Crude Calculations: Productivity and the Profitability of Conquest

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Abstract

Conquest had long been commonplace, and its attractiveness was central to the character of international politics. Why has it declined? Existing theories cannot explain why powerful countries no longer conquer states with easily extractable wealth. We develop an explanation based on the relationship between a potential conqueror's economic productivity and its ability to profit from conquest. Productivity has opposing effects on conquest's profitability: it raises the opportunity cost of each asset diverted to conquest, but also reduces the quantity of assets required for conquest. The net effect is determined by the composition of investment in innovation. We document that investment since at least 1950 is predominantly aimed at civilian, not military innovations, so that rising productivity should on-net reduce conquest's profitability. Using cost analyses of comparable wars, we estimate bounds on the profitability of conquering the oil and gas reserves of the Persian Gulf, a very tempting target, for the United States and Iraq, two potential conquerors of widely differing productivity. Though both mechanisms operate, we find that the net effect of higher productivity is to reduce the profits from conquest. Moreover, this net effect is large enough to render conquest generally unprofitable for contemporary high-productivity states.

Though, for many centuries, states routinely acquired vast territories by force, large-scale conquest has become exceedingly rare since World War II.[1] Explaining this change is crucial to understanding the broader transformation in the character of contemporary international politics. Foundational theories of international relations hold that a world in which conquest is attractive features severe conflicts of interest among states, sudden large shifts in the global distribution of power, frequent wars, and a generally unstable international system. By contrast, a world in which conquest is unattractive should be one where states find it easier to cooperate, power shifts gradually, war is rarer, and the system enjoys stability.[2]

So why has conquest declined? Some scholars have argued that because wealth is increasingly based on human capital, it is harder to extract by conquest, and because commerce is now relatively free, conquest is unnecessary to access other states' wealth.[3] But these cannot explain why states do not conquer places with natural resource wealth, which is easier to extract and can yield large rents. Many past conquests saw powerful states seizing large swathes of resource-rich territory in order to extract economic profits. Yet such conquests are now very rare, even in the case of oil, perhaps the most valuable and concentrated of all natural resources.[4] Other scholars argue that the norm against conquest restrains states out of fear of acting immorally or suffering punishment by the international community.[5] But these theories do not explain why

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[1] Altman 2020; Hathaway and Shapiro 2017.

[2] Fearon 1995, 408; Fearon 2018, 525, 538, 554; Jervis 1978, 168, 178-179, 187, 195; Mearsheimer 2001, 11, 60-61; Rosecrance 1986, 32-38, 155-162; Rosecrance 1996, 46, 48, 58.

[3] Angell 1913; Brooks 1999, 2005; Frieden 1994; Gartzke 2007; Gartzke and Hewitt 2010; Kaysen 1990; Rosecrance 1986, 1999.

[4] Colgan 2013; Meierding 2016; Schultz 2017.

[5] Fazal 2007; Hathaway and Shapiro 2017; Zacher 2001.

powerful states support this norm. If, in the norm's absence, these states could profit from seizing resource-rich territory, why would they uphold the norm?

We offer a novel explanation for why, in recent decades, some powerful states can no longer profit from conquering resource-rich territory. Our explanation draws on existing work that connects economic productivity to the profitability of conquest via two opposing theoretical mechanisms.[6] First, the higher is the productivity of a potential conqueror's economy, the higher are the opportunity costs of diverting productive assets like labor and capital from the economy in order to staff, equip, and fund conquest. This makes conquest more costly and so less profitable. Second, the higher the productivity of a potential conqueror's economy, the more advanced its military technology will be, so that less labor and capital is needed for successful conquest. This makes conquest cheaper. Put another way, higher-productivity states must use costlier assets to engage in conquest, but can get away with using fewer of them. Extant work offers no theory as to which effect dominates, and so cannot predict whether rising productivity should on-net raise or lower the profitability of conquest.

We develop an original theory of productivity's net effect on the profitability of conquest. Increased productivity derives from investment in innovations. The allocation of this investment between civilian and military markets determines whether improvements in civilian productivity outpace improvements in military prowess, and hence whether conquest's profitability declines. We document that, since 1950 and perhaps earlier, most investment in innovation around the world was aimed at civilian rather than military markets. Hence, rises in productivity during this time should on-net lower the profitability of conquest, because the opportunity cost of each asset

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[6] Francis 2009; Gartzke and Rohner 2011.

employed in conquest should have grown faster than the quantity of assets required for conquest declined.

We also identify a crucial theoretical requirement for any economic explanation of conquest's decline that is missing from previous theories. Productivity or any other factor can only explain the decline of conquest if its effect is sometimes large enough to render conquest actually *unprofitable*. Productivity might on-net reduce the profits of conquest, but if it does not reduce them below zero in at least some real-world cases, then productivity cannot explain why any case of conquest does not happen. It is not just the direction of productivity's effect that matters—its size is also crucial.

We claim that, in recent decades, the net effect of productivity is large enough for some states that the costs of conquest overwhelm the benefits even for the most tempting targets, so that these states cannot profit economically from conquest. Moreover, we show that this would be true even if such states were exempt from the norm against conquest, and so would suffer no costs for violating that norm. Some of today's high-productivity states were yesterday's most prolific conquerors—France, Japan, the Netherlands, Portugal, Spain, the United Kingdom, the United States. While these states' past conquests were undoubtedly driven by a mix of motives, as long as profit was a substantial motive in many cases, the recent unprofitability of conquest for these states may explain much of the decline in conquest over time. Our theory therefore offers a potential explanation for this decline.

Testing our claims is challenging because conquest is now rare and, across the instances that have occurred, there are few estimates of the costs and benefits for the conqueror, much less of the impact of productivity on cost. We tackle these challenges with an unconventional but innovative empirical approach. Because measuring conquest's costs and benefits is difficult, we

focus on a single target for conquest and two states that might conquer it. Because conquest didn't actually occur in either case, we use other, similar instances of conquest that did occur to place bounds on the costs of conquest in these cases. We exclude from these bounds the costs of conquest that are not directly influenced by productivity, such as the costs of violating the norm against conquest. We set aside these potentially serious costs of engaging in conquest in order to isolate the role of productivity and understand how it might affect states' support for the norm. These bounds give us enough information about productivity-driven costs to test our theory.

The target for conquest is the oil and gas reserves of Bahrain, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates (abbreviated as "PGR" for Persian Gulf Reserves). We argue that, according to extant theories, this target should be the most tempting for any conqueror in recent decades. Our two potential conquerors are the United States in 2003 and Iraq in 1990. The US has one of the world's highest levels of economic productivity, and its greatest military prowess, while Iraq has middling levels of both.

These cases are chosen to maximize inferential leverage. Since we find that the US wouldn't profit from conquering PGR, we can infer that other states of similar or higher productivity—which all have lesser military prowess—wouldn't either. Because this target is the most tempting, it also follows that the US and other high-productivity states would not profit from conquering other targets, either. Finally, given that we find that Iraq would profit substantially from conquering PGR, we can infer that other states with comparable or lower productivity would, too.

We estimate the benefits of conquering PGR using data on oil and gas production. We bound the costs for the US and Iraq of conquering PGR using similar instances of conquest that the each engaged in. We argue that, had the US counterfactually invaded PGR rather than Iraq in

2003, the resulting invasion and occupation would have been at least as costly for the US as the Iraq War, even assuming this conquest would be tolerated by the international community. For Iraq, we argue that if it had extended its 1990 invasion of Kuwait to the rest of PGR, the resulting conflict would be no more costly for it than the Iran-Iraq War, again assuming this act would not be subject to international punishment. We use available detailed assessments of the costs to the US of the Iraq War, and of the costs to Iraq of the Iran-Iraq War, to bound the productivity-driven cost to each country of conquering PGR. Both bounds are designed to be extremely conservative, in that the true cost of conquering PGR for the US is much higher than we estimate, and that for Iraq is much lower than we estimate.

Using these bounds, we find that conquering PGR would be unprofitable for the US, but would pay handsomely for Iraq. Specifically, the productivity-driven costs for the US would exceed the benefits by more than two to one, while the benefits for Iraq would exceed the costs by about a third. Moreover, productivity plays a critical role in the difference in profitability between the US and Iraq. The US would employ at least one-fifth of the assets Iraq would use, but the US opportunity cost per asset would be at least seven times that of Iraq. Consistently with our theory, higher productivity thus both increases the opportunity cost per asset used in conquest and reduces the quantity of assets needed, but the former effect outweighs the latter.

Our findings provide the first direct evidence that the net effect of productivity on profits from conquest is both negative and large enough in recent decades to render conquest unprofitable for states with high productivity.[7] High productivity can therefore explain why

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[7] We cannot specify a numerical value of productivity at which conquest crosses from profitable to not, for reasons explained in Section H of the online appendix. However, we can show that the US is well above this value in 2003 and Iraq is below it in 1990, given the observed level of benefits available from conquest. We therefore use "in

these states do not seek to conquer resource-rich states in search of profits, and would not even if they were exempt from the norm against conquest. By contrast, we find that conquest can still be highly profitable for states with lower productivity in the absence of norm-driven costs like international punishment for engaging in conquest. We infer from these findings that the norm against conquest is unnecessary to deter high-productivity states from profit-motivated conquest, but is needed to deter low-productivity states. As we discuss in the conclusion, this potentially explains why high-productivity states support this norm and contribute to enforcing it: they would not profit from conquest even if they were free to engage in it, but other states would and must be deterred from doing so. More speculatively, it might also help to explain the origins of this norm.

PRIOR EXPLANATIONS FOR THE DECLINE OF CONQUEST

Previous research on the decline of conquest can be divided into economic and normative explanations. The former posit ways in which states' economic characteristics can lessen their tendency to engage in conquest. One line of work theorizes that as the principal source of wealth in some states' economies shifted from land to human capital, the benefits of conquest declined. Nationalism, capital flight, the types of investments a conqueror would make, dispersal of production, and the stifling of innovation and entrepreneurialism by the conqueror's repression all reduce the benefits that can be coercively extracted from such a target.[8] However, these theories

recent decades" to refer to the fact that this threshold was crossed at some point well before 2003, and "high-productivity" and "low-productivity" to refer to states that are respectively above and below this threshold.

[8] On nationalism, see Kaysen 1990; Rosecrance 1986, 1999. On capital flight, see Angell 1913; Rosecrance 1999. On investments, see Frieden 1994. On dispersion of production and stifling, see Brooks 1999, 2005.

cannot explain why powerful states do not conquer territory rich in natural resources rather than human capital. Oil, for example, is not nationalistic and cannot flee or be stifled, and its production from a given field is easily seized and cannot be dispersed.

A closely related set of arguments holds that because commerce has become cheaper and freer over time, it is increasingly preferred to conquest as a way of accessing other states' wealth.[9] However, no matter how easy or widespread trade or investment become, states engaging in them must still give up something valuable in return for others' goods or productive assets: imports and investments have to be paid for. Thus, it remains an open question empirically whether commerce has actually become cheaper than conquest as a means of acquiring other states' valuable resources. Importers of oil, for instance, pay a price well above its production cost, and could capture those rents for themselves if they instead conquered the oil-bearing territory.

Certain domestic actors like multinational corporations, exporters and outward investors, and capitalists may generally prefer commerce to conquest.[10] However, if conquest pays overall, then it should be possible for a government to undertake it and use the resulting gains to compensate these actors, while still profiting overall. Even if a government was unable to commit to compensation, other domestic actors, such as extracting and refining firms in the case of oil, would enjoy concentrated benefits from conquest and so be expected to advocate influentially for it.

This prior work supplies much of what is needed for a comprehensive economic explanation of the decline in conquest—that conquest no longer pays for the conqueror. However,

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[9] Angell 1913; Brooks 1999, 2005; Gartzke 2007; Gartzke and Hewitt 2010; Rosecrance 1986, 1999.

[10] On multinational corporations, see Brooks 1999, 2005. On exporters and investors, see McDonald 2009. On capitalists, see Gartzke 2007; Gartzke and Hewitt 2010. For a critical review, see Brooks 2013.

there remains an important gap: why can't powerful states profit from conquering weak but resource-rich states? We fill this gap with a theory that explains when and why productivity on net increases the costs of conquest and an empirical demonstration that productivity's effect is not only in the theorized direction but large enough to render conquest unprofitable for high-productivity states in recent decades.

Other explanations for the decline in conquest focus on the norm against it.[11] Once this norm was established, principally by the United States after World War II, some states were deterred by the prospect that conquest would be punished by the international community while others refrained because it was now judged immoral. Our results are consistent with this claim: we find that low-productivity states could still profit from conquest if it were tolerated by the international community, and so must be restrained by moral suasion or the threat of punishment.

While this literature carefully documents the effects of the norm, it has less to say about the norm's origins and enforcement. It is clear why the US (or any particular state) would prefer that other states refrain from conquest, and Fazal and Zacher argue that the US saw the norm as a means to prevent further major wars and preserve the status quo. However, the US undertook a string of successful conquests during the nineteenth century, and after World War II it enjoyed unprecedented power over the rest of the world. Why would it instantiate, enforce, and obey a norm against conquest, when it could expect to dominate the resulting imperial contest if conquest were instead allowed to continue? Why would other powerful states also help to enforce the norm? Our theory suggests an answer: by World War II, US productivity had already grown to the point that it would not profit from further conquest, so that the US preferred to live in a world where both it and other countries eschewed conquest. As some other powerful states' productivity rose,

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[11] Fazal 2007; Hathaway and Shapiro 2017; Zacher 2001.

they also came to support and enforce the norm. While we cannot test these conjectures here, our work highlights the role of productivity in the major powers' turn away from conquest as an important topic for further research.

Finally, our results also speak to the literature on the national security implications of oil dependence.[12] These studies focus on the threat that commercial access to oil imports might be cut off and the consequences of policies toward this threat. Most of this work does not consider the possibility of conquering foreign oil reserves, despite its potential to eliminate this threat and also yield large economic benefits.[13] Our study explains why states mostly refrain from conquering foreign oil reserves.

THEORY

We start by discussing productivity's two opposed effects on the profitability of conquest, as theorized previously by Francis as well as Gartzke and Rohner.[14] We then describe our own theory of the conditions that determine which effect dominates, and of how large the net effect must be. Figure 1 illustrates the theory.

[FIGURE 1 ABOUT HERE]

A state that wishes to engage in conquest must divert productive assets like capital and labor from its civilian economy to its military in order to equip and staff the conquest. Even if

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[12] For recent works in this area, see Glaser and Kelanic 2016.

[13] For an important exception, see Kelanic (2016).

[14] Francis 2009; Gartzke and Rohner 2011.

only standing military forces were employed, a conqueror would still have the option of instead demobilizing these forces and returning the constituent labor and capital to the civilian economy. Thus, for every asset that is diverted from the civilian economy (or retained in the military) and employed in conquest, the conqueror will lose the value that asset would have produced had it remained in (or been returned to) the economy. This is the opportunity cost of employing the asset in conquest. By definition, the more productive each asset would have been in the economy, the higher this opportunity cost will be. Potential conquerors with higher economic productivity will therefore incur a higher opportunity cost for each productive asset they employ in conquest. Holding the quantity of assets employed constant, higher productivity raises the total opportunity cost of engaging in conquest. This lowers the profitability of conquest and thereby the incentive to engage in it.

H1: The higher a state's economic productivity, the greater is the opportunity cost per asset deployed for conquest.

However, the total cost of conquest also depends on how many assets the conquer must use to successfully invade and occupy a target. This in turn depends on the amount of military power generated per asset, which we call the conqueror's military prowess. Prowess is the military analogue to productivity. Productivity is how efficiently assets like labor and capital can be transformed into valuable goods and services; prowess is how efficiently those same assets can be transformed into military power.

Theoretically, higher productivity should lead to higher prowess. The same things that make labor and capital better at producing value in the civilian economy often also make these

assets better at generating power in the armed forces. A novel management technique that renders workers more enthusiastic may also improve soldiers' morale. A new jet engine design that improves fuel efficiency in passenger airliners will also improve it in fighters and bombers. Better industrial robots can manufacture cars more cheaply, but also tanks. Thus, increases in productivity tend also to increase military prowess.

This means that productivity should lower the costs of conquest through its effect on military prowess. Because each asset can generate greater military power, the quantity of productive assets that must be employed to conquer a given target is lower. Holding the cost per asset employed in conquest constant, higher productivity therefore lowers the total cost of engaging in conquest.

H2: The higher a state's economic productivity, the fewer productive assets it must deploy to successfully conquer.

Productivity thus has two, opposed effects on the cost of conquest. It raises the cost of each asset the conqueror uses to invade and occupy a target, but lowers the number of assets required. Previous works recognize productivity's opposed effects, but do not theorize about which effect dominates. Francis assesses empirically whether productivity is associated with conflict, but does not theorize about whether the association should be positive or negative overall.[15] Gartzke and Rohner assumes the net effect is positive in the historical era when conquest was more prevalent, and negative in the more recent era when conquest is rarer, and so does not really explain the

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[15] Francis 2009.

prevalence of conquest in either era.[16]   Thus, extant work offers no firm prediction about the direction of productivity's net effect.

To theorize about productivity's net effect, we must consider the process by which economic productivity and military prowess increase. Both the value productive assets can create in the civilian economy, and the power they can generate in the military, increase because of innovations. These are new, improved ways of employing labor and capital for their intended purpose, whether civilian or military. Innovations result from investment in research and development. Sometimes this investment is aimed at civilian innovations, such as when Apple designs more powerful smartphones or an academic scientist tries to develop cheaper solar panels. Other times investment is aimed at military innovations, such as Lockheed's investment in its famous Skunk Works or the US government's funding of research at the Defense Advanced Research Projects Agency.

In aggregate, investment aimed at generating civilian innovations is much more likely to actually result in civilian improvements than in military ones, and vice versa. Of course, innovation is stochastic: sometimes trying to improve one thing leads to an improvement in another. The examples given earlier—morale-improving management techniques, new jet engine designs, better industrial robots—were developed to improve civilian production but also improved military power. And sometimes the reverse occurs, as military investment leads to valuable civilian innovations, such as the internet, trauma surgery techniques, and rocket engines. But on average, the improvement is largest and most likely in the intended purpose, because the search that leads to innovation rationally starts with the possibilities that seem most likely to

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[16] Gartzke and Rohner 2011.

achieve that purpose. Thus, if the goal of investment is improving civilian production, it is much more likely to do that than to accidentally improve military power.

If investment is mostly aimed at civilian innovation, and consequently mostly yields civilian innovations, then in aggregate the value each productive asset can create in the economy will grow faster than the power it can generate in the military. Thus, as productivity increases, the opportunity cost per asset used in conquest will grow faster than the quantity of assets required declines. Alternatively, if investment is more devoted to military innovation, and so mostly yields military innovations, then on average an asset's military prowess will outgrow its economic productivity, so that as productivity increases, the quantity of assets need for conquest will fall faster than the opportunity cost per asset rises.

Thus, to figure out which effect of rising productivity dominates, we need only determine whether investment in innovation is predominantly aimed at civilian or military improvements. In fact, we can document that since at least 1950 and perhaps earlier, most investment in innovation around the world is aimed at civilian rather than military improvements.[17] Figure 2 illustrates the distribution of this investment in 2015.[18] Most research and development (R&D) spending globally occurs within developed countries, and since World War II, the US has consistently spent more than any other developed country on R&D, and also devoted a greater share of R&D to

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[17] We suspect that investment in civilian innovation exceeded that in military innovation in most years back into the nineteenth century, especially for the most developed countries. However, data limitations make it hard to be confident in this.

[18] Based on data in NSB 2018.

military purposes.[19] Even so, US spending on military R&D never exceeded that on civilian R&D, and in most years the latter was much larger.[20] During 1941-1949, military R&D was higher than civilian in the US, and this may have been true of other major belligerents in World War II.[21] However, this nine-year anomaly is unlikely to overcome the general trend for the subsequent 70 years where civilian R&D was much greater than military for the countries that made up most of the world's spending on R&D.

[FIGURE 2 ABOUT HERE]

Thus, most of the world's investment in innovation from at least 1950 on sought civilian rather than military improvements. Given this, our theory offers a clear prediction for productivity's net effect.[22]

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[19] OECD 2019. These data include both government and private-sector R&D spending back to 1980. We assume the US was also the largest R&D spender and devoted the largest share of R&D to military purposes during 1950-1979, when the other OECD countries were poorer, most sustained lower defense burdens, and all spent much less on defense, than the US.

[20] Authors' calculations from OMB 2019, Table 9.7 and NSF 2019, Table 6 covering 1953-2017. For 1950-52, see Usselman 2014, 373.

[21] Usselman 2014, 373-375.

[22] Of course, it might be that our theory has it backwards: maybe conquest became unattractive for some reason other than productivity and this lowered the value of military prowess, leading countries to invest less in military innovation. This reverse causation surely exists, but in Section A of the online appendix, we argue that exogenous limits on the relative sizes of the markets for military and civilian innovation in modern economies constrain how much reverse causation could be occurring. Put another way, even if conquest had remained profitable for some

H3: Since at least 1950, the net effect of productivity is to raise the overall cost of conquest and thereby reduce its profitability.

Even if our theory is right, it still might not suffice to explain why conquest has declined. In particular, the effect of productivity on the profitability of conquest might be in the theorized direction, but not large enough in magnitude. Then conquest would yield lower but still substantial profits for high-productivity states, and productivity alone is not enough to explain why they do not engage in it. This problem actually applies to any theory that purports to explain the decline in conquest, or any other discrete change in behavior. In order for productivity or any other factor to explain the decline of conquest, its effect on profits must be large enough for at least some states to wipe out the profits of conquest altogether.

H4: The effect of productivity is large enough in recent decades to render conquest unprofitable for high-productivity states.

The phrase "in recent decades" is a very important qualifier. We do not mean to argue that states that happen to enjoy higher productivity than their contemporaries cannot profit from conquest in any conceivable situation. Our claim is instead much narrower: that the actual levels of productivity observed among higher-productivity states in recent decades are sufficient to render conquest of the best available targets in the same period unprofitable for those states.

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reason other than productivity, so that military prowess and investment in improving it remained equally valuable, rising productivity would still be expected to erode conquest's profitability over time, as we have theorized.

EMPIRICAL APPROACH

Ascertaining the direction and magnitude of productivity's effect on the profitability of conquest is quite challenging. Conquest is rare in recent decades, and there are few available assessments of the costs and benefits of those conquests that occurred. This forces us to examine only a small number of cases, for which such assessments are feasible. We must then somehow determine the impact of productivity specifically on profitability. We tackle these challenges with an unconventional but innovative empirical approach. We first present our cases and our reasons for choosing them. We then describe how we measured the costs and benefits of conquest, and how we evaluated the impact of productivity on costs.

Our chosen target for conquest is arguably the most tempting available in recent decades: the territory comprised of Kuwait, Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates, which we will abbreviate as PGR, for Persian Gulf Reserves. The oil and gas contained in this territory are by far the most valuable concentration of natural resources anywhere in the world.[23] We demonstrate in Section B of the online appendix that the ratio of benefits to costs of conquest offered by PGR is among the highest of any substantial target of conquest.[24] Its only rivals are countries whose wealth, according to extant theories, would be much more difficult to extract. Available data on PGR's oil and gas production and market prices enable us to estimate the benefits from conquering it.

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[23] BP 2018, 12, 26.

[24] "Substantial," because we can always find very small targets that offer exceptionally high benefit-to-cost ratios. A state could kidnap Bill Gates, force him to transfer his assets to it, and enjoy a sky-high benefit-to-cost ratio because kidnapping is cheap. But such targets also offer minute benefits relative to a target like PGR, so we ignore them.

We then chose two potential conquerors that vary widely in economic productivity and military prowess: the United States in 2003 and Iraq in 1990. The US economy has very high productivity, and its armed forces are widely viewed as having the greatest military prowess of any in the world. Iraq has considerably lower productivity and prowess, but, as we will document subsequently, it still had enough military power in 1990 to conquer PGR, absent outside intervention. The first case supposes that, rather than invading and occupying Iraq in 2003, the US instead conquered PGR. The second case supposes that Iraq extended its 1990 invasion of Kuwait into the rest of PGR.[25]

Consider the inferential leverage these cases yield. Suppose we find (as we do) that the high-productivity, best-prowess conqueror will not profit from taking the most-tempting target. Then we can infer that it will not profit from conquering any other target either. Moreover, if the theory is right, then this finding would also imply that no other state with higher productivity, which would by construction have lower military prowess, could profit from conquering this or any other target. Such states would face higher costs per asset (due to higher productivity) and also have to use more assets (due to lower prowess) in conquest than our conqueror, so that their total cost for any given target would be higher. Suppose we also find (as we do) that the low-productivity conqueror would profit substantially from taking this most-tempting target. Then we can infer that this conqueror, and others close enough to it in productivity and prowess, would profit from taking other, somewhat less-tempting targets as well. Finally, suppose the difference in profitability between the two conquerors can be attributed mostly to their differing productivities

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[25] It may strike the reader as odd to choose cases of conquest that did not occur, but this is a consequence of the contemporary rarity of conquest: conquest does not occur *in most cases*. Our theory should apply to all cases of *potential* conquest, and so can be tested on cases where it did not occur.

(more on this subsequently). Then we can infer that productivity suffices to explain why high-productivity states rarely engage in conquest, but some other factor—perhaps the fear of international punishment for violating the norm against conquest—must deter low-productivity states.

Because our cases are counterfactual, we cannot observe the costs of conquest. However, both conquerors engaged in other wars of conquest in the Persian Gulf, for which the costs can be observed. We use the costs of these other wars to place bounds on the cost each conqueror would incur in conquering PGR. Specifically, we treat the cost to the US of invading and occupying Iraq in the Iraq War as a lower bound for its cost to instead conquer PGR. We treat the cost to Iraq of fighting and occupying parts of Iran in the Iran-Iraq War as an upper bound for its cost to instead conquer PGR. We offer detailed arguments for these bounds subsequently, but suppose for now that they are valid. If we find (as we do) that the US would not profit from conquering PGR when using a lower bound for its cost, then we can infer that in reality a US conquest of PGR would be even more unprofitable than our calculation suggests. If we find (as we do) that Iraq would profit from conquering PGR when using an upper bound for its cost, then we know that in reality Iraq's conquest of PGR would be even more profitable. These bounds therefore tell us enough about the unobserved costs of conquering PGR to enable a test of our theory.

We exploit the comprehensive cost assessments available for the Iraq War and the Iran-Iraq War to determine our bounds and also to evaluate the impact of productivity on cost. Because these assessments break down the total cost for each state into its many constituent components, they enable us to distinguish between the costs of war that are directly affected by productivity and those that are not. In particular, we can observe the opportunity costs paid by each state for the labor and capital employed in the war (abbreviated $OCPA$), and the quantity of these productive

assets each state used ($QPAU$), precisely the two mechanisms through which productivity is theorized to affect the cost of conquest. The opportunity cost per asset is equal to productivity by definition, so that any difference we find between the conquerors in $OCPA$ is entirely due to their differing levels of productivity. However, the quantity of assets used is affected by factors other than productivity, so that we cannot be sure that the difference we find between the conquerors in $QPAU$ is equal to the effect of productivity. We will assume that the difference we observe in the quantity of assets used is entirely attributable to differing productivity, but then consider the sensitivity of our findings to deviations from this assumption.

We set aside other costs of conquest that are not plausibly affected by productivity through the opportunity cost of diverting assets. The most important of these other costs derive from the norm against conquest: moral regret on the part of the conqueror, and ruptured relations, economic sanctions, or military intervention imposed by the international community in response to the violation of the norm. We set these norm-driven costs aside because our goal here is to isolate the effect of productivity on the profitability of conquest through opportunity cost. In effect, we assume that both cases would be exempted from the norm against conquest, and so tolerated by the international community. We will subsequently discuss how our conclusions about the profitability of conquest might change if these costs were included, and what this might tell us about the enforcement and origins of the norm.

Our theory predicts that the US, having higher productivity than Iraq, would suffer a higher opportunity cost per asset but employ fewer assets in conquering PGR than Iraq, with the former effect outweighing the latter. We also evaluate whether the overall effect of productivity is large enough to render this conquest unprofitable for the US. Let B_{PGR} be the benefits of conquering PGR. In symbols, we expect:

$$OCPA_{Iraq} < OCPA_{US} \qquad \text{(H1: US should pay more per asset)}$$

$$QPAU_{Iraq} > QPAU_{US} \qquad \text{(H2: US should use fewer assets)}$$

$$OCPA_{Iraq} * QPAU_{Iraq} < OCPA_{US} * QPAU_{US} \qquad \text{(H3: the former effect dominates)}$$

$$B_{PGR} < OCPA_{US} * QPAU_{US} \qquad \text{(H4: conquest not profitable for US)}$$

This last sort of test is not commonly done. More often, empirical analyses determine only the direction of the effect of an independent variable (e.g., the sign of its regression coefficient) and its size (e.g., the magnitude of its coefficient). However, knowing an effect's direction and size is not enough to determine whether it explains some puzzle. Take the absence of conquest: even if the effect of productivity on the profitability of conquest is negative and large, that does not necessarily mean that it is large enough to render conquest unprofitable in any empirical case. By evaluating whether the observed values of productivity are high enough to drive the profits from conquest *below zero,* we can assess whether the effect of real-world values of productivity is enough to explain why some states do not engage in profit-motivated conquest in recent decades.

THE BENEFITS OF CONQUERING PGR

We assume that the anticipated economic benefit to the conqueror of taking PGR is equal to the expected profits from oil and gas production. These activities dominate the economies of PGR, averaging 77% percent of their governments' revenue and 69% percent of exports.[26] Much of the rest of these economies provides goods and services to be purchased with oil and gas profits or is supported by them, and would disappear if those funds were transferred to a foreign

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[26] IMF 2016, 13.

conqueror. A conqueror might also seize the existing stock of wealth, itself funded mainly by past oil and gas profits. However, the part of this wealth that is liquid, such as sovereign wealth funds and private financial assets, seems likely to flee upon invasion. The illiquid part, including buildings and land holdings, would likely become far less valuable if oil and gas profits were no longer captured by the residents of this territory.

The expected profits from oil and gas production in PGR would be highly uncertain, because the future price of oil and gas is difficult to reliably forecast. Given this unpredictability, we take the simple approach of assuming that the expected profits are equal to their observed average over the ten years prior to each conquest.[27]

Of course, a conqueror might use its control over the substantial share of world supplies contained in PGR to restrict supply and increase prices and profits. In Section C of the online appendix, we show that incorporating this possibility would reinforce our conclusion that Iraq would profit from conquering PGR, but not change our conclusion that the US would not profit. In brief, the reason is that the US, in aggregate with the states whose economies are closely integrated with its own, is a major consumer of oil and gas, so that most of the extra benefits gained from restricting production would be canceled out by the increased cost of consumption. By contrast, Iraq is a very minor consumer, so that its extra cost would be overwhelmed by the additional revenue it would receive.

We use data on annual oil and gas production in PGR and market prices to calculate annual revenues from oil and gas in PGR for 1965 to 2018.[28] We subtract off per-unit production costs to

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[27] Instead assuming that expected profits are equal to the average across any retrospective window up to all years prior to conquest (back to 1965, the first year in our data) does not qualitatively alter our findings.

[28] BP 2018.

convert these to annual profits.[29] Based on the profits estimated for 1980 to 1989, in 1990 Iraq could expect to realize $159 billion per year from PGR's oil and gas production.[30] Based on profits for 1993 to 2002, in 2003 the US could expect $82 billion per year.

It might seem that we are stacking the deck in favor of our findings—that conquering PGR would be profitable for Iraq but not the US— by setting the benefits for the Iraq to be more than those for the US. The difference in benefits derives from the much lower price of oil in the decade before 2003 than in that before 1990, but what if we had chosen different years from which to calculate expected benefits? We show that our findings would still hold for most choices of years from 1965 to 2018 in Section D of the online appendix.

THE COST TO THE UNITED STATES OF CONQUERING PGR IN 2003

We proceed to measure the total productivity-driven cost to the United States of conquering PGR. We first argue that this would be at least as costly for the US as its invasion and occupation of Iraq, so that we can use the cost of the latter as a lower bound on the cost of the former. We then describe the costs to the US of the Iraq War.

Conquering PGR Would Cost the US More than the Iraq War

To establish this bound, we need to identify and measure the principal characteristics that determine whether one target for conquest is costlier than another. We draw seven such characteristics from the literatures on peacekeeping, insurgency, rebellion, and power projection. First, the distance from the conqueror to the target: the cost of projecting power increases as forces

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[29] Petroff and Yellin 2015.

[30] Throughout, all figures are adjusted for inflation to 2007 US dollars.

must operate further from home bases and supply lines lengthen.[31] Second, the ruggedness of the target's terrain: mountains provide defensible strongholds for rebels and so make insurgency more difficult to suppress.[32] Third, the target's land area: the more land must be occupied, the more forces are required to exert control.[33] Fourth, the size of the target's population: a larger population contains more potential insurgents and requires a larger force to control.[34] Fifth, the will of the population to resist: the target's population is more likely to resist a more predatory conqueror.[35] Sixth and seventh, the size and quality of the target's military: obviously, the bigger and more advanced the defending forces, the costlier conquest will be.

[TABLE 1 ABOUT HERE]

Table 1 shows that PGR poses at least as daunting a challenge for the US as Iraq did. Their distance from the US and terrain are similar, but PGR is larger and more populous than Iraq. While Iraq's military had more personnel, PGR's was almost certainty of higher quality. By 2003, after a decade of severe sanctions, Iraq's military was a shell of its former glory, possessing essentially no air force or navy, a poorly trained and equipped army, and mostly obsolete equipment.[36] At the same time, Saudi Arabia and the UAE, which make up almost 90% of PGR's combined military

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[31] Boulding 1962, 262.

[32] Fearon and Laitin 2003, 75–90.

[33] Jardine 2012.

[34] Goode 2009.

[35] Ferwerda and Miller 2014.

[36] Hosmer 2007, 56.

personnel, were not under sanctions and possessed advanced weapons systems such as American

M1 tanks and F-15 fighters. While PGR's forces would not operate under unified command, Iraq's

also suffered from serious deficiencies in command and control in the Iraq War.[37] Finally, the US

would be invading and occupying PGR to capture its oil and gas reserves, rather than to remove a

dictator hated by the majority of his citizens. Since these reserves underpin the livelihood of most

inhabitants of PGR, their will to resist should be at least as strong as that of the people of Iraq. It

therefore seems likely that PGR would be costlier to invade and occupy than Iraq was.

One could argue that the US could pursue its conquest of PGR in a very different—and

cheaper—fashion than the Iraq War. It could rely heavily on mercenaries, who might be cheaper

to use than the US military. It might avoid mistakes some have argued occurred in Iraq: it could

use far more US forces and set better occupation policies, so that any insurgency would be weaker.

The US could occupy just the oil and gas fields and associated infrastructure (e.g., refineries and

pipelines), which would reduce the area and population that would need to be controlled. Finally,

the US could "take the gloves off", allowing its troops to use any means necessary to pacify PGR,

instead of trying to limit civilian casualties as it did in Iraq.

We show in Sections E and F of the online appendix that these are unlikely to reduce the

cost enough to matter. In brief: the US *already* relied very heavily on mercenaries in Iraq; most

occupations feature serious mistakes by the conqueror; taking just fields and infrastructure still

leaves the target larger than and almost as populous as Iraq; and even if the US were as rapacious

a conqueror as Nazi Germany, subduing the population could take many years. Perhaps most

convincingly, even if the US were able to occupy PGR with only 100,000 troops—giving a ratio

to PGR's population less than that of law enforcement to population in the US—and all other costs

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[37] Hosmer 2007, 56.

declined proportionately, our findings would still hold. We therefore assume that the costs to the US of conquering PGR would be at least as high as those of invading and occupying Iraq, and turn to analyzing the latter.

The Cost to the US of the Iraq War

To measure the US cost of the Iraq War, we rely on the assessment prepared by Stiglitz and Bilmes (henceforth "SB").[38] This provides the most comprehensive and detailed accounting available. Most other assessments were published before SB, and so cannot draw on as many years of costs experienced to guide the analysis.[39] The SB figures are consistent with those offered by the US government, with regard to the costs that both consider.[40] However, the government's and most independent assessments do not give as comprehensive an accounting of the productivity-driven costs of the war, which are our focus.[41]

Nonetheless, the SB figures are likely still conservative. A subsequent, independent analysis by scholars at the Watson Institute at Brown University found a substantially larger total cost.[42] In a 2012 follow-up, SB also judged their original estimate to be conservative.[43] We are thus reassured that in using this assessment for the US cost of the Iraq War, we will not have an inaccurately high baseline from which to bound the US cost of conquering PGR.

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[38] Stiglitz and Bilmes 2008.

[39] Wallsten and Kosec 2005; Belasco 2014.

[40] JEC 2008; Crawford 2017.

[41] We annualize the SB "realistic-moderate case" estimates, which are computed in terms of net present value over 2003 to 2017.

[42] Crawford 2017.

[43] Sliglitz and Bilmes 2012.

The productivity-driven costs for the US derive from the large number of personnel and enormous array of supplies it employed to invade and occupy Iraq. The time these personnel spent in Iraq could otherwise have been spent working in the civilian economy, had they been released from service in Iraq or never recruited in the first place. Hence, while they were deployed, the US suffered an opportunity cost of the value their labor would have produced in the economy. Some returned to the US with serious injuries or permanent disabilities, so that their subsequent ability to work in the economy was impaired. Others were killed, and so could never re-enter the economy. Thus, the injuries and deaths that occurred during deployment created additional opportunity costs because the economy lost the future value these people would otherwise have produced. Analogously, the weapons, uniforms, vehicles, fuel, food, medicines, and many other supplies sent to Iraq could not be utilized for other purposes. Those that were worn down or damaged were rendered less valuable for subsequent uses; those that were expended or destroyed were unavailable for future use. The use of these supplies thus also entails opportunity costs.

Because individuals are free to join the US military or not, and firms are free to supply it or not, the government must pay people and companies enough to render them willing to devote their labor and capital to the military. This compensation must at least equal the value these productive assets would otherwise generate in the economy—that is, their opportunity cost. If the government offered less, people would not volunteer to join the military and firms would not agree to supply it. US government spending on the Iraq War therefore provides a measure of the total opportunity costs of the war. SB calculate that this spending comes to $151 billion annualized.

In fact, this figure substantially underestimates the true opportunity cost of the personnel deployed to the war. During the war, the US government placed restrictions on the ability of personnel to exit military service (the so-called "stop-loss" policy). This was necessary only

because the compensation paid was insufficient to match the increased risk personnel bore in the war, so that too many soldiers would exit if allowed to do so. This implies that the compensation paid by the US government underestimates the opportunity costs suffered by these individuals. SB overcome this problem by estimating the uncompensated portion of these opportunity costs. They compute the income lost to veterans due to disability or death suffered in the war, and then subtract off the (partial) compensation offered by the government. The uncompensated remainder is $27 billion annually.

We must also account for the opportunity costs paid by other members of the US-led coalition, who provided approximately 10% of the total forces for the Iraq War.[44] We assume that if the US sought to conquer PGR, it would do so without the support of a coalition, and would therefore need to augment its own forces to make up for those not provided by coalition members.[45] This implies that our total so far of $178 billion per year represents only 90% of the opportunity costs of the Iraq War for the US side, so that the true total figure is $178 / 0.9 or $198 billion annually.[46] Table 2 summarizes our accounting.

[TABLE 2 ABOUT HERE]

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[44] At the beginning of the war, non-US coalition members provided 16% of the forces, but this fell to 6% by 2007 (Stiglitz and Bilmes 2008, 144-5). We conservatively assume an average over the war of 10%.

[45] We presume that any states that joined the US in conquering PGR would demand a share of the benefits equal to their share of deployed forces. Hence, there is nothing for the US to gain from enlisting a coalition to conquer PGR, because any reduction in the costs to the US would be matched by a proportional reduction in the benefits the US realized.

[46] Most of the other coalition members were high-productivity states like the US, so that they faced comparable opportunity costs per asset.

We will use this figure subsequently, but it is important to note that it includes *only* the opportunity costs of diverting productive assets to the Iraq War. This allows us to isolate the impact productivity has on the total cost of the war, while ignoring other costs that are not a function of US productivity. The most important of these is the higher price US consumers of oil paid as a result of the Iraq War disrupting the oil market. Of course, including this cost in our total figure would only reinforce our finding that this conquest would be unprofitable for the US.

We also leave out the costs of financing the war, such as the interest the US government must pay on the debt it took on to fund the war. These are opportunity costs, but because the conquest of PGR would be intended to extract capital—profits from oil and gas sales—the opportunity cost of capital cannot affect whether conquering PGR is profitable. If the US profits from conquering PGR, then any capital expended will be more than replaced, so that there is no opportunity cost. If the US does not profit, then it will suffer an opportunity cost on the net loss of capital, which if included in our calculation would only make conquest more unprofitable.

THE COST TO IRAQ OF CONQUERING PGR IN 1990

We first argue that the invasion and occupation of PGR would be much less costly for Iraq than its war with Iran. We then describe our assessed cost to Iraq of the Iran-Iraq War, which forms an upper bound on its cost of conquering PGR.

Conquering PGR Would Cost Iraq Less than the Iran-Iraq War

Based on the same determining characteristics previously identified, Table 3 shows that PGR in 1990 represents a less challenging target than Iran did in 1980. Both are adjacent to Iraq,

and while the land area of PGR is larger, its terrain lacks Iran's mountains, easing invasion and occupation. Moreover, Iran has a much larger population and the will of its population to resist occupation should have been at least as high as that of PGR, given that the Iranians were fighting to protect the newborn Islamic revolution. Iraq would enjoy a much larger advantage in military size over PGR in 1990 than it had over Iran in 1980. Iraq's forces were also combat-hardened in 1990—by the long war with Iran—but not in 1980. In both 1980 and 1990, Iraq had the latest generation of Soviet-exported weapons. Iran in 1980 had the latest generation of US-exported weapons, but PGR in 1990 was mainly equipped with outdated US equipment in very modest quantities. A US government report from late 1989 asserted that Saudi Arabia's military, by far the largest in PGR, was "both outgunned and outnumbered" by Iraq.[47] This strongly suggests Iraq's military would do much better against PGR in the 1990s than it did against Iran in the 1980s.

[**TABLE 3 ABOUT HERE**]

Moreover, we can also directly compare the intensity of the Iran-Iraq War to that of Iraq's partial invasion of PGR in 1990. The former was a vicious, bloody war of attrition that imposed immense costs on Iraq.[48] US and others' aid given to Iraq and sanctions imposed on Iran rescued Iraq from what might otherwise have been a devastating defeat. Over the course of its eight years, the war inflicted an estimated 150,000 deaths and 400,000 wounded on Iraq.[49] The war was total for Iraq: Iraq's government mobilized at least one million men—almost half its prime-age male

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[47] DOS/DOD 1989, 3–4.

[48] Woods and Murray 2014.

[49] See Section G of the online appendix.

population—and used its entire arsenal, including chemical weapons, against Iran.[50] Iraq's most valuable infrastructure was heavily damaged, its economy severely disrupted, and its government forced to go deep into debt.[51]

By contrast, Iraq's invasion of Kuwait in 1990 succeeded in just two days and utilized only about 100,000 troops.[52] The invasion and seven-month occupation imposed only a few hundred casualties on Iraq's forces and no serious damage on Iraq itself.[53] Iraq began reinforcing its troops in Kuwait as soon as the invasion was completed, causing the US government to become concerned that Iraq might invade Saudi Arabia next.[54] Had it done so, US intelligence estimated that Iraq's forces would overrun eastern Saudi Arabia in a matter of days.[55] Though the long supply lines would surely have taxed Iraq's logistical capabilities, it seems plausible that Iraq could then have proceeded from eastern Saudi Arabia to conquer the rest of PGR. In reality, the rapid deployment of US forces to Saudi Arabia led Iraq to try only to hold Kuwait.

We thus conclude that the cost to Iraq of conquering PGR absent external intervention would be no greater than that of fighting the Iran-Iraq War, indeed that it would likely be much smaller.

The Cost to Iraq of the Iran-Iraq War

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[50] Pollack 2002, Chapter 2.

[51] Mofid 1990.

[52] Johns, 2006.

[53] Woods 2008, 87.

[54] Woodward 1991, 225.

[55] Ibid.

We know of only one comprehensive accounting of the cost of the Iran-Iraq War.[56] Fortunately, it is based on a detailed, thorough economic analysis that is very similar to that employed by Stiglitz and Bilmes (SB) for the Iraq War, aiding comparability between the two. Mofid estimates that the Iran-Iraq War cost Iraq $92 billion per year. This figure includes the budgetary expenditures, the oil revenue lost due to disruption of production and exports, non-oil GDP lost due to disruption of the economy, and the cost of replacing infrastructure destroyed by enemy attack. Unlike Stiglitz and Bilmes, Mofid ignores the cost to Iraq of the labor lost due to death and injury in the war. Because Iraq suffered hundreds of thousands of casualties, ignoring this could result in a substantial underestimate of the total cost of the war. We therefore employ the same method used by SB for the US to estimate the cost for Iraq of these casualties, arriving at a figure of $31 billion annually. Adding this to Mofid's figure, we reach a total cost of $123 billion per year.[57] Table 4 summarizes our accounting.

[TABLE 4 ABOUT HERE]

In contrast to our figure for the US cost of war, the figure we use here includes *all* the costs of war for Iraq. For the US, we intentionally included only the costs that are directly a function of US productivity, in order to establish that these alone suffice to render conquering PGR

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[56] Mofid 1990.

[57] The precise figures we use from Mofid, as well as our own calculation of the cost of Iraqi casualties, are documented in Section G of the online appendix. Just as in the US case, we ignore the opportunity cost of the capital Iraq spent and lost (through reduced oil production) in the Iran-Iraq War. As before, this cannot affect whether conquering PGR would be profitable for Iraq, only how large the net profit or loss would be.

unprofitable. For Iraq, we instead include both the costs of war driven by productivity, like the value of labor lost, and those not driven by productivity, like the cost of lost oil revenue. Our purpose here is to demonstrate that even if all the costs of war are included in our Iraq figure, conquering PGR would still be profitable for Iraq.

Also unlike our US figure, which was designed to be an underestimate of the cost of conquering PGR, our figure here is almost surely a large overestimate of Iraq's cost. As we showed above, PGR should be a much easier target for Iraq than Iran was, with the conquest likely requiring only a quick, decisive war rather than a bloody war of attrition. Iraq's labor productivity is also likely considerably lower than the estimate we used, which would lower the real cost. Finally, we show in Section C of the online appendix that the disruption to the oil market that would be caused by Iraq's conquest of PGR would lessen or even eliminate the losses in oil revenue that Iraq suffered in the Iran-Iraq War. Hence our figure should be a very conservative upper bound on the cost to Iraq.

RESULTS

Table 5 displays our estimates of the benefits, costs, and profits of conquering PGR for the US in 2003 and Iraq in 1990. Consistent with H4, we find that the costs would exceed the benefits for the US by more than two to one. Our analysis demonstrates that the high productivity of the US economy is enough to drive the profits of conquering the most tempting target in the world well below zero. Moreover, consider all the costs of conquest we excluded because they were not driven by US productivity or could not be reliably estimated: the moral regret and international punishment for violating the norm against conquest; the cost of higher oil prices for US consumers deriving from disrupting supplies in PGR; and the larger population and land area, larger and more

advanced militaries, and likely greater will to resist of PGR relative to Iraq. Incorporating these would seriously increase the costs of conquest, in all likelihood swamping the benefits and rendering the conquest deeply unprofitable for the US.[58]

[TABLE 5 ABOUT HERE]

By contrast, the expected benefits of conquering PGR outweigh the costs for Iraq in 1990 by about a third.[59] This is true even though our cost figure for Iraq includes not only productivity-driven costs like government expenditures on troops and equipment, but also other costs like the disruption of Iraq's oil exports, and even though our bound is based on a war which would almost certainly be vastly costlier than Iraq's conquest of PGR. Still, conquering PGR, if it did not bring adverse international responses, would be highly profitable for Iraq. This means that Iraq's productivity, middling relative to the rest of the world, is sufficiently low to make conquest a profitable enterprise, were it not for the international community's reaction.

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[58] The annual costs of conquest might decline over time as the target is pacified and fewer forces are needed for occupation. Our US cost figure accounts for this decline, since it derives from annualizing the total cost for the US over its first fifteen years of occupying Iraq, during which US forces fell to very low levels. Our figure for Iraq does not, since Iraq's forces committed to the Iran-Iraq War actually rose over its duration, but accounting for this would reduce the cost for Iraq and thus strengthen our conclusion.

[59] This is not due to the higher benefits Iraq could anticipate in 1990, relative to the US in 2003. We show in Section D of the online appendix that the benefits of conquering PGR in most years from 1965 to 2018 would still exceed our figure for Iraq's cost of doing so, so that our conclusion that Iraq would profit does not depend much on the year we chose.

Our measures also allow us to see and compare the differing effects productivity has on the cost of conquest: it both increases the opportunity cost per productive asset, and decreases the total number of assets needed. Table 6 compares proxies for the per-unit cost and the amount of the labor the US and Iraq devoted to their respective wars: the productivity and average size of forces deployed, respectively. By these indicators, the US diverted less labor than Iraq, in line with H2, but paid more for each unit of labor, as H1 expects. The higher productivity of the US economy, and corresponding higher technology and capital-intensiveness of the US military, enabled the US to use less labor in conquest than Iraq did. However, this productivity-caused decline in the number of assets required for conquest was more than matched by the productivity-caused increase in the opportunity cost per asset, supporting H3.[60] While the US utilized about one-fifth the labor Iraq did, each unit of US labor cost seven times as much as for Iraq. This is consistent with a total US cost of conquest much higher than Iraq's. The net effect of the increase in productivity from Iraq to the US was large enough to make a highly-profitable conquest for Iraq very unprofitable for the US, even given our conservative cost estimates.

[TABLE 6 ABOUT HERE]

Thus, at least in this case comparison, productivity's net effect on the profitability of conquest was both negative and large enough to eliminate any profit. But recall that our choice of the US as the high-productivity conqueror enables us to make inferences about other contemporary high-productivity states as well. Among these states, the US has made uniquely massive investments in military technology since World War II, which has given it the most sophisticated

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[60] Hypothesis 3 was stated as $OCPA_{Iraq} * QPAU_{Iraq} < OCPA_{US} * QPAU_{US}$. Table 6 shows, equivalently, that $OCPA_{US} / OCPA_{Iraq} > QPAU_{Iraq} / QPAU_{US}$.

military in the world. If conquering a target as tempting as PGR is not profitable for the US, then it surely will not be profitable for other contemporary high-productivity states either, given their less advanced militaries. And if conquering PGR would not be profitable for these states, then other potential targets of conquest would not be either.

Of course, we have shown only that productivity suffices to make conquest unprofitable for high-productivity states in recent decades. These states might also have other reasons for not engaging in conquest: the risk of military failure, the costs of international responses, the moral regret of behaving badly. We cannot be sure that productivity is *the* reason they do not engage in conquest. We can only assert that, were these other factors absent, productivity would be enough to eliminate the economic motives for these states to conquer in recent decades.

By contrast, productivity in Iraq was low enough to render the conquest of PGR highly profitable, at least in the absence of any adverse international response. Given this, we can infer that conquering even somewhat less-tempting targets would also be profitable, and that states with lower productivity than Iraq would also find such conquests profitable, under the same conditions. If this is true, it means that such states refrain from conquest, not because it would be unprofitable, but because of some other factor. Most such states have relatively weak militaries, and many might hesitate to behave immorally, so that the risk of military failure or moral regret cause them to eschew conquest. However, low-productivity states with strong militaries and ruthless leaders, like Iraq in 1990, seem instead to be deterred from conquest by the threat of severe international response. Thus, productivity's effect on the desirability of conquest for high-productivity states, and the corresponding willingness of these states to support a norm against conquest and compel low-productivity states to obey it, can together plausibly explain the decline of conquest globally.

CONCLUSION

Since the end of World War II, there has been a sharp decline in the scale of conquest as well as rapid growth in economic productivity around the world. We presented a theory of how increasing productivity influences the profitability and hence occurrence of conquest, and tested it against two empirical cases carefully chosen to support broader inferences. Consistent with extant theory, we found that productivity raises the cost of diverting productive assets from a conqueror's economy to conquest, but also strengthens a conqueror's military prowess so that fewer assets are needed for conquest. Consistent with our own theory, which predicts that the former effect should outweigh the latter because worldwide investment in innovation was mostly oriented toward civilian rather than military improvements, we found that productivity on-net reduced the profitability of conquest. Finally, we found that, in recent decades, although low-productivity states should still find conquest profitable, the net effect of productivity was large enough to render conquest unprofitable for high-productivity states, even setting aside the costs of violating the norm against conquest. This provides direct evidence that increased productivity can explain the radical shift in the interest of some of the world's most powerful states away from profit-motivated conquest.

These findings imply that both productivity and the norm are essential to explaining why particular states have not engaged in more conquest. High-productivity states refrain because conquest would be unprofitable, even if they were exempted from the norm. Low-productivity states are deterred because, although they would profit from conquest in the norm's absence, the existence of the norm means that conquest will bring moral regrets (if they have internalized the norm) and punishment by the international community for violating the norm. Thus, the norm-

driven costs of engaging in conquest are not needed to explain the decline in conquest by high-productivity states, but are needed to explain this for low-productivity states.

Our findings can also explain why contemporary high-productivity states like the US support and enforce the norm against conquest. Because these states cannot profit from conquest, they have no incentive to undermine the norm against it. They also should prefer that other states eschew conquest. This is obviously so if the high-productivity states in question were to be targeted. But even if a third party was conquered, it would disrupt commerce and potentially empower the conqueror to seize more territory, gain more power, and eventually threaten even the high-productivity states. These negative externalities of conquest give high-productivity states strong incentives to support and enforce the norm against others, in addition to obeying it themselves. Since the high-productivity states include some of the world's most powerful states, they also have the capability to enforce the norm effectively.

This reasoning also suggests an explanation for the origins of the norm. Prior to the dramatic increases in productivity of the late Modern Era, any state could potentially profit from conquest. Although states would prefer others not to engage in conquest, the most powerful of them would want to be free to do so themselves, and so would not support a norm against it. Later, as some states experienced rising productivity, the profits they could realize from conquest gradually declined, eventually to below zero. Such states would therefore come increasingly to prefer to access foreign wealth through commerce rather than conquest, but would be hamstrung in doing so by the widespread occurrence of conquest and the restriction of commerce that often attended conquest. These states would have a growing collective interest in moving to a new equilibrium, one in which conquest would be rare and commerce relatively free. These high-productivity states gained the preponderance of power needed to enforce international norms only

after World War II, and used this power to implement a new equilibrium that included a norm against conquest and institutions designed to free commerce. Both conquest and barriers to commerce declined precipitously thereafter.

Of course, this story is speculative, and there are other possible explanations for the origins and enforcement of the norm against conquest. Our evidence supports the idea that this norm is presently maintained because many powerful states have no incentive to violate it, but this evidence says nothing about where the norm came from. Further empirical research is needed on the role that rising productivity may have played in this norm's origins.

While increasing productivity has thus been a powerful force for peace in recent times, this was not necessarily true in the more distant past. Historians of early modern Europe (1400-1750) argue that some governments invested heavily in military innovation, causing a leap in military prowess even though economic productivity rose very slowly.[61] Our theory suggests that this should greatly increase the profitability of conquest, and so offers a potential explanation for the dramatic rise in conquest during this period. Future research should investigate the relative trends in productivity and prowess in earlier times and the relationship of these to the profitability and occurrence of conquest.

Our findings also offer guidance on what might lead to a future resurgence of conquest. First and most obviously, if increases in productivity lie behind the decline of conquest, then serious reductions in productivity could reverse it. If, for example, a sustained and severe economic recession struck some currently high-productivity states, they might be tempted to engage in newly-profitable instances of conquest. If enough of these states, who would otherwise be expected to enforce the norm against conquest, violated it, then the norm itself might break

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[61] Hoffman 2015.

down, leading yet more states to resort to conquest. Even if recession only led these states to stop paying the costs of enforcing the norm, low-productivity states normally deterred by the norm might ignore it.

Second, suppose that some resource becomes scarcer, more concentrated, or essential for modern economies. Then its resulting value might rise high enough that the benefits of conquering the few locations in which it is found outweigh the costs even for high-productivity states. This is arguably what happened with oil. Oil was worth little until the burgeoning importance to modern economies of internal combustion engines drastically increased its value, and it subsequently became subject to conquest. Indeed, oil could become so again in the future, if its price were to rise high enough, perhaps because demand from newly-developed economies outpaced supply and substitution toward other fuels. And though it is not easy to imagine what it might be, a "new oil"—a resource so scarce and so valuable as to tempt even high-productivity states to conquest—could arise.

Finally, new innovations might drastically increase military prowess relative to economic productivity. Even high-productivity states might then be able to use so few productive assets in conquest that it would become profitable again. For example, fears have been raised about the military potential of artificial intelligence and autonomous vehicles.[62] It is easy to see how these technologies might increase military prowess: autonomous military vehicles equipped with artificial intelligence could substantially reduce the labor required for conquest. However, these same technologies also have civilian applications that would drastically increase productivity. Our theory predicts that they will only increase the incentives for conquest if they increase military prowess by more than they increase economic productivity. This in turn can only occur if

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[62] Horowitz et al. 2018.

investment in their development is oriented more toward military than civilian improvements. At present, the opposite is true: investment in these technologies is mostly driven by their commercial possibilities. As long as this remains so, our theory predicts that these technologies will on-net *decrease* the incentives for conquest, because they raise the cost of diverting productive assets to engage in conquest more than they lower the quantity of assets needed.

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Table 1: Indicators of Conquest Difficulty of Iraq and PGR in 2003

Target	Proximity	Terrain	Area (km²)[63]	Population (millions)	Will to Resist	Military Personnel[64]	Military Quality
Iraq in 2003	Distant	Mostly flat dessert	434,320	26.2	High	389,000	Low
PGR 2003	Distant	Mostly flat desert	2,263,491	29.8	Higher	289,000	Medium
Which is harder?	Same	Same	PGR	PGR	PGR	Iraq	PGR

Table 2: The Opportunity Costs of the Iraq War for the US (in billions)

Component of Cost	Annualized Cost
Opportunity Costs Compensated by US Government	$151
Uncompensated Opportunity Costs Suffered by US	$27
Opportunity Costs Paid by Non-US Coalition Members	$20
Total Opportunity Costs	$198

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[63] Area and population are from World Bank n.d.

[64] National Military Capabilities v5.0. See Singer et al 1972.

Table 3: Indicators of Conquest Difficulty of Iran in 1980 and PGR in 1990

Target	Proximity	Terrain	Area (km²)[65]	Population (millions)	Will to resist	Military Personnel[66]	Military Quality
Iran in 1980	Adjacent	Desert and mountains	1,628,760	38.5	High	Iraq: 430,000 Iran: 305,000	Similar to Iraq
PGR 1990	Adjacent	Mostly flat desert	2,263,491	21.4	High	Iraq: 1,390,000 PGR: 238,000	Lower than Iraq
Which is harder?	Same	Iran	PGR	Iran	Same	Iran	Iran

Table 4: The Opportunity Costs of the Iran-Iraq War for Iraq (in billions)

Component of Cost	Annualized Cost
Budgetary Cost, Oil Revenue Lost, Other Economic Disruption, Infrastructure Destroyed	$92
Labor Lost Due to Deaths and Injuries	$31
Total Opportunity Costs	$123

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[65] Area and population come from The World Bank n.d.

[66] National Military Capabilities v5.0. See Singer et al 1972.

Table 5: The Profitability of Conquering PGR (in billions)

Potential Conqueror	Annual Benefits	Annual Costs	Annual Profits	Would Conquest Pay?
US in 2003	$82	$198	-$116	no
Iraq in 1990	$159	$123	+$36	yes

Table 6: Cost and Quantity of Assets Used in Conquest

	Opportunity Cost Per Asset	Quantity of Productive Assets Used
Proxy	Labor Productivity (GDP per capita[67])	Average Forces Deployed per Year[68]
US in 2003	$44,507	116,000
Iraq in 1989	$6,458	594,000
Ratio of US to Iraq	~7:1	~1:5

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[67] The World Bank n.d.

[68] These figures are documented in Section I of the online appendix.
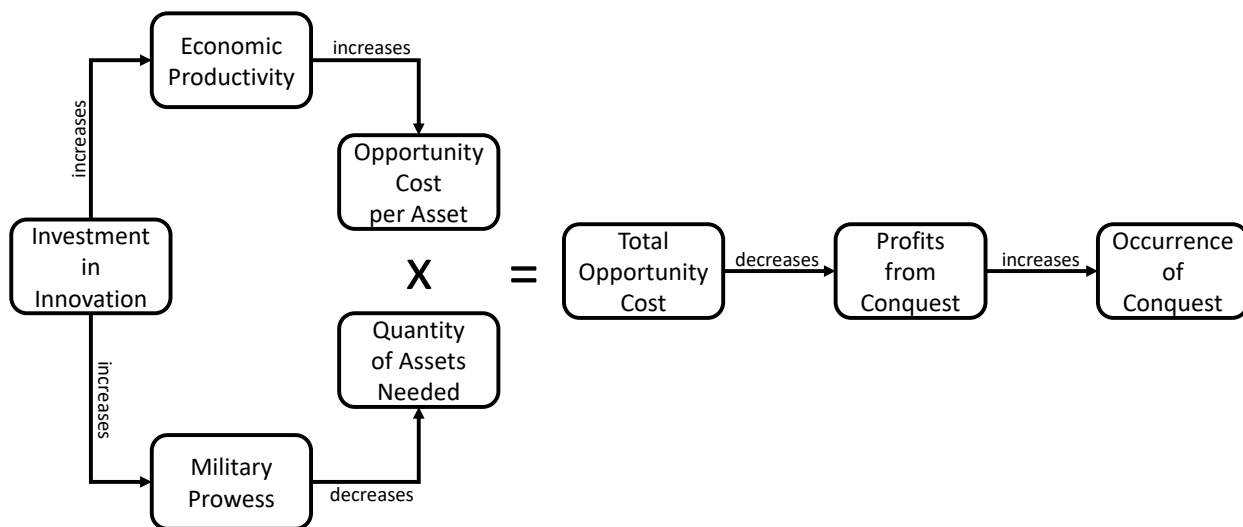
Figure 1: Productivity's Effects on Conquest

Figure 2: The Distribution of World Research and Development Spending in 2015