslavement.

Emancipation increased aggregate performance of the US economy by reducing social costs of production that were not being internalized, which implies an illustrative comparison to carbon emissions. If a new technology could remove all carbon emissions from the atmosphere, costlessly, it would be a substantial technological innovation but would not directly increase measured aggregate economic surplus when the costs of annual carbon emissions are not deducted from the value of output. Assigning a social cost of carbon, which is also inherently difficult to quantify, this new emissions-reduction technology would properly generate substantial economic gains. Assigning a social cost of enslavement, our estimated aggregate economic gains from emancipation are greater than the implied US aggregate economic gain from the hypothetical elimination of *all* annual US carbon emissions (as a share of GDP).

Emancipation illustrates the substantial potential for economic gains in institutional contexts with coercion or other sources of severe misallocation. Our analysis thereby connects the literature on American slavery with a recent literature that highlights how institutions and misallocation impact aggregate economic performance (Hsieh and Klenow, 2009; Petrin and Levinsohn, 2012; Hsieh et al., 2019; Findeisen et al., 2021; Hornbeck and Rotemberg, 2024). We characterize the institution of slavery as creating an extreme case of labor misallocation. Prior economic history literature has focused on the “expropriation rate” or the share

of enslaved people's marginal product that went to enslavers (Fogel and Engerman, 1974; Ransom and Sutch, 1977). We highlight that even if enslaved people had received 100% of what they produced, that compensation would be substantially less than the costs of slavery incurred by enslaved people. We calculate that enslaved people received consumption goods equal to roughly 7% of their costs incurred, enslavers extracted roughly 7%, and therefore 86% of the costs imposed were wasted. This is the core misallocation under slavery: enslaved people were coerced to work and live under conditions with immense costs to themselves, which exceeded the value of output they produced.

The impact of emancipation provides a stark illustration of how labor misallocation can substantively impact aggregate productivity, which yields a new fact of American history: emancipation led to the single greatest annual increase in aggregate economic performance, by far, in American history. Recent debates about the role of enslavement in American political and economic development highlight the ways in which America's development was influenced by enslavement. We show that turning the focus of economic analysis to the enslaved, and the cost of enslavement incurred by them, reveals that ending America's slave regime did not precipitate a period of economic struggle to be endured; rather, emancipation led to an immediate and sizeable increase in aggregate economic performance. In the last sections of this paper, we discuss in more detail how our emphasis and re-framing complements and departs from the literature on American slavery.

We revisit this topic now, despite all that has been written about slavery, for several reasons. First, re-characterizing the economic impacts of emancipation places American slavery as foundational in the country's development, which generated wealth for enslavers (and some others) but at tremendous costs for the aggregate economy. Emancipation then unleashed immediate aggregate economic gains in the American South and nationwide, with the potential for further gains through later declines in racialized coercion. Second, slavery and emancipation illustrate how aggregate economic surplus can be substantively influenced by market and institutional distortions that misallocate workers. Third, if the moral failure of slavery had indeed been an economic success (Fogel and Engerman, 1974; Baptist, 2014), it would cast doubt on the value of economic success. Slavery would have been morally wrong, even if it were an economic success, but American society did not face such a trade-off: emancipation eliminated a private source of wealth for some, but sparked dramatic aggregate economic gains.

I Emancipation and Aggregate Economic Gains: Theory

We start with a simple model to clarify how emancipation impacted aggregate economic gains in the United States. The model captures the core inefficiency of slavery: that landowners

consider their private costs of employing enslaved people and free people, and the private cost of employing enslaved people is less than the cost imposed on enslaved people. This is the fundamental difference from voluntary labor markets, in which people choose to work only when their compensation is at minimum their cost of working.

I.A Model Setup

We assume that individual landowners produce a commodity output Y with fixed price. There are two sectors: a slave sector s and a free sector f . In the slave sector, landowners/enslavers pay for enslaved people at a total private cost r . This total private cost includes labor payments that are received by enslaved people (their consumption) and labor payments expropriated by enslavers (captured in the annualized market price of enslaved people). In the free sector, landowners/employers pay for free people at wage w . This wage reflects the market cost of free workers, including wage labor or sharecropping, and we set aside ways in which enslavement could affect market wages (Merritt, 2017; Clegg, 2020).

Output in each sector is a function of labor and other inputs, $Y^s = F^s(L, X)$ and $Y^f = F^f(L, X)$. The production function varies by sector, reflecting a greater intensity of work in the slave sector and thereby higher output per person. In the slave sector, the additional value produced by an additional enslaved person is equal to the total private cost r ($\frac{dF^s}{dL} = r$). In the free sector, the additional value produced by a free person is equal to the wage w ($\frac{dF^f}{dL} = w$). These two conditions are a consequence of assuming that markets are efficient in the slave and free sectors, from enslavers' and employers' perspectives. We discuss below the implications of allowing for market distortions, particularly from post-emancipation Southern institutions that restricted Black labor mobility and suppressed wages (e.g., Naidu, 2010; Hornbeck and Naidu, 2014).

We define aggregate economic surplus as the total value of output minus the total cost of inputs. Growth in aggregate economic surplus is closely connected to growth in aggregate welfare (Weitzman, 1976; Basu and Fernald, 2002), though it does not reflect an aggregate welfare function and the distribution of surplus across people. Aggregate economic surplus increases with aggregate productivity growth (Solow, 1957; Jorgenson, 2018), which yields more output value from the same input costs or the same output value from fewer input costs.

Importantly, we define the total cost of labor inputs as the total cost incurred by people (and not only the private cost paid by enslavers or employers). In the free sector, the wage paid is equal to costs incurred by a free person. In the slave sector, we define c as the costs incurred by an enslaved person.

I.B Aggregate Economic Gains from Emancipation

We now consider the aggregate economic gains from emancipating one person, who moves from the slave sector to the free sector. The value of output increases in the free sector ($\frac{dF^f}{dL}$) and decreases in the slave sector ($\frac{dF^s}{dL}$), with a decline in aggregate output value. Aggregate input costs also decline, however, with a decline in labor costs in the slave sector (c) and an increase in labor costs in the free sector (w). Emancipating one person results in aggregate economic gains (AEG) equal to the externality in the slave sector ($c - r$):

$$\begin{aligned}
 (1) \quad AEG &= \left[\frac{dF^f}{dL} - \frac{dF^s}{dL} \right] - [w - c] \\
 &= \left[\frac{dF^f}{dL} - w \right] - \left[\frac{dF^s}{dL} - r \right] + [c - r] \\
 &= c - r.
 \end{aligned}$$

This expression, $c - r$, reflects the gap between the total cost of labor and the private cost of labor in the slave sector. The aggregate economic gain from emancipation is this gap multiplied by the number of emancipated people. Emancipation may also induce changes in other inputs X , but the value marginal product of these other inputs is equal to their marginal cost, so induced changes in other inputs do not have first-order impacts on aggregate economic gains (i.e., the envelope theorem). Emancipating 13% of the US population is larger than a marginal change, but we maintain focus on the core issues by setting aside second-order effects.

If the slave sector and/or free sector were not privately efficient, then there would be additional terms corresponding to the relative magnitudes of private inefficiencies in both sectors. For example, while distortions in free labor markets are not our focus, there would be further aggregate economic gains from moving emancipated workers to labor markets distorted in the opposite direction. When free worker wages are suppressed through restrictions on Black labor mobility, the marginal value of their labor is greater than its cost ($\frac{dF^f}{dL} - w > 0$), such that increasing the number of Black workers in the free sector generates further aggregate economic gains. Similarly, emancipation generates greater aggregate gains when workers in the free sector receive surplus from wages that exceed their opportunity cost of labor. Emancipation also makes it feasible to achieve later gains through reductions in racial discrimination (Hsieh et al., 2019). Our focus, however, is on the main inefficiency from enslavement: that enslavers consider only the private cost of using enslaved labor and not the total cost imposed on enslaved people, so the total cost of their labor is greater than its marginal value ($c - \frac{dF^s}{dL} > 0$).

In using equation 1 to quantify the effect of emancipation, the main challenge is quan-

tifying the total cost incurred by enslaved people (c). Formerly-enslaved people required a substantial wage premium to work under the intensive gang labor system, used under slavery to increase agricultural output per person (for cotton production, in particular). Even this substantial wage premium would not be compensation for all conditions of slavery, however, that were inextricably linked to labor coercion and the extraction of economic value from enslaved people. We also use the “value of statistical life” (VSL) literature to consider a more holistic measure of the costs from enslavement, which we discuss may overstate or understate the cost of enslavement.

From equation 1, the effect of emancipation on aggregate economic gains also depends on enslavers’ private cost of labor (r). This private cost includes the annualized market value of enslaved people, which reflects the value produced by enslaved people in excess of enslavers’ other private costs. In principle, if the market value of enslaved people were sufficiently high, then enslavement could be efficient and emancipation would generate aggregate economic losses. Enslavement would still be morally wrong, but there would then be a trade-off between morality and aggregate economic gains because enslavement was so effective at creating and extracting economic value.

The economic inefficiency of slavery is not that enslavers extracted substantial value from enslaved people; rather, the economic inefficiency is that enslavers only captured a small portion of the total costs imposed on enslaved people. Equation 1 highlights the economic inefficiency from costs incurred by enslaved people exceeding value received by enslavers (equal to costs paid by enslavers). Slavery was not only a substantial transfer of value from enslaved people to enslavers, it was also an inefficient mechanism of transferring value.

There are other inefficiencies of slavery that are not the focus of our analysis. Enslavers incurred costs to provide food, housing, and other consumption goods to enslaved people, though enslaved people would prefer their own consumption choices if they received the wage value of those in-kind transfers. In the free sector, landowner expenditures on labor are fully received by free people in the form of wages; in the slave sector, however, much of landowner expenditure is not received by enslaved people. Similarly, public and private expenditures on the enforcement of slavery represent further losses in aggregate economic surplus. Acemoglu and Wolitzky (2011) focus on inefficiencies from the cost of coercion itself, considering the endogenous determination of coercion levels. Tullock argued that this coercion relied on state support for slavery to be profitable, which imposed costs on enslaved people while being inefficiently subsidized by free workers (Magness, Carden and Murtazashvili, 2023). By contrast, we focus on the inefficiency from labor market distortions even when coercion is free.

Earlier literature explored the Pareto optimality of slavery (Bergstrom, 1971; Findlay,

1975; Canarella and Tomaske, 1975), with an appeal to Coase (1960), but the externality we emphasize can not be internalized due to legal frictions, borrowing constraints, and other transaction costs. Enslaved people valued their time more than enslavers (Moes, 1958), so their inability to purchase their freedom represents a market failure. This relates to the Scitovszky critique of Kaldor-Hicks compensation criteria (Kaldor, 1939; Hicks, 1939; Scitovszky, 1941): enslaved people may be unable to pay enslavers enough for their freedom, but enslavers also cannot pay people enough for their enslavement, so the continuation of slavery does not imply its efficiency. Welfare comparisons are fraught (White, 2008), but we focus instead on how emancipation impacts the total value of output minus total input costs (i.e., aggregate economic surplus).

II Emancipation and Aggregate Economic Gains: Calculations

II.A Labor Income

To begin assessing the approximate magnitude of aggregate economic gains from emancipation, we assign \$40 to be free farms' annual agricultural labor income per person in 1860. This number comes from the Parker-Gallman samples on agricultural output for free farms in the South in 1859/1860, and prices from Towne and Rasmussen, as calculated by Fogel and Engerman (1974). This number reflects the total value of agricultural output, multiplied by a 0.58 labor share, and divided by the number of people. For consistency, we report all numbers on a per capita basis that includes all adults and children. Average per capita income then approximates average per capita consumption, which is notably smaller than prevailing wages for prime-age men.

We assign \$60 to be enslaver farms' annual agricultural labor income per person in 1860, which corresponds to r in equation 1. This number comes from the consumption of enslaved people being roughly \$30 per capita and enslaved people receiving roughly 50% of their output (Ransom and Sutch, 1977). The remaining \$30 would be capitalized into the market value of enslaved people, which at a 7% rate of return implies an average per-capita market value of \$430 for enslaved people. Estimated per-capita market values of enslaved people in 1860 are somewhat higher (\$750 from Wright, 2006), but cotton prices were increasing rapidly in the 1850s and market values of enslaved people in 1860 also reflected expected growth in their value, as enslaved people could be forcibly relocated along Westward expansion of cotton production (Ransom and Sutch, 1977; Calomiris and Pritchett, 2016). This \$60 number also reflects labor productivity of enslaved people being 50% greater than if they were free, which is at the upper range of estimated productivity differences due to greater intensity of work under enslavement (Fogel and Engerman, 1977).

II.B Cost of Enslavement

We now consider the cost of slavery incurred by enslaved people, which corresponds to c in equation 1. These costs are inherently difficult to assess, and the resulting calculations provide a wide range of approximate magnitudes, but the challenges of considering these costs should not distract from their central importance to understanding the aggregate economic consequences of enslavement and emancipation.

II.B.1 Gang Labor Premium

After emancipation, there was a substantial decline in labor supplied by formerly-enslaved people (Ransom and Sutch, 1977; Litwack, 1979; Foner, 1988). Landowners considered paying people a substantial premium to continue working under the “gang labor” system, which had organized enslaved people into high-intensity work groups that generated greater agricultural output per person (Fogel and Engerman, 1980). This wage premium was generally insufficient compensation for the greater intensity of work, however, and these labor arrangements were uncommon (Genovese, 1976; Foner, 1988; Litwack, 1979; Seagrave, 1971). Given a roughly 2.5x wage payment for gang labor contracts after emancipation (Seagrave, 1971) and a \$40 annual agricultural labor income per free person, this gang labor premium implies the cost of enslaved labor exceeded \$100 per person. Fogel and Engerman (1974, 1977) consider costs imposed by the gang system, along with smaller gains to cotton consumers, but these prior estimates do not capture how enslavement distorted labor markets and the resulting aggregate economic gains from sectoral reallocation through emancipation (our equation 1). Also, working in the gang labor system represented only one component of the costs incurred by enslaved people and a more comprehensive accounting is necessary.

II.B.2 Value of Time

Enslaved people lost control of their lives for the entire year (8,760 hours) and research on reparations payment magnitudes has valued this additional time (Craemer et al., 2020). Multiplying the \$40 free labor income by 2, representing payment for approximate “non-working” hours enslaved, and adding the gang labor wage premium gives an enslaved labor cost of \$180 per person. Enslaved people gave up year-round control over their lives and faced separation from their families, such that non-working hours would not be considered “leisure” in the typical sense of free people. This payment for non-working hours also hardly reflects the physical violence endured, fear and mental strain, and general loss of agency over one’s own life. Ransom and Sutch (1977) discuss changes in the material consumption of emancipated workers, including some adjustment for valuing declines in Black labor supply after emancipation, yet they emphasize economic struggles of Black people after emancipation and general economic struggles in the South. As with Fogel and Engerman, this

discussion misses the substantial aggregate gains from sectoral reallocation due to the costs of enslavement.

II.B.3 Value of Statistical Life (VSL)

We also consider a more comprehensive measure of the valuation that people attach to their lives, rather than attempt to assess the costs associated with each particular class of abuse endured under slavery. Characterization of enslavement as all-encompassing is common in slave narratives and in interviews with the formerly enslaved. Doddington (2018) discusses enslavement as creating a dead person inside of the enslaved one, and finds numerous instances in WPA slave narratives where formerly-enslaved people spoke of preferring death to a return to enslavement.¹ Formerly-enslaved people also describe enduring worse than their own death to support their family, such that the absence of mass suicide does not imply more limited costs of enslavement. Enslaved people also lived with some hope of freedom, even though escape attempts were generally unsuccessful and failure resulted in punishment for themselves and their family (Stampp, 1956; Blassingame, 1972). By contrast, the decision to enter indentured servitude came with milder treatment and the promise of future release.

Some enslaved people had an opportunity to purchase their freedom, but the inability of most to pay for their freedom does not imply a lower cost of enslavement. Enslaved people had restricted opportunity to purchase their freedom, despite being willing to pay a premium over the market price for their manumission (Findlay, 1975), and faced severe impediments to borrowing against their future earnings to finance their freedom (Conrad and Meyer, 1958).

The value of freedom is difficult to quantify, but there is a substantial literature on people’s willingness to risk their lives (for reviews and meta-analyses, see Viscusi, 1993; Mrozek and Taylor, 2002; Viscusi and Aldy, 2003; Kochi, Hubbell and Kramer, 2006). This trade-off between income and mortality risk has been studied across various employment settings in the historical United States, including within mining (Fishback, 1992), railroads (Kim and Fishback, 1993), and across industries (Costa and Kahn, 2004). For example, if a person is indifferent to accepting another job with 1% higher annual mortality risk and 150% higher annual salary, then their “value of statistical life” (VSL) is approximately 150 times their annual income. The aggregate economic gains from preventing mortality, or aggregate losses from inducing mortality, are then generally valued using this VSL. The VSL is not well-defined in cases of certainty, but a well-defined 13% mortality risk can be compared to a 13% chance of enslavement for a person born in the United States ignorant of their birth

¹“Liberty or death” was a common refrain among the enslaved (Doddington, 2018), echoing Patrick Henry and other revolutionaries that risked their lives for freedom from comparatively mild oppression even as Henry invoked imagery of the chains of slavery.

circumstances.

Estimates of the “value of statistical life” (VSL) vary substantially across contexts and people’s preferences, but typical values are roughly 100-200 times annual income (Viscusi and Masterman, 2017).² For an annual per capita income of \$40 and VSL multiplier of 150, this implies a VSL of \$6,000 for enslaved people and an implied annualized value of \$420 (\$6,000 VSL multiplied by a 7% interest rate).³

This annualized value of \$420 is not a direct annualized cost of enslavement, given that enslaved people also valued their lives, but much of this value came from the hope of freedom for themselves and their family. This annualized value of freedom also does not include the value of emancipation to their descendants. We report estimates below using an annual \$420 cost of enslavement, along with estimates based on the gang labor premium (\$100) and a valuation of time enslaved (\$180), which illustrate how even the smallest \$100 cost of enslavement reshapes the narrative on the aggregate economic consequences of slavery and emancipation.

II.C Aggregate Economic Gains from Emancipation

When enslavers used enslaved people, with an implied annualized cost to enslaved people of \$420, this cost was unpaid but nonetheless incurred. This imposed cost exceeds the private cost to enslavers of \$60, such that the externality in equation 1 ($c - r$) is \$360 per person. Multiplying by 4 million emancipated people gives \$1.44 billion, which is 35% of total US GDP in 1860 (\$4.17 billion in 1860 dollars, Gallman (1966)).

Emancipation would then generate substantial aggregate economic gains, worth the contribution to GDP from a 35% increase in aggregate productivity. Aggregate productivity growth generally increases the value of output in excess of accompanying increases in input costs; in the case of emancipation, output declined but the cost of inputs declined much more when including the costs incurred by enslaved people. Annual technology growth in this era was roughly 0.5% (Abramovitz and David, 1973), so the aggregate economic gains from emancipation were worth roughly 60 years of technology growth (compounded).

Focusing on slave states only, the VSL numbers imply an economic gain from emancipation that was worth 99% of slave states’ GDP (\$1.46 billion in 1860, Lindert and Williamson (2012)). By comparison, their agricultural output is estimated to have declined 33% from 1860 to 1880 (Ransom and Sutch, 1977; Wright, 1978; Brinkley, 1997). Ransom and Sutch (1977) attribute this to declining Black labor supply, rather than destruction from the Civil

²The implied VSL is generally larger than the net present value of people’s incomes, as people value their lives substantially more than their material consumption.

³We use the annual income for free people (\$40), rather than the annual consumption of enslaved people (\$30), because the annual consumption of enslaved people is artificially suppressed through coercion and their free lives are not worth less to themselves because they receive less in-kind consumption under enslavement.

War, and this voluntary decline in labor supply is itself an indication that output was artificially and inefficiently high through coercion.⁴ Output is inflated by coercion (Barzel, 1977; Geloso, 2023), and output declines after emancipation in our stylized model, but it is the declining costs of enslavement that increase economic efficiency and generate large aggregate economic gains.

We compare the aggregate economic gains from emancipation to GDP, as a benchmark, just as the gains from innovations are conventionally expressed relative to GDP. Regardless of benchmark, however, the absolute economic gain from emancipation (\$1.44 billion) is large relative to GDP, the aggregate gains from annual technological innovation, or the aggregate gains from the railroad network.

It is an illustrative comparison to the aggregate economic gains from the railroad network because emancipation and the railroads both have large effects due to misallocation (in opposite directions). When the economy is assumed to be efficient, the aggregate economic gains from the entire railroad network constructed by 1890 are roughly 2.7% (Fogel, 1964) or 3.2% (Donaldson and Hornbeck, 2016). When the railroad network is allowed to increase production in a distorted economy, where the marginal product of inputs is greater than their marginal cost, the railroad network constructed from 1830 to 1890 is estimated to generate annual economic gains worth 27% of GDP (Hornbeck and Rotemberg, 2024). In reverse, the slave economy created conditions where the marginal product of enslaved labor was less than its marginal cost, such that emancipation generated annual economic gains worth 35% of GDP.

Emancipation could have decreased aggregate economic surplus, in principle, if enslavement were more “effective.” If enslavers were able to capture more value from enslaved people, such that the average market value of enslaved people were \$5600 in 1860 (\$390 / 7%), then the private cost to enslavers (r) would equal the cost to enslaved people (c) and slavery would be economically efficient (i.e., equating the social marginal product and social marginal cost of inputs).

Relatedly, if enslavers were required to pay an annual \$360 tax per enslaved person, that would force enslavers to internalize the costs imposed on enslaved people. This tax would be generally prohibitive, however, at 600% the value of enslaved people’s annual output. This substantial implied Pigouvian tax, for any remaining enslavement to be economically “efficient,” suggests a comparison to carbon emission externalities that is illustrative.

In the modern United States, the economic cost of annual US carbon emissions is not deducted from GDP. The introduction of a new technology that costlessly absorbs all US

⁴The decline in Black women’s labor supply is overstated after emancipation, due to transition into unpaid family labor, but still reflects womens’ distorted labor supply due to enslavement and coercion.

carbon emissions would then not directly increase GDP, but would increase actual US aggregate economic surplus by reducing these unaccounted-for costs. For an estimated social cost of carbon of \$51 per ton (EPA, 2021), removing all 6.3 billion tons of US annual carbon emissions would be worth 1.2% of US GDP (26 trillion in 2022, BEA 2023). These EPA guidelines value mortality risk with a VSL that is 200 times average income: \$4.8 million in 1990 dollars, compared to 1990 GDP per capita of \$24,000 (EPA, 2016). For a higher \$185 per ton social cost of carbon (Rennert et al., 2022), eliminating all US carbon emissions would be worth 4.5% of US GDP. These aggregate economic gains are substantially less than the gains from eliminating the use of enslaved labor in the US, as a share of contemporaneous GDP.

Emancipation came through substantial cost of the Civil War (Goldin and Lewis, 1975), though emancipation itself would not inherently require a Civil War. In principle, emancipation could have been achieved at lower cost through compensation to enslavers (Goldin, 1973), though the acceptance and implementation of compensated emancipation faced substantial challenges. Gradual emancipation would also have prolonged the costs of enslavement that were not only a redistribution of wealth between enslavers and the enslaved but imposed substantial annual aggregate losses.

Our estimates also imply notable improvements in aggregate economic efficiency from self-emancipations, when people escaped enslavement. For every \$1 dollar increase in their consumption (from \$30 to \$40), they generated a \$36 increase in aggregate economic surplus (\$420 minus \$60). Assisted emancipations, such as through the underground railroad, generated substantial social return.

Following the Civil War, there was consideration given to providing formerly-enslaved people 40 acres of land per family. In contrast to the substantial costs that had been imposed on enslaved people, this transfer would have cost roughly 15% of GDP as a one-time cost or 1.1% of GDP on an annualized basis. This calculation reflects an average 1870 land value of \$13 per acre in Kansas (Census of Agriculture, 1870; Haines, 2010), which was a destination of Black Exodusters, and 1.2 million families of the formerly-enslaved (3.3 people per imputed family in the complete 1870 Census of Population from IPUMS), with the cost annualized at 7% interest.

These land transfers were not made and the value would be substantially larger now, compounded at 7% interest from 1870 to 2023. This would be worth \$500,000 for each of the estimated 40 million descendants of people enslaved in the US. This is larger than the modern racial wealth gap of \$160,000 per person, which is a focus in research on reparations payment magnitudes (Darity and Mullen, 2020). However, the total annualized cost of these \$500,000 payments is only 5.3% of US GDP and smaller than the gains from emancipation as

a share of GDP. Reparations payments are also a transfer, in contrast to the lost aggregate value through inefficient transfers under enslavement.

We do not consider general equilibrium effects from emancipation. This large reallocation of people, from the slave sector to free sector, had a variety of further economic and political consequences. Increased production in the free sector would generate *more* gains if input-use there was distorted below efficient levels (Naidu, 2010; Hornbeck and Rotemberg, 2024), but we focus on the direct distortion in the slave sector from enslavers not internalizing the costs imposed on enslaved people. Advancement of formerly-enslaved people was delayed by the end of Reconstruction and Jim Crow laws (Engerman, 2003; Althoff and Reichardt, 2024). By contrast, enslavers' children more quickly recovered from the loss of slave wealth, as enslavers' families leveraged marriage networks and social connections (Ager, Boustan and Eriksson, 2021).

The birth of enslaved children made slavery more inefficient, in aggregate, because the private return from children's enslavement is substantially below the value of their lives to them and their parents. Indeed, mortality rates were very high for enslaved children and declined substantially after emancipation. As the enslaved population increases, emancipation generates greater aggregate economic gains.

Table 1 summarizes our calculated aggregate economic gains from emancipation, under alternative parameters. Row 1 reports our baseline calculation for VSL-implied costs to enslaved people. Rows 2 and 3 report a broader range of estimates, where the assumed VSL is 200-times or 100-times annual per capita income (\$40 for agricultural labor income per capita). Row 4 reports substantially larger gains from emancipation, valuing enslaved people's lives based on average GDP per capita (\$130) that assigns equal economic value to people in the US. Rows 5 and 6 report smaller gains from emancipation, based on valuation of time and the gang labor wage premium.

Even the smallest estimated gain from emancipation is worth 3.8% of US GDP and 11% of slave states' GDP on an annualized basis, or 7 years of technological innovation. This aggregate annual gain, as a share of national GDP, exceeds Fogel's estimated annual gains from the entire railroad network constructed by 1890. This smallest estimated gain also reflects a very partial measure of the costs of enslavement, based only on the gang labor wage premium, which neglects the many associated costs of enslavement beyond a greater intensity of labor effort.

III Shifting the Literature on American Slavery

These sections further discuss how our characterization of American slavery complements and departs from prior literature. We emphasize the costs to enslaved people in considering

economic concepts like efficiency and productivity, which re-frames the aggregate economic impacts of emancipation. We draw on a modern literature that highlights the connection between misallocation and aggregate economic growth (Hsieh and Klenow, 2009; Hornbeck and Rotemberg, 2024), for which American enslavement illustrates how extreme labor market distortions can create the potential for extreme aggregate economic gains.

III.A The “Efficiency” and “Productivity” of Slavery

Historical debates on the economics of slavery have explored many issues, including the profitability of slavery and the material well-being of enslaved people relative to free wage laborers. These debates precede the Civil War (Estes, 1846; Fitzhugh, 1857), with origins in abolitionist and pro-slavery writings, and have continued through later writings (e.g., Stampf, 1956; Conrad and Meyer, 1958; Fogel and Engerman, 1974; Gutman, 1976; Genovese, 1976; Ransom and Sutch, 1977; Baptist, 2014).

Slavery was profitable, from the perspective of enslavers, because the labor income generated by enslaved people was higher than the financial costs of maintaining an enslaved person. These profits were capitalized in the substantial market value of enslaved people.⁵ This view is largely accepted despite abolitionist arguments that slavery was a backward unprofitable institution (see Wright (2006)) and arguments that unprofitable slave labor existed more as a social institution (as in Philips (1918)). A more-contested issue, outside our focus, is whether slavery discouraged Southern economic growth more generally (Wright, 2017; Bleakley and Rhode, 2024), or whether slavery broadly encouraged US economic growth (Baptist, 2014; Beckert, 2014; Hilt, 2020; Wright, 2022).

Particularly controversial has been estimating the material well-being of enslaved people, which has included estimating the “rate of expropriation” (i.e., the share of enslaved people’s output that enslaved people did not receive). Ransom and Sutch (1977) estimate that enslaved people did not receive 50% of their output, an upward revision to the 10% estimate by Fogel and Engerman (1974) who provocatively compare this favorably to average tax rates. This “rate of expropriation” does not reflect what was truly taken from enslaved people, however. Enslaved people could have received all of their marginal output, or even more than they produced, but still incurred costs of enslavement that substantially exceeded what they received. The previous focus on expropriation rates is about who consumes the output of enslaved people, which misses the core inefficiency of slavery that arises from the greater costs of enslavement. An alternative calculation would be (one minus) the output received by enslaved people (\$30) as a share of the costs incurred (\$420), which we estimate at 93%. Further, enslavers kept only 7% of the cost imposed on enslaved people and 86% of

⁵See Stelzner and Beckert (2023) for a recent example of using the prices of enslaved people to consider the contribution of enslavement to US GDP growth.

this cost was entirely wasted.

Characterizations of slavery as “efficient” reflect enslaved people working within a market economy, from the perspective of enslavers, whereby enslavers sought to maximize their own profits by equating the marginal product of labor with their private marginal cost of labor. We emphasize an aggregate perspective that includes all input costs, and not only those internalized by enslavers, whereby enslavement is inefficient because it did not equate the marginal product of labor with the social marginal cost of labor that includes costs incurred by enslaved people. Free labor markets generally do not have this issue because the costs incurred by free workers are reflected in the wages they accept voluntarily. Coercion makes enslavement distinct from increased factory intensity, for example, which is reflected in compensating wage differentials. Similarly, while early economic growth may have come at health costs, such as increasing urban mortality through the industrial revolution (Beach and Hanlon, 2017; Antman, 2022; Alsan and Goldin, 2019), people’s choice of material well-being creates more presumption that the gains exceed the costs in contrast to when that decision is coerced.

Slavery was “productive” in the sense that enslaved people produced high levels of output, and total factor productivity (TFP) declined after emancipation reflecting lower output relative to workers, capital, and land (Ransom and Sutch, 1977). Declining TFP does not reflect people forgetting production methods after emancipation; rather, formerly-enslaved people could not be paid enough to endure such conditions, which indicates those methods produced less than the costs incurred.⁶

This now generally accepted view of slavery as productive is in contrast to Smith (2000) and Von Mises (1927), among others, who argued that people not working on their own account had less incentive and would therefore be less productive. Hummel (2012) discusses this literature, with a focus on the “deadweight loss” output consequences of slavery from misaligned incentives for work and innovation, along with reference to costs of enforcement (Acemoglu and Wolitzky, 2011) and costs imposed by gang labor (Fogel and Engerman, 1974). Emancipation decreases output in our stylized framework, from \$60 to \$40 per person, which is associated with decreased labor intensity and increased leisure (Barzel, 1977; Ransom and Sutch, 1977). Our focus on the costs of enslavement produces much larger efficiency gains, however, than the sense in which output is overstated under enslavement.

Slavery increased output through imposing “non-pecuniary” costs on enslaved people (Engerman, 1973; Baptist, 2014; Naidu, 2020), but these were only “non-pecuniary” be-

⁶While sharecropping produced less than plantation methods, observers found that formerly-enslaved people “appear to be willing to work, but are decisive in their expressions, to work for no one but themselves” (Litwack, 1979, p. 446).

cause enslavers used coercion to avoid paying those costs. These costs were still incurred, in practice, and emancipated people required substantial payment to endure such conditions. Aggregate economic surplus is the value of output minus the value of costs, and these costs should be subtracted from output value to characterize aggregate performance of the US economy under slavery. Technological innovations that increase aggregate productivity generate economic surplus not because they increase output itself, but because they increase output beyond any accompanying increases in inputs (or they decrease inputs by more than they decrease output).

We characterize emancipation as not only a transfer of measured income into unmeasured non-pecuniary income (as in Atack, Passell and Lee, 1994), but something more because the non-pecuniary costs were greater than the income gains. This makes emancipation an efficiency-enhancing transfer reflected by the growth in aggregate economic surplus. The cost savings by formerly-enslaved people are not reflected in GDP, or material consumption, but still reflect a dramatic improvement in aggregate economic performance and overall economic surplus.

Output declined after emancipation, with particular declines in child and female labor (Ransom and Sutch, 1977; Litwack, 1979; Jones, 1985; Hunter, 1998), but these voluntary declines in labor force participation indicate the costs of working exceeded the return from working. We also leave aside the decline in child labor due to schooling, which reflects further generational gains as education and human capital investment increase productivity.

Emancipation also brought about changes in the geographic allocation of workers. In the antebellum era, the movement was from the the “Old South” to the “New South,” where enslaved people were allocated to places and tasks where their marginal product was highest (Fogel and Engerman, 1977; Naidu, 2020), but with emancipation the strong desire of formerly-enslaved people to relocate and connect with family members illustrates that higher marginal product came at even higher marginal costs. One of the main costs of enslavement was separation from family, or living under the threat of separation, whereas one of the main benefits to enslavers in the 1850s was the ability to transfer enslaved people to areas with increasing cotton production (i.e., the “New South”). There was only an elastic supply of enslaved people at private cost r because of this coercion and relocation, which is part of the high cost c to enslaved people. This separation between the costs and benefits of geographic relocation highlights part of the core externality creating a disconnect between the private and social costs of enslaved labor.

From the perspective of maximizing aggregate output value minus aggregate costs, including costs to enslaved people, the geographic and occupational mobility of formerly-enslaved people after emancipation suggests they had been forced to live in the wrong places under

the wrong conditions. Goldin (1973) emphasizes the private efficiency from inducing enslaved people to work in agriculture where they produced relatively more, in contrast to urban sectors in which free labor and enslaved labor were more similarly productive, but this comparison reflects the relative output for enslavers rather than the output of enslaved people relative to their costs incurred by sector.

Post-emancipation production exhibited greater dispersion in marginal products, which can indicate lower allocative efficiency (Naidu, 2020), but this reflects closer alignment between marginal products and marginal costs under (more) voluntary labor markets when including costs that were incurred by enslaved people. The post-reconstruction economy was characterized by various efforts to restrict black labor mobility and extract additional value (Naidu, 2010), but these reflect milder coercion than under enslavement. Market frictions after emancipation are also part of the legacy of slavery, as the formerly-enslaved had reason to distrust contracts signed with people who only a short time earlier had coerced their labor and lives.⁷

The general notion of economic decline after emancipation is in sharp contrast to the gains from emancipation that should be celebrated as miraculous growth in aggregate economic surplus, comparable to gains from the largest sources of aggregate productivity growth. Wright (1997) focuses on Southern economic struggles after emancipation, which reflects the perspective of output, but the Southern economy had actually just experienced dramatic growth in the difference between output and costs. This is because the antebellum economy used enslaved labor far beyond what would equate marginal value and marginal cost, which was an economic problem solved through emancipation.

We are characterizing aggregate economic gains after emancipation, which are distinct from changes in social welfare under some social welfare function. Economic analyses of slavery generally presume that emancipation increased welfare of enslaved people, transferring material consumption from enslavers to the formerly-enslaved with a decline in total consumption. Declining output and total consumption then represent the price paid for abolishing slavery, an uncontroversial moral wrong, but efficient markets maximize the difference between output and costs rather than output itself.

Growth in aggregate economic surplus is meaningful for society because there is more output without correspondingly more use of inputs. If output only increases because labor inputs increase, then there are not more resources for society to consume net of the value of labor. If the value marginal product of labor is lower than its marginal cost, then aggregate

⁷Former enslavers also proved themselves to be untrustworthy: “a Tennessee planter promised, they would be awarded a share of the crop... But when the two freedmen stood before their former master to obtain the promised shares, he refused to pay them anything, declared he could no longer support them, and ordered them off his land” (Litwack 1979, p. 420).

economic surplus declines as labor inputs increase. When the value marginal product of labor is substantially below its marginal cost in one sector (the slave sector) and more approximately equal to its marginal cost in another sector (the free sector), then aggregate economic surplus increases when reallocating workers from the slave sector to the free sector through emancipation – just as aggregate economic surplus increases from technological innovation. This is an under-appreciated implication of input misallocation, across sectors in this case, which has substantial implications for aggregate economic growth (Hsieh and Klenow, 2009). Emancipation provides a clear illustration of the potential aggregate economic gains from reallocating workers in the presence of severe sectoral misallocation.

Enslavement was not a market economy, from the perspective of enslaved people who were coerced to work without a direct relationship between the value of their labor and cost of providing that labor, so there would be no presumption that market forces would direct production toward efficient outcomes. Whether this system was “capitalist” depends on the definition of capitalism, but historians and economists have focused on the market-aspects of the slave economy from the perspective of enslavers in adopting various definitions (Baptist, 2014; Hilt, 2020). Lamoreaux and Wallis (2023) define advanced capitalist societies as those where more people are free to use their labor and resources as they see fit; in this sense, emancipation was a dramatic movement toward the US becoming a more capitalist society.

Fogel (1989) argues that the “material success” of slavery should be held in contrast to its moral horror and exploitation (p. 9). We propose an alternative comparison, in which slavery was also an aggregate economic failure because it produced much less than the costs it induced. The key paradigm shift is in treating enslaved people and their costs incurred as part of the aggregate economy, rather than focusing on aggregate output or aggregate output net of costs incurred by enslavers only. Even the material well-being of enslaved people, often focused on in the literature, is not particularly informative about aggregate well-being because people do not directly maximize their caloric intake, overall nutrition, or height. The immorality of slavery becomes more reflected in the economics of slavery once the costs are appropriately included.

David and Temin (1974) argue that Fogel and Engerman (1974) “overlook the economic essence of slavery, namely, that the slaves lost the freedom to exercise choices as producers and consumers.” David and Temin (1974, 1979) then focus on welfare, and the inability of economic analysis of material well-being to inform the broader question of social welfare. Indeed, enslavement reduces aggregate welfare when enslaved people receive sufficient weight in the social welfare function, but focusing instead on aggregate economic surplus allows our framework to clarify how enslavement was inefficient and unproductive from an aggregate perspective.

We show that emancipation brought immediate economic prosperity, as abolitionists had hoped, when economic prosperity is defined to include the production costs incurred by enslaved people. But we do not argue that enslavement held back the market economy, as abolitionists claimed, as it did extract substantial wealth for enslavers.

III.B Centering the Costs of Slavery

Our framework connects economic analysis of slavery with the broad more-qualitative literature that highlights the myriad substantial costs imposed on enslaved people. These costs were not tangential to “economic production;” rather, enslavers’ extraction of value from enslaved people was inextricably linked to the all-encompassing control of enslaved people’s lives.⁸ Enslavers’ journal entries note many deaths as overworked and undernourished people perished as they labored (Steckel, 1986*a,b*). Through coercion, enslaved people were induced to work to the point of heatstrokes, fainting, and muscle tears. Enslavers remarked that maintaining a productive slave system required fear of severe punishment or death (Stampf, 1956). Overseers were incentivized to induce additional output, and contemporaries noted how the profit motive lay behind the harsh overwork of enslaved people. One white Mississippian told Frederick Law Olmsted, the *New York Daily Times* journalist who wrote a widely popular series detailing his research visits to the antebellum South, “I’d rather be dead than be a nigger on one of these big plantations” (Stampf, 1956, p. 85).⁹

Public displays of abuse and terror were not only forms of labor discipline, but also displays of power necessary to keep the social and cultural norms of American enslavement intact (Hartman, 1997). Indeed, being made to watch physical abuse is its own form of psychological abuse. Frederick Douglass notes that witnessing one particularly harsh whipping of an elderly stableman, Old Barney, was the moment that convinced him that he had to escape enslavement because of its ritualistic brutality (Douglass, 1994).

While enslaved people had some influence over their work (Blassingame, 1972; Genovese, 1976), these were insufficient checks for enslavers to fully internalize the costs imposed on enslaved people. There was a general rule that work on Sundays was forbidden, which

⁸From the WPA narrative of Walter Rim of Fort Worth, TX: “I seed him git one whippin’ and nothin’ I can do ’cept stand dere and cry. Dey gits whippin’s every time massa feels cross. One slave name Bob Love, when massa start to whip him he cuts his throat and dives into de river. He am dat scairt of a whippin’ dat he kilt himself.” The full narrative has been digitized here: https://freepages.rootsweb.com/~ewyatt/genealogy/_borders/

⁹From Doddington (2018): “Henry Bibb was equally clear in highlighting how resistance was inseparable from the masculine role of protector: ‘I thought if I must die, I would die striving to protect my little family from destruction, die striving to escape from slavery’ (p. 28). Similarly, when Peter Bruner was captured, he voiced a similar sentiment: “Bruner stoically informed his captor ‘that I would rather he would kill me than to take me back home and that it did not make a bit of difference with me what he did with me, I would as lief die now as any other time’ ” (p. 43-44).

reflected practical limits to what enslavers could extract.¹⁰ Extreme mistreatment of enslaved people was also limited by the market itself, particularly the rising prices of enslaved people. One enslaver in 1849 noted “The time has been that the farmer could kill up and wear out one Negro to buy another; but it is not so now. [The prices of] Negroes are too high in proportion to the price of cotton, and it behooves those who own them to make them last as long as possible” (Stampp, 1956, p. 81). Indeed, the Alabama agricultural society noted that crop yields were related to enslaved people being overworked, with excess mortality and infant mortality explicitly noted (Stampp, 1956). These checks on extreme work reflect limits from their perspective as businesses using a machine or mule that might break down, rather than additional costs borne by the machine or animal itself.

Enslavement extended far beyond a labor relationship to impact every feature of enslaved people’s lives. The typical plantation was not a farm business as much as a combined agricultural and socially policed operation (Stampp, 1956; Blassingame, 1972; Genovese, 1976; Baptist, 2014; Rosenthal, 2018).¹¹ Constantly monitored, enslaved people were to have as little contact as possible with free Black people, could not work without direct approval, and had to obey strict requirements on conduct at all times. The nature of the autonomous and isolated plantation severely limited the social lives of the enslaved. Religious songs with hopeful aspirations have been elevated in the narrative, highlighting hopes for freedom and an end to misery, but songs also featured family breakup and violence at the hands of enslavers (Levine, 2007). Enslavers encouraged Christian practices among the enslaved, but religious practices were overseen by enslavers to maintain control (Franklin, 1947; Genovese, 1976; Jones, 1985; Levine, 2007), and the post-emancipation ability to organize freely and worship without white supervision was a critical and highly-valued component in early post-emancipation life (Sernett, 1999).

Enslavement substantially disrupted enslaved people’s family form, function, and relationships (Frazier, 1939; Gutman, 1976). Characterizations have varied on the rates of family breakup and enslaver control over intimate family behavior (Franklin, 1947; Fogel and Engerman, 1974; Pritchett and Logan, 2018), but such relations were manipulated for the purpose of labor coercion. After emancipation, the narrative record describes formerly-enslaved people searching for family members separated by enslavers (Gutman, 1976; Litwack, 1979; Foner, 1988). Emancipation and the ability to form and manage households of one’s choos-

¹⁰If work was required on Sunday, Louisiana law stated that “slaves are entitled to the produce of their labor on Sunday; even the master is bound to remunerate them [the enslaved], if he employs them” (Genovese (1976), p. 315).

¹¹We use references to “landowner,” “farm,” and “agriculture” throughout for exposition, but note that enslavers were also involved in production outside of agriculture and that enslavers leveraged the value of enslaved people to secure credit for other non-agricultural economic activities (González, Marshall and Naidu, 2017).

ing, along with the free agency to manage daily mundane tasks, were highly valued in these WPA narratives, contemporaneous slave narratives, interviews, and media reports. The coercion under enslavement that existed outside of work times was necessary to ensure labor coercion. During enslavement, the two were related and inseparable in forming cultural and social relationships that governed plantation life (Stampp, 1956; Blassingame, 1972; Genovese, 1976; Jones, 1985; Engerman, 2003).

Slavery treated enslaved people as commodities or capital that were traded and used within that market system (Steckel and Ziebarth, 2013; Berry, 2017; Jones-Rogers, 2019). Enslavers' accounting practices were quite modern for the time, especially in their accounting for individual-level output at a granular level (Rosenthal, 2018), but from the narrow perspective of enslavers' profit maximization. The consideration of aggregate economic performance under enslavement, and the impacts of emancipation, requires a different accounting of the costs imposed on enslaved people than that considered by enslavers in making their production decisions. While enslaved people were treated like capital, the costs imposed on them are distinct from the costs of using capital goods. These further costs of enslavement are well-known in the historical record, but have been neglected in considering their implications for aggregate economic gains after emancipation.

Forms of coercion on plantations were numerous. While there were incentive systems on a limited number of plantations (Fogel and Engerman, 1974), incentives were substantively rarer than punishments (Gutman, 1975). For example, one narrative describes an enslaver offering prizes based on quantities of cotton picked and using that information to punish people if their future picking fell below those individual-specific thresholds (Rosenthal, 2018, p. 96). The fear of punishment is also costly, and induces more-than-optimal effort even when punishment is not applied in equilibrium. Steckel (1986*a*) estimates mortality rates for enslaved people that are inconsistent with "benevolent" slavery and further shows that enslaved children were very malnourished (Steckel, 1986*b*). Slave narratives further detail forms of physical, emotional, and sexual abuse that came to define the American enslavement experience.

This does not imply that enslavers used violence "irrationally" or excessively from their own private perspective; rather, it may pay an enslaver to coerce someone into higher production, which lowers the enslaved person's health and life expectancy. Enslavers used whippings to punish adultery and discourage divorce (Franklin, 1947; Stampp, 1956; Fogel and Engerman, 1974), but it would not follow that this trade-off is socially optimal. Similarly, emancipation could even reduce the material well-being of Black people in some dimensions (DeCanio, 1974; Downs, 2012), but caloric intake or consumption are not the totality of what people optimize for themselves. Even if there were a post-emancipation increase in drunk-

eness, or buying of “frivolous things,” there was a sharp dividing line between freedom and slavery for emancipated people (Gutman, 1976, pp. 136-7).¹²

The lives of enslaved women are particularly illustrative of coercion under enslavement and the impacts of emancipation. Enslaved women worked in the fields up to the week of the birth of their children and were returned to the fields less than a month later (Fogel and Engerman, 1977). Relatedly, the infant and child mortality of enslaved children was particularly pronounced, with infant mortality twice the national rate and remaining at that level until age 10 (Steckel, 1986*a*). The coercion of enslaved women included sexual exploitation, which extended also to enslaved men (Foster, 2019). Even after giving birth, enslaved women found their biological products marketed for consumption as wet nurses (Jones-Rogers, 2019).

Labor force participation declined considerably after emancipation, particularly for Black women. By hours worked, the decline was between 40% and 55% for Black women, while for Black men the declines were 15% to 20% (Ransom and Sutch, 1977). Even with the promise of contractually higher earnings for greater productivity, emancipated people were generally vigilant in protecting their leisure time, particularly time away from the fields for women and children (Litwack, 1979).

The decline in labor force participation was not entirely spent in leisure, however. A significant reallocation was made to household work and childcare, particularly by Black women, as these tasks had been centralized and/or discouraged on large plantations. Black women advocated for this time to attend to their own households, and some labor contracts after emancipation explicitly noted household tasks that Black women were to perform, and therefore they were not expected to provide labor outside of their household during those times (Litwack, 1979; Jones, 1985; Hunter, 1998). Forcing these women into the labor force would increase measured market output, but decrease aggregate output relative to input costs as valued by them. A similar argument can be made for children, who would be forced out of school and into the labor market.

This formulation of aggregate economic gains from the end of enslavement is consistent with Adam Smith’s negative view of slavery, but for different reasons. Smith maintained that enslaved labor would not be as productive as free labor because free workers have better incentives. Indeed, reductions in serfdom may have improved incentives such that output increased (Markevich and Zhuravskaya, 2018). The high levels of output per capita of American slavery brought this long-held view under question. We contend that enslaved

¹²Some estimates indicate declines in Black life expectancy after emancipation, driven by migration to urban areas and the urban mortality penalty (Downs, 2012). This does not indicate reductions in well-being after emancipation, however, because one mechanism underlying people’s valuation of their lives is their ability to make decisions that could result in their deaths (migration to cities, consumption of alcohol, etc).

people in the United States were coerced to produce more output than free people, but the costs imposed on enslaved people exceeded the increase in output. Enslavement in the United States distorted the incentives of workers such that the marginal cost of labor far exceeded the marginal benefit, rather than enslavement reducing incentives of enslaved people to work.

IV Conclusion

Using insights from the recent literature on misallocation, we find that emancipation was a large source of aggregate economic gain to the American economy. The substantial aggregate economic gain from emancipation reshapes our understanding of the historical foundation of the American economy and its growth. Emancipation also illustrates how growth in aggregate economic surplus can be substantively influenced by market distortions. Coercive institutions, such as American slavery, create severe misallocation and a pent up potential for substantial aggregate economic gains.

Emancipation unleashed one of the largest bursts of aggregate economic gains in American history, which arose not from technological innovation but from institutional innovation that ended chattel bondage. This fundamentally changes the characterizations of Southern economic decline after emancipation and its subsequent convergence. Output declined in the South after emancipation, and later converged, but costs declined so substantially that even this output decline represented a miraculous aggregate economic gain relative to corresponding gains from technological innovation. Subsequent labor market imperfections – from racial discrimination, restrictions on geographic mobility, and occupational exclusion – reflect efforts to return partially to antebellum coercion, with associated aggregate economic losses that were regained through subsequent racial progress.

Our analysis highlights economic losses from coercion and, more generally, racial and sexual harassment and oppression. Such actions may generate some gains to those exerting power, but generally impose substantially larger costs on those coerced. Such actions are not predominately redistributive, benefiting some at similar expense to others, but lead to substantial aggregate losses. When those in power benefit from such systems, though, institutional changes can be required to generate these large aggregate gains.

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Table 1. Aggregate Economic Gains from Emancipation, Alternative Scenarios

Scenario:	Annual Cost to Enslaved People	Annual Value of Output	Emancipated People	Aggregate Economic Gain	Share of US GDP	Share of Slave States GDP
	(1)	(2)	(3)	(4)	(5)	(6)
1. VSL cost (150x, \$40 income)	420	60	4 million	\$1.44 billion	35%	99%
2. VSL cost (200x, \$40 income)	560	60	4 million	\$2.00 billion	48%	137%
3. VSL cost (100x, \$40 income)	280	60	4 million	\$0.88 billion	21%	60%
4. VSL cost (150x, \$130 income)	1,365	60	4 million	\$5.22 billion	125%	358%
5. Gang labor cost & Value of Time	180	60	4 million	\$0.48 billion	12%	33%
6. Gang labor cost	100	60	4 million	\$0.16 billion	3.8%	11%

Notes: Each row reports calculated aggregate economic gains from emancipation under alternative scenarios. Row 1 calculates the annual cost of enslavement (in Column 1) based on the value of statistical life (VSL): 150 times annual income per capita (\$40), annualized at 7% interest. Column 4 is the difference between Column 1 and Column 2 (the annual value of output, which is equal to the annual cost to enslavers, including annual consumption of enslaved people and the annualized market value of enslaved people), multiplied by Column 3 (the number of enslaved people emancipated). Column 5 expresses this aggregate economic gain as a share of United States GDP, and Column 6 expresses this aggregate economic gain as a share of slave states GDP.

Rows 2 and 3 report alternative calculations, based on the VSL being alternative multiples of annual income (200 or 100). Row 4 calculates VSL based on GDP per capita, rather than lower agricultural income per capita.

Row 5 assigns an annual cost to enslaved people based on the post-emancipation wage premium associated with the intensive gang labor system and assigning a wage value to "non-working" time enslaved. Row 6 uses only the gang labor wage premium.