

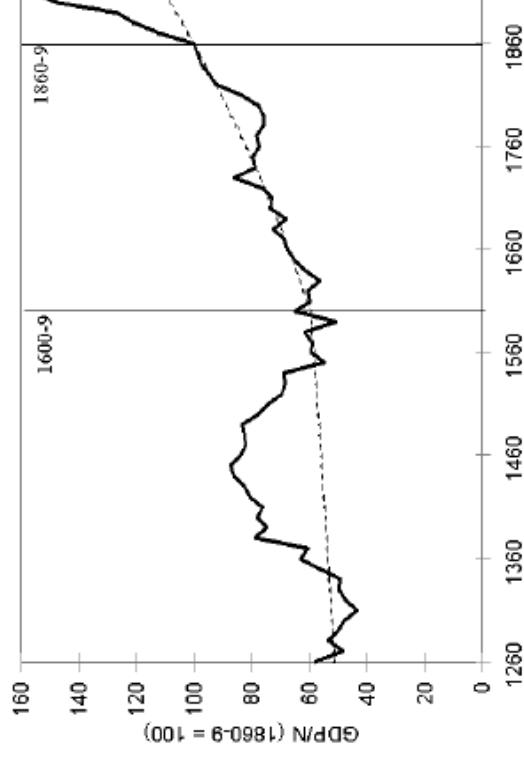
**Tuesday April 8**

**Social Consequences of  
Economic Growth:**

**The Long Run**

- Last time we discussed the debate over the short-run social consequences of the Industrial Revolution.
- The conclusion was that there was some evidence of a decline in working class living standards in at the very beginning of the Industrial Revolution.
  - This is what Clark's estimates show. (notice again the downturn after 1760).
- But this decline is modest, short-lived and reversed quickly.

Figure 10: Real GDP per Person, England, 1260-1914



- And there is no question about what happened subsequently: a dramatic improvement in living standards.
- Between 1800 and 1900, per capita GDP, a very rough and ready measure of living standards, doubled.

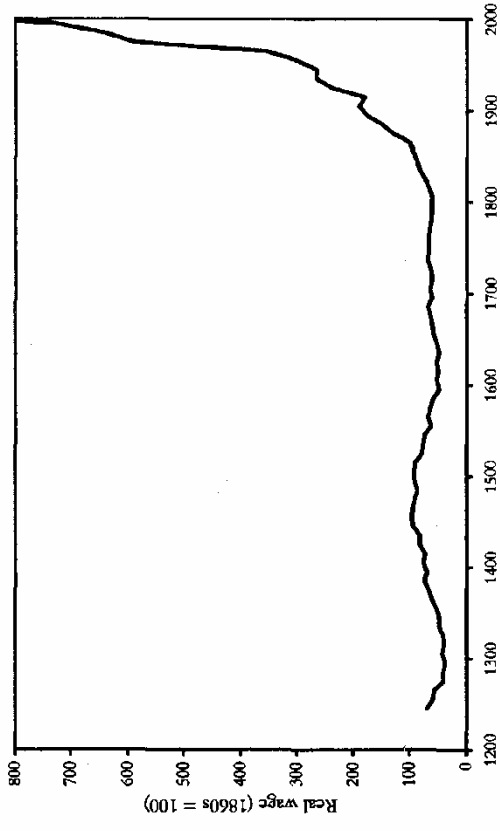


Figure 14.3 Real hourly wages for building laborers in England, 1200–2000. Data from Clark, 2005.

- And the improvement was even faster in the 20<sup>th</sup> century.
- We see this for Britain in Clark's Figure 14.3.
- And the same was true for other parts of the world, with the geographical spread of modern economic growth.
- One can question the representativeness of building laborers (whose wages are shown here). But, in fact, if anyone could not share in the benefits of modern economic growth, Marx and Engels would have said it was just such unskilled workers. And measured by their real wages, they clearly have benefited.

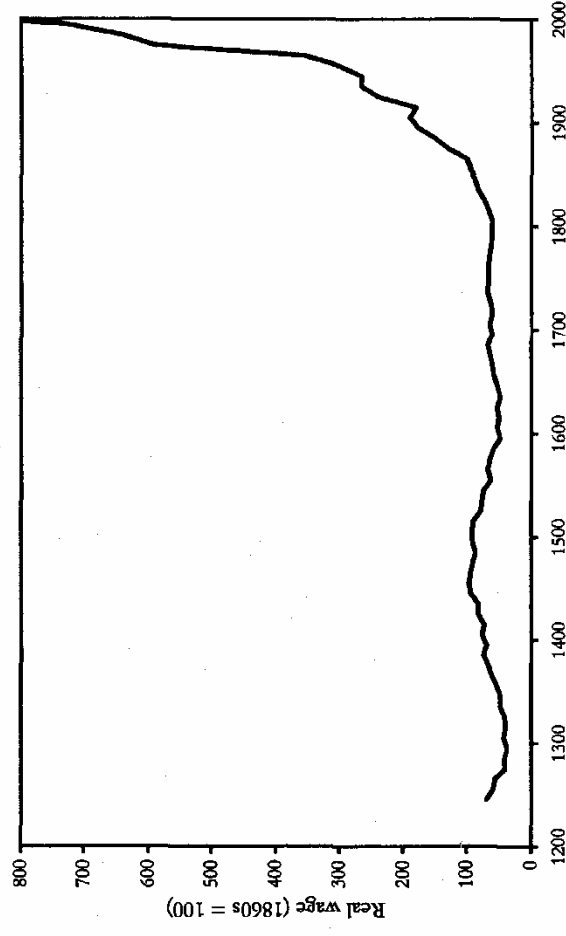


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- This was contrary to the fears of the Luddites, who feared *technological unemployment*.
- It contradicted the expectations of the Reverend Malthus, David Ricardo and Marx and Engels, all of whom anticipated a decline in working class living standards.
- It surprised the many 19<sup>th</sup> century writers on the “Machinery Question,” who feared that unskilled workers would be competed out of work by their mechanical rivals.
- All this proved quite wrong. But the question remains: could these same fears, however misplaced in the past, be valid in the future?



# First the facts: can we really be sure that workers as a group have benefited?

- Clark is at pains in his book to establish that workers have reaped the bulk (maybe 70%) of all income gains in the last 200 years.
- He does this by referring back to what should be now by a familiar accounting identity:
  - $P_Y Y = wL + pK + rT$ 
    - Where  $Y$  is the firm's output and  $L$ ,  $K$  and  $T$ , in *italics*, are now its labor, capital and land inputs. ( $w$  is the wage,  $p$  is profits or the return to capital,  $r$  is rents or the return on land, and  $P_Y$  is the price of the output.
- This is simply the statement that the revenues that producers earn have to go to someone.
- They can be paid to the workers; they can be paid to landlords, or they can be paid as profits to the owner of the firm and its equipment.
- To remind you, this is not an assumption; it is simply a matter of arithmetic.

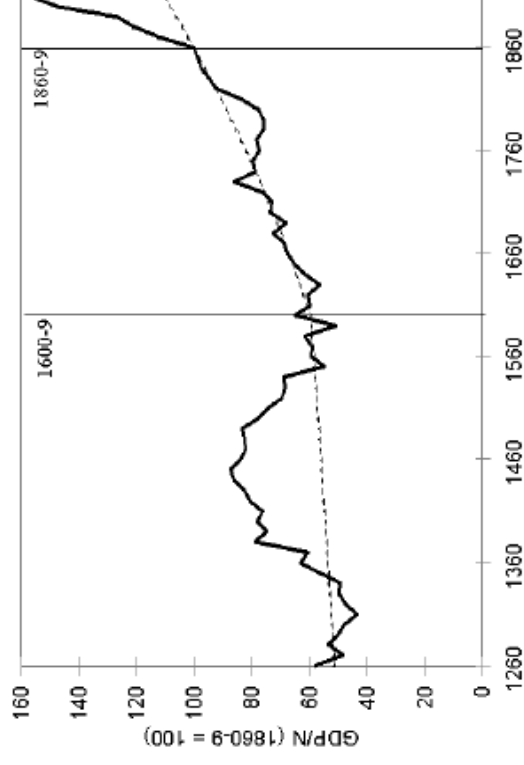
- We can take this expression for revenue ( $P_Y Y = wL + pK + rT$ ) and divide both sides by  $L$ .

- We then get:

$$(P_Y Y)/L = w + p(K/L) + r(T/L)$$

- Moving from the individual firm to the economy, the LHS of this eqn. is GDP per capita, as in the familiar diagram at right.
- The RHS of the eqn. tells us who these gains mainly went to:
  - workers (the first term)
  - owners of capital (the second term)
  - or owners of land (the third term).

Figure 10: Real GDP per Person, England, 1260-1914



# Clark first shows that the returns on farmland were unchanging

- He computes real farmland rents ( $r$ ) on an average acre of land using information from the Charity Commissioners (the source we saw earlier).
- These trend neither up or down over the long period.
  - Certainly they go down after the Black Death, when labor was scarce, rendering land relatively abundant.
  - They then go up in the 19<sup>th</sup> century, when higher incomes and larger populations stimulated the demand for food and energy (like now).
  - They then go down again in the early 20<sup>th</sup> century, when new lands (the Canadian Prairies, the Argentine Pampas, Australian grazing land) “come on line.”
- But there is no long-run trend one way or the other.

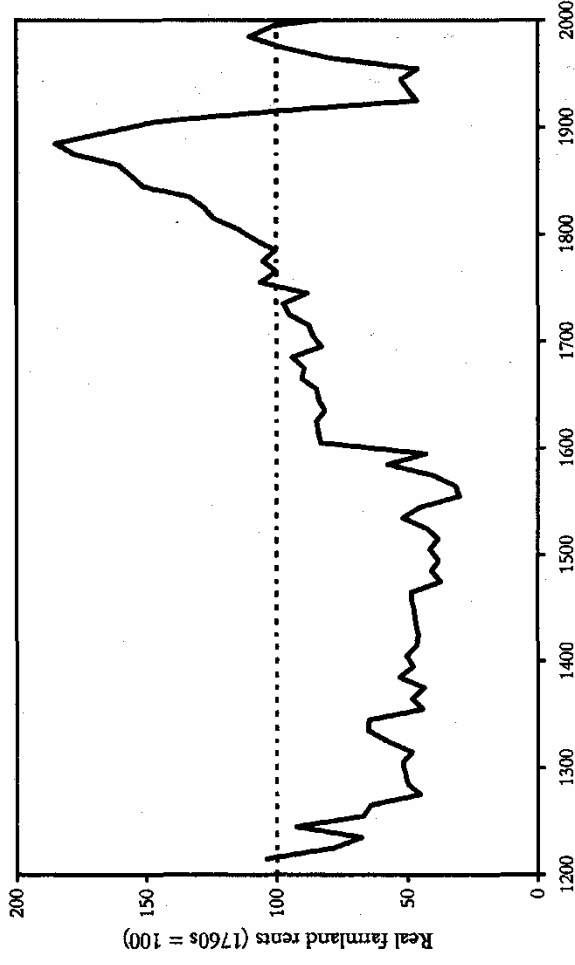
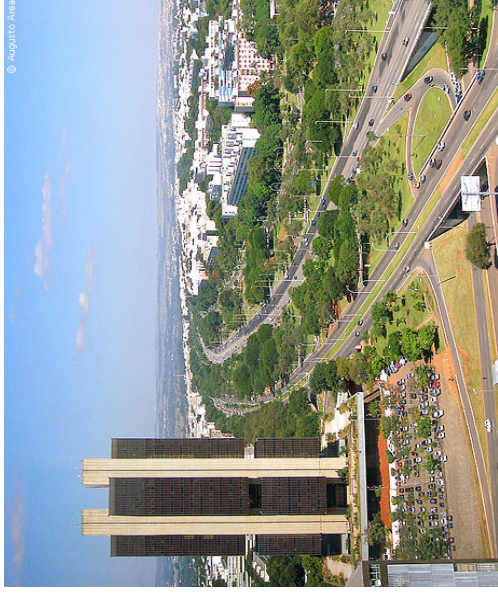


Figure 14.2 Real farmland rents per acre in England, 1210–2000.



- To be sure, this generalization ignores the rising return to urban land, which is in limited supply.
  - When my parents bought a lot in the Berkeley Hills in 1950, it cost \$2,500. Rise in the general price level since then has been 761%.  $\$2,500 * 8.61 =$  suggests that such a lot would now cost a bit more than \$20,000.
  - But same lot today would cost \$250,000.
  - There are no more unbuilt home lots in the Berkeley Hills (there is no more buildable space in Manhattan).
- Although of course you can build new cities (Phoenix, Tampa, Brasilia, Canberra).



- Put this together and the rate of return to landowners remains approximately 4%, where it was two centuries ago.
- Recall again our accounting identity:
 
$$(P_Y Y)/L = w + p(K/L) + r(T/L)$$
- Since  $r$  is unchanged and  $T/L$  has fallen (population has gone up, while land has not), the share of the output going to landlords has gone down.
- Indeed,  $T/L$  has fallen so enormously that the share of land rents in total national income (GDP) has “declined to insignificance,” as Clark puts it.
- **This must mean that workers and capitalists are getting the income gains.**

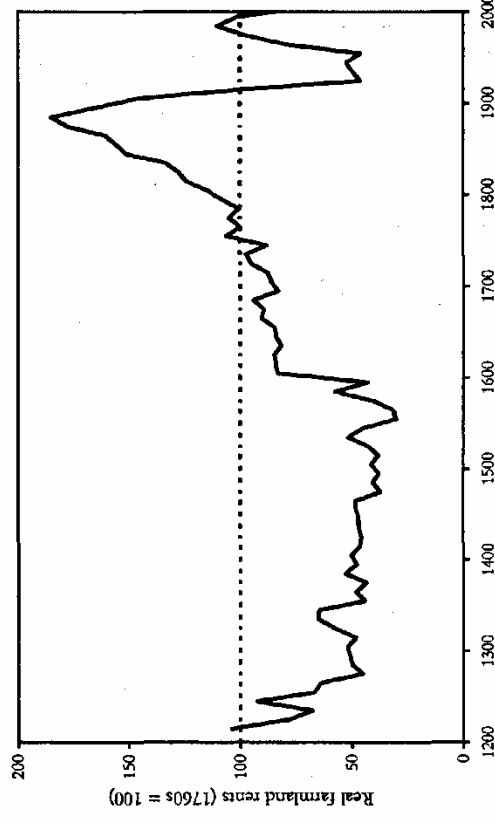


Figure 14.2 Real farmland rents per acre in England, 1210–2000.

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# But why has the share of land fallen so dramatically?

- First reason is that the *income elasticity of demand* for many *land-intensive products* has been low.
  - This is *Engel's Law*, encountered earlier. As incomes rise, people spend their additional resources on things other than the products of the land. How many calories does one person need? People sitting at desks all day need even fewer calories than their 18<sup>th</sup> century predecessors, who were sweating in the fields. With less demand for its products, there is less demand for land.
- Second reason is *land-saving technical change*.
  - The Green Revolution, chemical fertilizers etc. have made it possible to obtain the same yields using less land.
- Third reason is land was previously the main produce of energy (wood, peat), but now there are substitutes (fossil fuels, nuclear energy, solar energy, wind energy), as emphasized by Tony Wrigley.
  - But what about biofuels?

# Clark then shows that returns to capital have not risen

- Real interest rates, or the return on capital ( $p$ ), was about 10% two centuries ago. The return on capital is similarly about 10% today.
  - You might ask why investors in capital demand and receive a higher return than investors in land. This is because capital investment is riskier. The extra return being the *risk premium*.
- If you have read Clark closely, you will know that he in fact argues that the rate of return on capital has fallen slightly.
- But this complication doesn't change the story, since if this variable has in fact fallen, this means that workers gain even more than implied by our discussion.

- Recall again our accounting identity:

$$(P_Y Y)/L = w + p(K/L) + r(T/L)$$

- The capital/labor ratio ( $K/L$ ) in the advanced economies has increased over the last 2 centuries. Each worker (student) has more machinery (laptops, MP3 players) with which to work. So capital income as a share of the pie has remained stable, at roughly 30 per cent, even if the return on capital has fallen modestly.
- So this leaves the majority of the pie for workers.

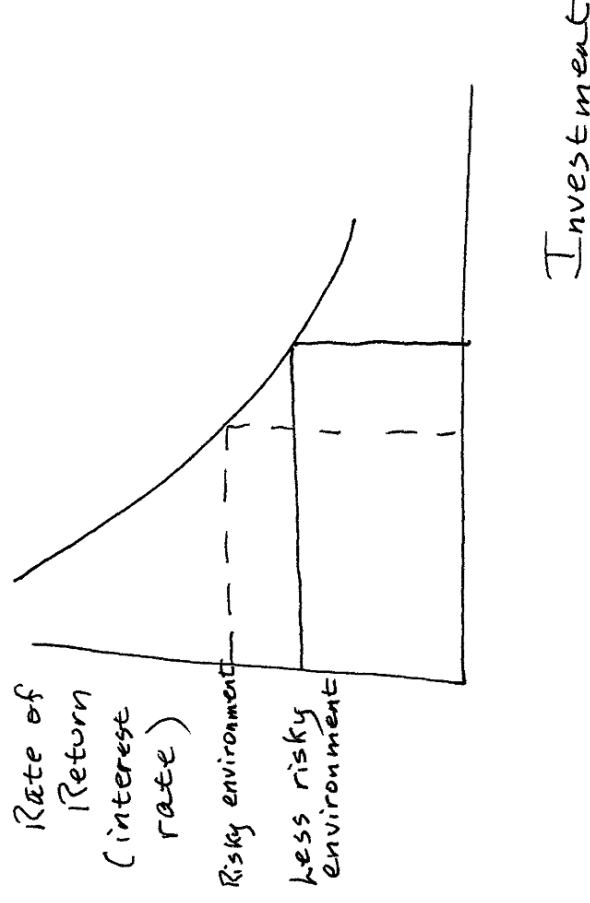
# Parenthetically, Clark asks why the return on capital has not risen

- You would think that investments in new technology (innovative machinery) would reap high returns.
- Given that the pace of innovation accelerated in the 19<sup>th</sup> and 20<sup>th</sup> centuries, why hasn't the return on capital investment also risen?

# Parenthetically, Clark asks why the return on capital has not risen

- You would think that investments in new technology (innovative machinery) would reap high returns.
- Clark's insight is that in a competitive economy, these *supra-normal returns* are quickly competed away.

- Richard Arkwright initially made supra-normal profits on his spinning mills by installing more efficient machinery, but nothing prevented others from doing the same – from entering and driving down the return (as illustrated by our familiar diagram).
- The Liverpool-Manchester railway (connecting port to mill town) initially earned supra-normal profits, but nothing prevented competitors from entering, building additional lines (including between Liverpool and Manchester) and driving down the return.
- Microsoft was able to earn supra-normal profits on its operating system and suite of office products. But that attracted entry by Google. Google made supra-normal profits. But that attracted....





## Interim conclusion:

- 1) Returns to landlords have declined to insignificance as a share of GNP.
- 2) The share of owners of capital has remained more or less constant at 30 per cent of GDP
  - Capital stock has grown, to be sure, but the return on each unit of capital (each machine) has declined at the same time.
- 3) So the bulk of the income gains of the last two centuries must have gone to labor.

# And the beneficiaries have not been just highly skilled workers

- The most surprising outcome, Clark observes, is that unskilled workers have benefited even more than their more skilled brethren.

– We see this in Clark's figure to the right.

- This is especially surprising given the presumption of contributors to the literature on the Machinery Question, that it would be the unskilled who would lose their jobs to technological unemployment.
- One would think, after all, that machines can substitute most easily for the routine, brute-force tasks carried out by unskilled workers.
- And technological unemployment there has surely has been.three slides remind...

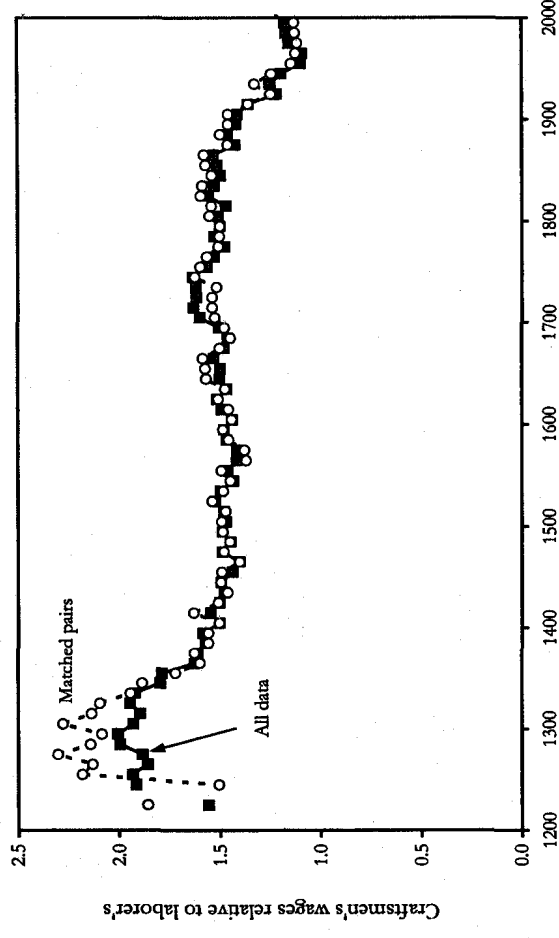
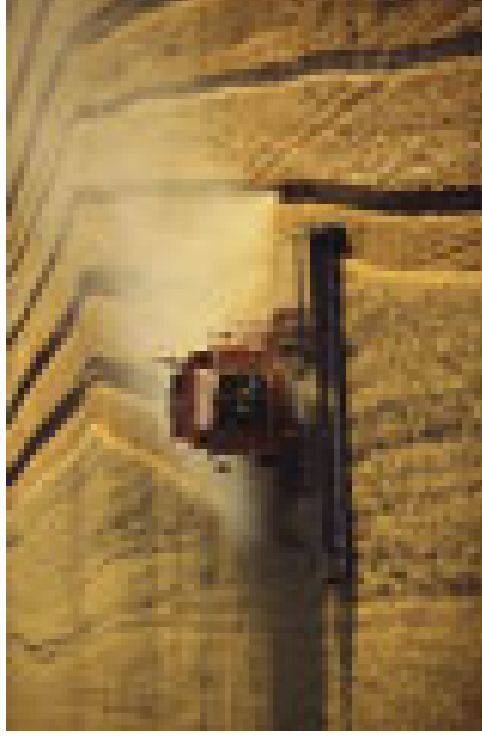


Figure 9-4 Wage of craftsmen relative to that of laborers in England, 1200–2000. The relative wage looks different in the earlier years depending on whether it is calculated using all the wage data or only data for matched pairs of craftsmen and their helpers.

- Clark illustrates his point (with questionable taste) by comparing unskilled workers and horses.
- Horses were widely used for transportation (horseback riding, horse-drawn carriages, pulling boats on canals), for farm work (plowing) and in industrial uses (turning mills, providing other power) in the 19<sup>th</sup> century.
- They were replaced in all these uses. The population of horses in Britain, for instance, has declined from 3 million in the early 19<sup>th</sup> century to 2 million in the early 20<sup>th</sup> century and negligible levels today, when horses are used exclusively for recreation.
- Horses were thus an early casualty of industrialization – victims of technological unemployment.



- Of course, horses remained in use for transport and farm production well into the 20<sup>th</sup> century in the West.
- And they remain in both uses in less developed countries today.
- But one can see this changing there in the same way.



# And technological unemployment there surely has been

- The iconic example is *threshing* (“separating the wheat from the chaff,” the main thing that occupied unskilled labor on the farm during the winter months).



- At top right we see threshing wheat with a flail; at bottom right we see a late 19<sup>th</sup> century threshing machine.

- One can question Clark's figures. His Figure 9.4 comparing the wages of building craftsmen and their helpers may not be representative of all workers.
- One can worry that what has been true so far (that there is still a strong demand for less skilled workers) may not be true going forward.
- But Clark argues otherwise.

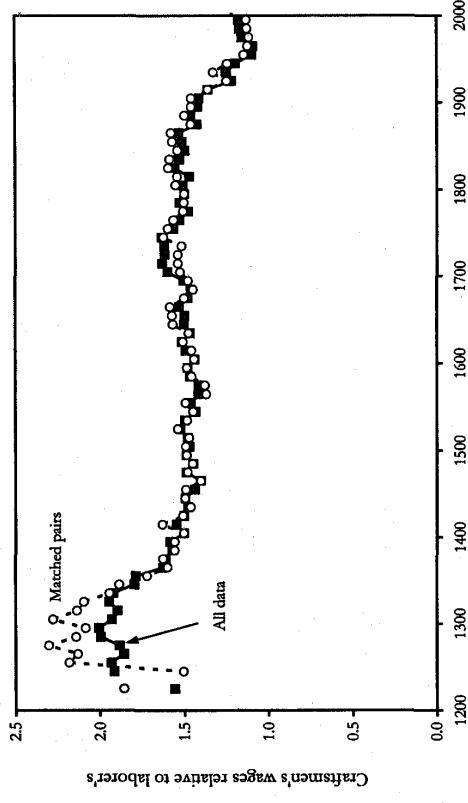


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# So Clark's question is: Why haven't unskilled workers suffered the same fate as horses?

- Clark argues that there are many tasks that don't require a lot of training (formal or informal) but that require a combination of muscle, dexterity and judgment.
- And these are not easily mechanized.
- The unskilled worker who cleans my house, details your car, and patrols the streets of Bagdad is not easily replaced by a machine, given the need for dexterity and judgment as well as muscle power (sometimes referred to as "horsepower" – note the irony).
- Supermarkets still hire low-skilled workers to stock their shelves with the many tens of thousands of products customers demand in a way that is attractive to the consumer. (They haven't figured out a way to mechanize this process, despite being an industry that operates on notoriously thin margins.)



- Indeed, as incomes rise, the demand for these services rises too.
  - People hire a gardener to pull weeds in their garden rather than doing it themselves.
  - They pay to have an unskilled worker polish their car at the corner of Oxford and California Streets rather than doing it themselves.
  - Neither of these tasks, like housecleaning and patrolling the mean streets of Bagdad, is easily mechanized.

- The implication, according to Clark, is that unskilled workers – contrary to the fears of Marx, Engels and others – are not at risk of seeing their living standards erode.
- Technological progress results in the mechanization of some of their tasks, but only some. And it creates a demand for such workers to carry out new tasks, for which people are ready to pay.
- The bottom line is that there exists a wide variety of tasks (previous examples of those carried out by house cleaners, infantrymen) that require dexterity and judgment as well as muscle, and these resist mechanization.

- Yet every time we identify a task like housecleaning where human muscle, dexterity and judgment cannot be easily replaced by machinery, we get...



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- And “of course” it is inconceivable that infantrymen could be replaced by machinery.

- The Foster-Miller TALON robot equipped with various weapons



# Bottom line

- In the long run, the fruits of modern economic growth have been remarkably widely shared.
- They have accrued not to just to landowners and capitalists but in large part to workers, who are better off by each of our classic measures of material welfare: GDP per capita, real wages, consumption standards, health, longevity, even stature.
- The above statement applies also to unskilled workers – maybe to an even greater extent than others.
- The question, as always, is whether past is prologue – whether what was true in the 19<sup>th</sup> and 20<sup>th</sup> centuries will be true in the 21<sup>st</sup>.

- Some say that technology will overcome the obstacle of combining judgment and dexterity with muscle power.



- Some say that technology will overcome the obstacle of combining judgment and dexterity with muscle power.
- Others say that unskilled workers in China and India face a brighter future because of faster growth and new technologies enabling them to sell their services into world markets, while unskilled workers in the West face the opposite prospect (competing with billions of low-paid Chinese and Indians).
- This last is the question we will consider next.

