Profits and Economic Development

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ABSTRACT

Using industry-level manufacturing data, this paper demonstrates a negative effect of rents, measured by the mark-up ratio, on productivity growth. This result is robust to alternate specifications, including an instrumental variables approach. The negative effect is strongest in poor countries, suggesting that high profits stymie economic development rather than enable it. Consistent with the rent-seeking mechanism of the model, we find that high rents are associated with a slower reduction in tariffs. A country's average mark-up is a strong negative predictor of future economic growth, indicating that we may be measuring a phenomenon of the broader business environment.

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"Without development there is no profit, without profit no development." Joseph Schumpeter, The Theory of Economic Development (1934)

1 Introduction

Are rents, or excess profits, good for development?

We seek to answer this question by examining panel data at the industry level and applying analytical methods from the competition-and-growth literature (see Aghion and Griffith 2005) to a larger group of countries along the development spectrum. Economic theory supports both sides of the argument, with each conclusion offering conflicting advice for competition policy and anticorruption efforts. Surprisingly, there has been little statistical research in the last decade and a half since data availability has improved to increase the sample size by two orders of magnitude from earlier studies (e.g. Ades and Di Tella 1999) and the theoretical debate has become more complex.

On the one hand, rents seem to be a compelling feature of successful economic development. "Schumpeterian rents" (Galunic and Rodan 1997) can incentivize innovation and thus bring about the economic development Schumpeter was talking about, as the economy became more sophisticated and productive. "Without profit," Schumpeter (1934) noted, "there would be no accumulation of wealth."

A different view of rents and development can be found in North, Wallis, and Weingast (2009). North and co-authors argue that most societies in history—including today's developing economies (North et al. 2007)—are "natural states" in which a dominant coalition of elites carve up the economy into protected rents that can be collectively enforced. As these natural states become more consolidated, elites have an interest to promote specialization and trade in order to increase the amount of rents at play (p. 49). By this mechanism, rents go part and parcel with political stability, and their presence is required if the economy is to develop.[1]

A third idea can be found in the voluminous access-to-finance literature. Finan-

[1] Introducing an edited volume that applies North, Wallis, and Weingast (2009) to today's developing countries, North et al. (2012) recognize that some rents might generate a drag on growth while others enable it, but they do not find a pattern across the case studies analyzed (p. 20).

cial sector development is a key correlate of economic development (Levine 1997). Countries with less developed economies grow slower. In those countries, retained earnings are an important source of capital for new investment. It thus seems logical that an economy or industry that enjoys higher profits or rents should be able to fund a faster expansion.

Taken together, these three conceptualizations highlight the crucial role for rents in economic development: as an incentive for innovation, a glue to keep elite interest in stability and expansion, and a source of capital for investment. Yet in spite of this logic there is a case to question the notion that high profits are good for economic development.

The strongest challenge to this notion is the flip side to North, Wallis, and Weingast (2009). Business interests can capture the state (e.g. Stigler 1971), or vice versa (e.g. Shleifer and Vishny 2002). Rents, rather than being used to promote growth, can be used to sustain the status quo, which is often one of limited competition. They can lead to corruption, since bureaucrats who preside over high-rent sectors will be able to extract more from the private sector (Ades and Di Tella 1999). Rent-seeking activities exhibit increasing returns to scale, thus making rents self-sustaining, and because they are anti-innovation provide a further drag on growth (Murphy, Shleifer, and Vishny 1993). Rent-seeking can draw talent from the productive sector (Acemoglu 1995) and be destructive to entrepreneurship in particular (Baland and Francois 2000).

The other first-order challenge to the view that rents are good for development is the flip side to Schumpeter. Rather than being an incentive for innovation, high profits may be a lack of incentive to do much at all—or, as Hicks (1935) said, "the best of all monopoly profits is a quiet life" (p. 8). If managers are not profit-maximizing and are lazily enjoying the rents from limited competition (e.g. Hart 1983), then higher rents can lead to slower growth rather than more investment. Only when firms are at risk of losing their business are managers forced to innovate.

To tackle this question, we first construct a model that allows for either productive rents or unproductive rents. Our model is a basic one to provide the intuition behind our empirical approach. A number of firms compete in Cournot competition, such that the profit of each firm is decreasing in the number of other firms in the market. Firms can either use their profits to create new products or collude to prevent new entrants to the market, and their profit-maximizing decision depends on the relative returns to each. This captures the ambiguous overall prediction of the effect of rents on growth.

We model developing countries as having two characteristics. One, a higher quality of public administration or competition policy makes it more difficult to bribe regulators to prevent entry. This makes the cost of rent-seeking lower in poorer countries. Two, profits on new products are higher due to the ability of firms in poor countries to copy existing technologies. These features lead to the prediction that observed ex-post profits should be higher in developing countries, consistent with the financial literature on market segmentation (Bekaert et al. 2011). However, we still come up with an ambiguous prediction of whether rents are better or worse for growth in poor countries than they are in rich countries. In addition, in the empirics we examine access to financial markets, which are weaker in developing economies. Weak access to finance increases the value of rents to finance innovation, but it also increases the ability of incumbents to block new entrants, so again the prediction of rents on growth is ambiguous when access to finance is a challenge.

We test the model using the Lerner index as a measure of rents, following Nickell (1996), Aghion et al. (2005a), and Aghion, Braun, and Fedderke (2008). The Lerner index (Lerner 1934), also called a mark-up ratio, is equal to the difference between price and marginal cost divided by price. Under perfect competition, price should equal marginal cost giving a value of zero for the index. The greater the degree of monopoly pricing, the higher the index. In practice, marginal cost data are unavailable for large panel data applications, so mark-up is approximated using a variant of profits over revenues (Aghion et al. 2005a). Since firm-level data in less-developed economies is spotty and unavailable in time series for most countries, we follow Aghion, Braun, and Fedderke (2008) and use industry-level value-added data from the United Nations Industrial Development Organization (UNIDO 2013). UNIDO's INDSTAT data are available for around 20 manufacturing sectors in over 100 countries since the 1960s. The mark-up ratio we calculate is a measure of both rents and (lack of) competition, and in both the theory and empirics, we do not make an attempt to separate these two concepts.

We supplement the UNIDO data on the mark-up ratio with other industry and national-level variables and test the predictions of the model. Unlike our predictions, which are ambiguous about the relationship between profits and growth, our results are decidedly unambiguous. First, we find support for the prediction that observed rents are higher in less developed countries—virtually any indicator of underdevelopment is associated with a higher average Lerner in the manufacturing sectors. Second, we find that the relationship between rents and growth is strongly negative, with the results being primarily driven by the poorer countries (or those with higher political risk) in the sample. This result, that higher excess profits are correlated with slower growth in developing countries, is robust to a series of modifications to the specification including instrumenting for mark-up using the average mark-up in other industries in the country.

We then split the sample along two dimensions: financial sector development (as measured by the size of the banking sector relative to GDP) and the degree of external finance required by the industry (taken from Rajan and Zingales 1998). If access-to-finance constraints are binding, then rents may be especially helpful to finance innovation in sectors that require external finance but in markets with weak financial sector development. In fact, we find that the effect of rents on growth is especially harmful in this quadrant. In other words, far from being a way to finance investment out of retained earnings, rents seem to be the key to limiting competition.

To be sure, there is potential for endogeneity in our specifications, but most of the potential critiques work against our findings. If better-performing firms also acquire market share, then we should see a positive relationship between mark-up and growth. If firms in poor countries over-report costs or under-report profits, we should see less profit rather than more profits in developing economies. If high-growth industries are more profitable, then we should see a positive relationship between mark-up and growth. Some remaining critiques are dealt with by our use of multiple fixed effects specifications and instrumentation strategies.

At the level of the industry, our best measure of protection from "new entrants" is the level of tariffs. We look at the effect of Lerner on the change in tariffs, which of course have been on a secular decline over the period of the sample. As predicted by the model, the higher the Lerner, the slower the reduction in the tariff rate. We also test for the most likely alternative mechanism, that higher rents are associated with less competition which allows for managerial slack. Using data on management from Bloom and Van Reenan (2010), we find (albeit without much statistical power) that management practice has no association with mark-up, and that controlling for management quality does not affect the coefficient of interest.

Having established that rents are associated with lower initial development levels, slower growth within manufacturing sectors, as well as a slower-improving business climate, we then test whether there are any macroeconomic implications. We include the average level of mark-up across industrial sectors as a right-hand side variable in standard growth regressions and find that it is a robust negative predictor of economic growth, although the differential effect on poorer countries is not distinguishable from zero. A reduction in average mark-up by one standard deviation predicts higher GDP growth of 0.39 percentage points (compared to an average annual growth rate in our sample of 2.3 percent), in spite of the mark-up measure being just for the manufacturing sector. The effect of average mark-up on GDP growth is about one and a half times the size that we would expect just from the direct effect of mark-up on growth in manufacturing value added, suggesting that high mark-up in manufacturing is indicitive of high mark-up in non-manufacturing sectors as well. In a model allowing for conditional convergence, the growth penalty from a one standard deviation increase in mark-up is about half of the growth advantage from a one standard deviation reduction in GDP, indicating that the benefits of catch-up growth from being poor are larger than the costs of having a bad political economy.

Taken together, these growth results suggest a slight recasting of the traditional conditional convergence model. Poor countries grow faster than rich countries because of the benefits of catch-up, but those countries also tend to have higher rents, which slows growth. Developing countries have a tailwind from being poor in the catch-up sense, but a headwind from being poor through an inferior political economy of rent-seeking business.

Our findings are consistent with the earlier political economy literature which finds a destructive effect of rents (Ades and Di Tella 1999, Baland and Francois 2000) as well as the business literature seeking to understand how the business environment can help explain sustained rents. For example, Chacar, Newburry, and Vissa (2010) find that a stronger antitrust environment is associated with decreases in performance persistence, or sustained profits. Chari and David (2012) find that the pro-market reforms in India resulted in a decrease in firms' ability to sustain superior profits. They are also consistent with the few IO papers that examine the link between competition and growth in developing countries. Carlin, Schaffer, and Seabright (2004) look at firms in transition economies and find that monopolies innovate less than firms facing competition, and Gorodnichenko, Svejnar, and Terrell (2010) find that foreign competition stimulates innovation. The measures of innovation used in these papers roughly correspond to our own modeling of innovation, rather than being inventions per se: new plants, new products, new technologies, or getting quality accreditation.

In spite of the broad consistency of our findings with these earlier papers, the paper makes a unique contribution. Unlike the political economy literature, we explore the manufacturing sectors, and in so doing can use industry-level measures and increase the sample size from earlier studies by nearly two orders of magnitude. We also examine both mechanisms and growth effects. Unlike the business literature, the focus of our paper is not on firm profitability but instead from industry-level profitability to growth, reforms, and the overall growth of the economy. The insight is that what may be good for the players in one industry may not be good for the economy at large. And unlike the IO literature, we focus on the channel of rent seeking, finding that mechanism to be first order in poorer countries.

The rest of the paper is organized as follows. Section 2 presents the formal model. Section 3 describes the data and empirical specifications. Section 4 contains the main results establishing the link between rents and growth at the level of the industry. Section 5 evaluates the mechanisms of rent-seeking and managerial slack. Section 6 explores the growth implications. Section 7 concludes.

2 A simple model

In this section we develop a simple model to illustrate the tradeoff between rent-seeking and growth. We model rents or mark-up as determined by the level of competition within a market. Rent-seeking is the attempted blocking of a new entrant into the market by bribing or lobbying bureaucrats, and it is easier when the level of development is lower. Probabilistic entry is similar to the model in Aghion et al. (2005b), although they focus on entrance of foreign firms. Growth occurs when a firm innovates to produce a new product, which generates an increased incentive for a firm in a more competitive environment to innovate to leave the competition behind, as in Arrow (1962).

2.1 Set-up

In the first period, N identical firms compete in quantities, producing a homogenous good with inverse demand given by $P(Q) = f - gQ$, where Q is the total quantity produced and f and g are positive parameters. Marginal cost is constant at c, and $f > c$. The total profit generated by the firms is

$$\pi(N) = (\frac{f-c}{N+1})^2(\frac{N}{g}). \tag{1}$$

Mark-up of price over marginal cost is higher when N is lower, so high N in the theory corresponds to low mark-up in the empirical section. In between the first and second period, a potential innovator will have the option to pay a fixed cost h to leave the original market (market A) and create a new product, allowing it to operate as a monopolist in market B, earning a profit of π^M. The firm may be prevented from undertaking a profitable innovation by a credit constraint; it may spend only the profits it earns in the first period and an exogenous level of credit λ.

Whether or not the firm decides to innovate corresponds to productivity growth in the empirical section.[2] If the potential innovator decides to stay in market A,

[2] As will be discussed below, productivity is measured in revenue terms, rather than physical terms. Creating a new market is only one way to generate more value per worker, but it is an important one, especially in poor countries where relatively few different kinds of goods are being produced (Hidalgo and Hausmann 2009).

the incumbents then collusively decide on a level of rent-seeking, which reduces the likelihood of an additional competitor in the second period. If they collectively spend a, then the probability of an additional firm entering is $1-\alpha\sqrt{a}$, with $\alpha > 0$ an indication of how easy it is to persuade bureaucrats to restrict entry. Note that the credit constraint can never bind here: the firms never want to spend more on rent-seeking than they earned in profits in the first period, because that would guarantee losses.

If an entrant does not arrive, the incumbents will once again earn $\pi(N)$ in the second period. If one does, they will earn

$$\pi(N+1)*\frac{N}{N+1} = (\frac{f-c}{N+2})^2(\frac{N}{g}). \tag{2}$$

For convenience, we define the reduction in total profits for the N incumbents caused by entry as $d(N)$:

$$d(N) \equiv \pi(N) - \pi(N+1)*\frac{N}{N+1}. \tag{3}$$

It is natural to treat N as a discrete variable, but we can also consider it as a continuous variable when analyzing the effect of a change in N. Note that the reduction in profits caused by one additional entrant is declining in N (because moving from a monopoly to a duopoly reduces profits far more than moving from 12 firms to 13):

$$d'(N) = -\frac{(f-c)^2}{g}(\frac{N-1}{(N+1)^2} - \frac{N-2}{(N+2)^2}) < 0. \tag{4}$$

The solution concept is symmetric Nash equilibrium. This allows us to disregard implausible equilibria where, for example, the incumbents could threaten to produce huge quantities in the second period if the potential innovator did not leave the market, or where one incumbent paid less than their share of the rent-seeking. It also allows us to ignore what happens in market A if the innovator leaves, because the outcome of interest is the innovation itself. Working backwards, if the innovator stays in market A, the incumbents' total profits in the second period as a function of rent-seeking will be

$$\pi(N,a) = \pi(N) - d(N) * (1 - \alpha\sqrt{a}) - a. \tag{5}$$

Solving the first-order condition gives

$$a^* = (\frac{1}{2}\alpha d(N))^2, \tag{6}$$

and

$$\pi(N,a^*) = \pi(N+1) * \frac{N}{N+1} + \frac{1}{4}\alpha^2 d(N)^2. \tag{7}$$

Thus, the firm will innovate if the fixed cost is less than the additional profits that are created:

$$h \leq \pi^M - \frac{\pi(N,a^*)}{N} \equiv h^{want}, \tag{8}$$

and it has sufficient credit:

$$h \leq \frac{\pi(N)}{N} + \lambda \equiv h^{can}. \tag{9}$$

We can interpret h^{want} as the highest fixed cost where innovation is still profitable and h^{can} as the highest fixed cost where innovation is feasible given the credit constraint. To ensure that $1 - \alpha\sqrt{a}$ remains above zero, it is sufficient to assume that $\alpha < \sqrt{2d(N)}$. This just means that rent-seeking is not so cost-effective that the incumbents want to drive the likelihood of entry all the way to zero, which ensures we have an interior solution.

2.2 Comparative statics

2.2.1 Competitiveness

An exogenous increase in the number of firms has two effects: it is less profitable for the potential innovator to stay in market A, which encourages it to flee from competition and create the second market, but it also reduces profits in the first period, which may prevent it from doing so. The result is that without appealing to the data, we cannot make any predictions of the effect on growth of increasing N and reducing mark-up.

In the empirics, we observe a negative relationship in the data between mark-up and productivity growth, which we interpret as evidence that the escape competition effect dominates the credit constraint effect. To generate additional predictions from the theory, we will make a stronger assumption, that the credit constraint never binds, so the firm always innovates whenever the fixed cost is sufficiently low that innovation is profitable (i.e., $h \leq h^{want}$). Thus, we predict that any change that increases h^{want} will also increase productivity growth.

We can confirm algebraically that once we have assumed away the credit constraint, an increase in competition (i.e., N) boosts growth:

$$\frac{\partial h^{want}}{\partial N} = -\frac{\partial}{\partial N}\frac{\pi(N,a^*)}{N} \tag{10}$$

$$= -[\frac{\partial}{\partial N}\frac{\pi(N+1)}{N+1}+\frac{1}{4}\alpha^2(2\frac{[d(N)]}{N}d'(N)-\frac{d(N)}{N})^2)] > 0. \tag{11}$$

2.2.2 Development

In this section we retain the assumption that the credit constraint does not bind and analyze the effect of a country's level of development. The first of two differences in the model between rich and poor is that we assume that rent-seeking is easier in poor countries. This is motivated by the fact that corruption is generally decreasing with development. When rent-seeking is easier (i.e., α is higher), the potential innovator has less incentive to create a new market, increasing the maximum fixed cost it would be willing to incur:

$$\frac{\partial h^{want}}{\partial \alpha} = -\frac{\partial}{\partial \alpha}\frac{\pi(N,a^*)}{\alpha} \tag{12}$$

$$= -\frac{\alpha d(N)}{2N} < 0 \tag{13}$$

There is also unconditional convergence in manufacturing productivity because of the availability in catch-up growth (Rodrik 2013). To incorporate that fact into the model, we assume that the profits generated by an innovator (π^M) are higher in poor countries, because in poor countries it is possible to copy existing technology to create a new market. Increasing π^M raises the threshold fixed cost that the innovator is willing to pay, making productivity growth more likely, because $\frac{\partial h^{want}}{\partial \pi^M} = 1$.

To sum up, it is easier to rent-seek in poor countries, which slows productivity growth, but the prize for innovating is larger due to catch-up, which boosts productivity growth, so the net result is ambiguous as to whether productivity growth will be higher or lower in poor countries.

We can also see the effect of easier rent-seeking on profits. If the potential innovator stays in the original market, which is likely to be the more common case as innovation is generally difficult, then the change in total profits as a function of α can be found from equation (7):

$$\frac{\partial \pi}{\partial \alpha} = \frac{1}{2}\alpha d(N)^2 > 0. \tag{14}$$

Therefore we expect that profits will be higher in countries with lower quality of government institutions (higher α), consistent with the political risk premium demanded by investors in such jurisdictions, and this result is confirmed in the data.

2.2.3 Interaction of competitiveness and development

Again we assume that there is no credit constraint, and address the question of whether an uncompetitive, high mark-up, environment is more damaging in rich or poor countries. First consider the channel of rent-seeking being easier. Mathematically, we can see that rent-seeking is more damaging in poor countries:

$$\frac{\partial^2 h^{want}}{\partial \alpha \partial N} = -\frac{\alpha}{2}\frac{\partial}{\partial N}(\frac{d(N)}{N}) < 0, \tag{15}$$

because $d'(N) < 0$. To understand the intuition, consider the extreme cases where rent-seeking is impossible (meaning entry is certain) and where it is perfect and costless (meaning entry is impossible). In the first case, an exogenous increase from N to $N+1$ starting firms means that the potential innovator knows there will be $N+2$ rather than $N+1$ firms in the second period. In the second case, the innovator really will face a market with N or $N+1$ firms in the second period. The change in its potential profits are greater in the second case. The potential profits that can be gained in market B do not depend on α, so increasing competitiveness is more helpful when rent-seeking is easy.

We also need to consider the fact that in poor countries, the post-innovation profits are higher because there is more available catch-up, and that also impacts whether uncompetitiveness is more damaging in poor countries. Here we need to be more specific about the fixed cost that the innovator faces; we assume it is distributed according to the cumulative density function $Q(h)$, with associated probability density function $q(h)$. The probability of innovation P is then

$$P = Q(\pi^M - \frac{\pi(N)}{N}), \tag{16}$$

and innovation is more likely when there are more firms in the original market:

$$\frac{\partial P}{\partial N} = q(\pi^M - \frac{\pi(N)}{N})(-\frac{\partial}{\partial N}(\frac{\pi(N)}{N})), \tag{17}$$

which is positive because $\frac{\partial}{\partial N}(\frac{\pi(N)}{N}) < 0$ (because each firm's profit is decreasing in the number of firms). We are interested in whether this inducement to innovate is stronger when the prize for innovation is high or low. Mathematically,

$$\frac{\partial^2 P}{\partial \pi^m \partial N} = q'(\pi^M - \frac{\pi(N)}{N})(-\frac{\partial}{\partial N}(\frac{\pi(N)}{N})). \tag{18}$$

This is positive when $q'(\pi^M - \frac{\pi(N)}{N}) > 0$. Recalling that the term in parentheses is the threshold fixed cost where a firm is indifferent between innovating and not, this means that an increase in competitiveness encourages innovation more in poor countries if it is more likely to find a firm barely unwilling to innovate than barely willing to innovate. This will be the case if, for example, the fixed cost of innovating is distributed normally and the threshold is sufficiently high that innovation occurs in fewer than half of the cases. If so, then both effects point in the same direction, and uncompetitiveness is especially damaging in poor countries because of both the rent-seeking effect and the catch-up effect.

3 Data and Empirical Specifications

3.1 Rents, competition, and mark-up

We are interested in the relationship between the business environment and productivity growth, and there are two related concepts that we can use to describe the former. The first is rents, or excess profits, defined as a fraction:

$$\text{rents} = \frac{\text{revenue - total cost}}{\text{revenue}}. \tag{19}$$

The second is the competitiveness of the market, which is commonly measured by the Lerner index, or mark-up ratio:

$$\text{Lerner} = \frac{\text{price - marginal cost}}{\text{price}}. \tag{20}$$

In practice, we do not observe the data that would be required to calculate either rents or the Lerner index exactly, but we can use the data that is available to generate a good approximation. Following Aghion, Braun, and Fedderke (2008), we define mark-up as follows,

$$\text{mark-up} = \frac{\text{value added} - \text{wage bill}}{\text{revenue}}. \tag{21}$$

Since value added is revenue minus cost of materials, and total variable cost is the sum of the wage bill and the cost of materials, we can also write,

$$\text{mark-up} = \frac{\text{revenue} - \text{total variable cost}}{\text{revenue}}. \tag{22}$$

The only discrepancy between our definition of mark-up and rents is that rents should also subtract depreciation of capital, so mark-up will be higher than true rents. We have access to data on capital expenditures, but not to capital stocks. We do use sector fixed effects throughout, so to the extent that depreciation as a fraction of output is similar across countries within the same manufacturing sector, we can address this concern. Also, as a robustness check, we control for capital expenditures and the main results hold (not reported).

To see how our definition of mark-up approximates the true Lerner index, substitute average variable cost for marginal cost, and multiply the numerator and denominator by the quantity sold:

$$\text{Lerner} \approx \frac{\text{price} * \text{quantity} - \text{average variable cost} * \text{quantity}}{\text{price} * \text{quantity}}, \tag{23}$$

which is exactly the definition of mark-up in (22). With the data that we have, we cannot distinguish between competitiveness and rents, so we remain agnostic as to which one drives the results and use the two terms interchangeably throughout the paper. Disentangling the two remains on our agenda for future research.

Productivity is defined by

$$\text{productivity} = \frac{\text{value added}}{\text{employees}}, \tag{24}$$

and

$$\text{productivity growth in year } t = \frac{\text{productivity in } t - \text{productivity in } t-1}{\text{productivity in } t-1} \tag{25}$$

Note that productivity growth, our main dependent variable of interest, is defined as the change in the value added per worker, rather than the change in the number of units created per worker. In some ways, this is desirable, as a change from low quality coffee beans to gourmet beans will show up as a change in our definition of productivity, but it would not if we only focused on physical productivity. The downside to our approach is that value added also reflects market power, so that an identical pound of coffee beans is reported as different levels of value added if the producer is a monopolist instead of a competitive firm, and productivity growth may also reflect a change in competitiveness (Foster, Haltiwanger, and Syverson 2008).

Many papers in the literature define productivity growth as improvement in total factor productivity; that is, the change in the output that could be generated from a given quantity of labor and capital. We cannot use the same measure because we lack data on capital, but we do not view this as a limitation. If firms are diverting firms away from capital investment in favor of wasteful rent-seeking, that would show up as no change in total factor productivity but a decrease in productivity, and this is exactly the kind of damage from rent-seeking that we are interested in.

3.2 Empirical Specifications

In the primary specification of the model, we assume that productivity growth from time $t-1$ to t is a function of lagged mark-up, log GDP per capita, and fixed effects for year, country, and sector, with or without an interaction term of mark-up times log GDP per capita. That is, we assume

$$P_{ijt} = \beta_1 M_{ijt-1} + \beta_2 Y_{it-1} + \beta_3 M_{ijt-1} * Y_{it-1} + u_{ijt}, \tag{26}$$

where i indexes countries, j indexes manufacturing sectors, and t indexes time. We assume that the error term is uncorrelated with the independent variables, so

$$E[M_{ijt}u_{ijt}] = E[G_{it}u_{ijt}] = E[M_{ijt}Y_{it}u_{ijt}] = 0. \tag{27}$$

Value added in time $t-1$ is part of the definition of productivity growth from $t-1$ to t and mark-up in $t-1$, so it appears on both sides of (26), and it is reasonable to be concerned that measurement error in value added could lead to a spurious negative correlation between mark-up and productivity growth, as pointed out in Aghion, Braun, and Fedderke (2008). In our main specification, we instrument for mark-up in period $t-1$ with mark-up in the same country-sector in period $t-2$. This solves the problem as long as measurement error in value added in period $t-2$ is uncorrelated with the difference in measurement error between period $t-1$ and $t-2$.

Fixed effects for country allow us to control for omitted variables that are constant within a country over time, such as geography. Sector fixed effects control for the possibility that our results are being driven by different compositions of sectors being produced in rich and poor countries, and time fixed effects allow for arbitrary time trends in the data.

We allow for heteroskedasticity in the error term as well as correlation in the error term within a country by clustering standard errors at the country level (we also tried clustering at the country-sector level and found the standard errors were lower, so we cluster at the country level throughout). In other variations we consider different fixed effects specifications and replace productivity growth with growth in value added and log GDP with political stability.

3.3 Data

The INDSTAT2 2013 ISIC Revision 3, published by the Statistics Unit of the United Nations Industrial Development Organization (UNIDO) is our main source for manufacturing data. It covers over 160 countries from 1963 to 2010, categorized according to the 2-digit level of the International Standard Industrial Classification. UNIDO collects the data from a variety of sources, including national publications, published and unpublished international sources, and statisticians employed by UNIDO. Informal manufacturing is often excluded from these sources, so this paper should be regarded as addressing only formal manufacturing.

There are 23 manfacturing categories in the original data, but there are four pairs of categories that are only reported separately starting in the 1980s, and we combine those sectors back together for continuity. We also exclude the recycling sector due to lack of coverage, leaving us with 18 sectors. To give a sense of the fineness of the data, three examples of sectors are textiles, chemicals, and wood products excluding furniture.

The data we use are value added, output, wages (all reported in current US dollars), and employees, which are converted to constant (year 2000) values by multiplying by the US real GDP and dividing by the nominal US GDP, as reported in the World Development Indicators (WDI). We use these data to calculate productivity and mark-up as described above. Some countries are missing data required to calculate mark-up; there are 49 countries with sufficient data to calculate mark-up in 1963, between 74 and 91 from 1970 to 2008, and fewer for 2009 and 2010.

The WDI, published by the World Bank and updated in 2013, provides a number of variables we use. They include the cost of starting a business, which is an indication of the healthiness of the business environment, and is available from 2003 to 2010. There are also controls used in the growth regressions, which cover from 1970 to 2010: government consumption as a percentage of GDP, gross enrollment in secondary school, population growth, and life expectancy. Finally, the WDI is the source for GDP per capita (in 2000 USD), and for M2 as a percentage of GDP, which we take as a proxy for the development of the financial sector, both of which are available from 1963 to 2010.

The International Country Risk Guide (ICRG) provides data on political and social attributes from 1984 to 2010, compiled by experts in each country (PRS Group 2012). Military in politics, corruption, and bureaucratic quality are three components of the political risk rating, which we relabel political stability for clarity. In all cases, a higher number is better, so we relabel their variable corruption as "lack of corruption," etc. These variables are rescaled from 0 to 1.

3.4 Summary Statistics

In table 1 we provide summary statistics for some of the most important variables. Mark-up, productivity growth, and value added growth are all Winsorized, meaning that any values outside of the 1st to 99th percentiles are replaced by the 1st or 99th percentile values, to limit the impact of outliers.

Table 1: Summary statistics

	Poor		Rich	
	mean	sd	mean	sd
Average mark-up	0.245	0.086	0.212	0.069
Productivity growth	0.056	0.308	0.044	0.195
Lack of corruption	0.444	0.169	0.702	0.211
Political stability	0.580	0.114	0.781	0.105
Log GDP per capita	6.77	0.93	9.34	0.75
Log productivity	9.23	1.04	10.47	0.87
Sectors produced in 2000 (out of 18)	13.92	5.53	16.48	1.60

Note: t-values in parentheses. See text for sources.

The average mark-up is 24.5% in the poorer countries in the sample and 21.2% in the richer countries. Of course, this excludes capital deductions (which would probably amplify the difference) and it accords with the prediction from the model that profits are higher in poor countries. Average productivity growth of 5.6% in poor countries is slightly higher than the 4.4% in rich countries, consistent with the catch-up growth we model and with Rodrik (2013) which finds absolute convergence in manufacturing productivity across countries. An average of 13.9 of the 18 sectors are being actively produced in the poor countries in the year 2000 compared with 16.5 in the rich countries, consistent with Hausmann and Hidalgo (2009) in which richer countries produce more products. Corruption, political stability, wealth, and productivity fall in normal ranges and vary across the two samples as would be expected.

3.5 Correlates of mark-up

Our model predicts higher mark-up in less developed countries. We model development as the ease of bribing a bureaucrat to prevent the entry of a new firm. This measure correlates with income per capita but may be better approximated with other measures of political and bureaucratic development. In this subsection we show that virtually any measure of underdevelopment is correlated with a higher mark-up. Our variables are not cherry-picked. This correlation is consistent and robust.

To give a sense of the types of environment where we observe high mark-up, table 2 presents some correlates of mark-up. All of the variables are coded so that high numbers are better, and in every column, the dependent variable is mark-up (again observed at the country-sector-year level). In the first column, the only independent variables are real log GDP per capita and fixed effects for sector and year, and we see that poor countries tend to have higher mark-up. In the other columns, we control for GDP per capita so that we are not just picking up the income effect on high mark-up. Column 2 examines whether countries that are more likely to have military involvement in politics have higher mark-up; the correlation between military in politics is stronger than that for GDP. Columns 3 - 6 show that low mark-up is correlated with overall political stability (column 3), good bureaucracy (column 4), a low start-up cost for new businesses (column 5), and low corruption (column 6)—all of which are better predictors of mark-up than income per capita. These findings would not be surprising to investors in emerging markets who assign a larger political risk premium to riskier jurisdictions, effectively increasing the discount rate on the investment and requiring a higher rate of return.

Table 2: Correlates of Mark-up

	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP per capita	-0.010	0.005	0.004	0.004	-0.006	-0.002
	(-2.26)	(0.68)	(0.54)	(0.50)	(-1.05)	(-0.37)
Military out of politics		-0.084				
		(-3.99)				
Political stability			-0.207			
			(-2.87)			
Bureaucracy quality				-0.025		
				(-3.16)		
Low start-up cost					-0.333	
					(-2.23)	
Lack of corruption						-0.079
						(-2.61)
Observations	49047	25878	25866	25878	7557	25878
R-squared	0.153	0.189	0.169	0.173	0.132	0.159

Note: t-values in parentheses. All variables are coded so that high values are good. There are fixed effects for sector and year. See text for sources.

4 Results

4.1 Primary specification

The results for the primary (IV) specification and two comparison OLS regressions are in table 3.

The dependent variable in every column is productivity growth from period $t-1$ to t. The first three regressions are IV, with mark-up in period $t-2$ instrumenting for mark-up in period $t-1$,[3] as discussed above, and the fourth and fifth columns are OLS.

[3] The first stage (not reported) is very strong, which is an indication that mark-up is persistent over time, and there is no concern about a weak instrument. The first stage statistic that we consider

In the first model, mark-up is the only independent variable, along with fixed effects for country, sector, and year. In the second, real log GDP per capita is included as a control, to ensure that mark-up is not just a proxy for low GDP. Mark-up is strongly significant and is negatively correlated with productivity growth. The third column is our primary specification, where the interaction term of (log GDP per capita x mark-up) is also included, which is statistically significant and positive. This provides evidence for one of the main claims in the paper: a lack of competition is most harmful in poor countries.

The interaction term here has been demeaned, or defined as (mark-up - mean mark-up) x (log GDP - mean log GDP), implying that the coefficients reported on mark-up and log GDP in the third column can be interpreted as the effect of those respective variables when the other variable is at its mean (Balli and Sørenson 2013). If we did not demean the interaction term, then the reported coefficient on mark-up would be the effect of a change in mark-up when log GDP was zero, which (thankfully) does not happen often. Notice that the reported coefficients on log GDP and mark-up are similar moving from column (2) to column (3).

The magnitude of the effect is large, but not implausibly so. The standard deviation of mark-up is about .12, with a mean of .23. Based on the results in the third column, we predict a one standard deviation decrease in mark-up would increase productivity growth in a poor country (25th percentile of wealth) by 4.7 percentage points, and in a rich country (75th percentile of wealth) by 2.9 percentage points. This is substantial compared to the mean of productivity growth, 5.2 percent, but we regard it as believable because the standard deviation is quite high, at 26 percent.

The fourth column presents an OLS regression where mark-up is measured in period $t-1$. The magnitude of the coefficient on mark-up is approximately 50 percent larger than in our primary specification in column 3, an indication that it is

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is the Kleibergen-Paap (2006) F statistic, which is the appropriate first stage statistic in the presence of heteroskedasticity and clustered standard errors (Baum, Schaffer, Stillman 2010). If the interaction term is omitted, meaning that mark-up in period $t-1$ is instrumented with mark-up in period $t-2$, the F value is over 2,000. With the interaction term, where the instruments are mark-up in period $t-2$ and mark-up in period $t-2$ x log GDP per capita in $t-1$ and the endogenous variables are the same variables but measured one period forward, the F value is about 35, still well above the rule of thumb of 10.

Table 3: The effect of rents on productivity growth

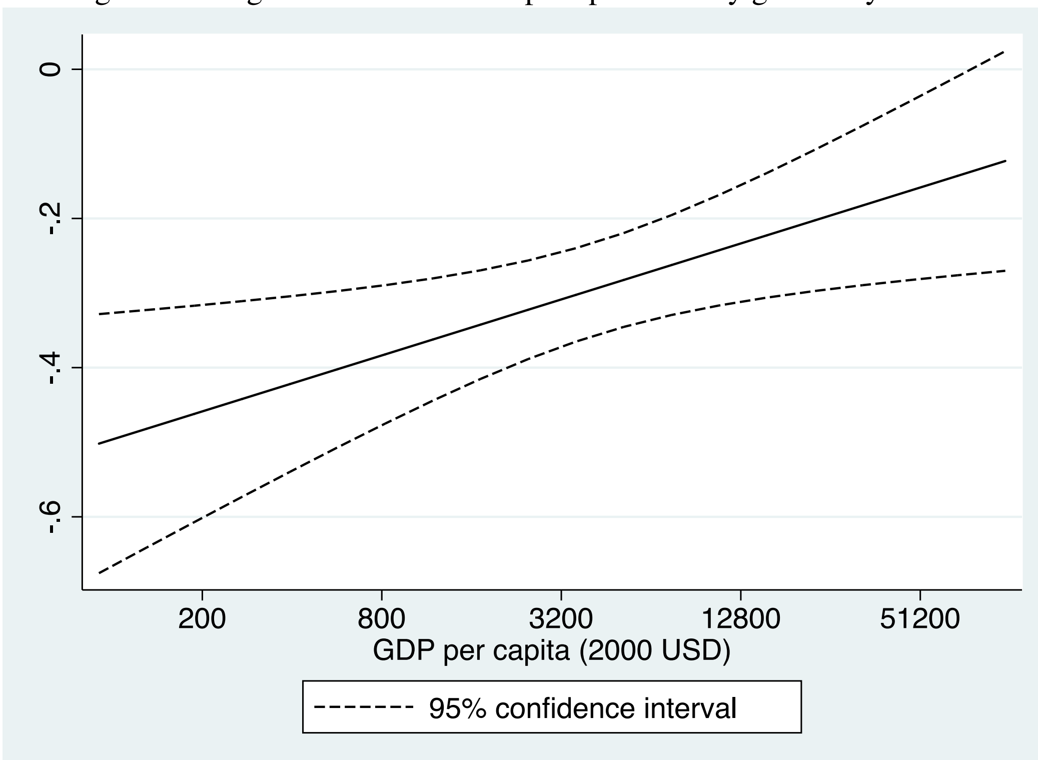
	(1) IV	(2) IV	(3) IV	(4) OLS $t-1$	(5) OLS $t-2$
Mark-up	-0.319	-0.322	-0.314	-0.497	-0.240
	(-9.10)	(-9.17)	(-9.60)	(-13.37)	(-10.11)
Log GDP per capita		-0.033	-0.031	-0.020	-0.031
		(-1.44)	(-1.39)	(-0.97)	(-1.35)
Mark-up x log GDP			0.058	0.101	0.037
			(2.71)	(4.18)	(2.53)
Country FE	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	35031	35031	35031	37437	35031
R-squared	0.115	0.116	0.119	0.121	0.094

Note: t-values in parentheses. Productivity growth is measured from time $t-1$ to t. In the first three columns, we instrument for mark-up in $t-1$ with mark-up in $t-2$. In the fourth and fifth columns, we use OLS with mark-up measured in period $t-1$ or $t-2$. The unit of observation is a country-sector-year.

important to instrument with lagged mark-up to avoid measurement error problems. The fifth column is also OLS, with mark-up in period $t-2$. Here the results are similar to our primary specification, but the coefficients are somewhat closer to zero, as expected.

In figure 1, we show the marginal effect of mark-up on productivity growth at different income levels, based on our preferred specification (column 3), with a 95 percent confidence interval. Here we see graphically that mark-up is damaging at all income levels (except possibly at the very highest levels), and more so at lower incomes.

Figure 1: Marginal effect of mark-up on productivity growth by income



Note: The dependent variable is the marginal effect of mark-up on productivity, evaluated at different income levels. It is based on column 3 of table 3.

4.2 Robustness

4.2.1 Alternate fixed effects

In our primary specification, we have fixed effects for year, country, and sector. In the first two columns of table 4, we remove one fixed effect, so that we have year and sector fixed effects and then year and country fixed effects. Removing the country fixed effects moderates the coefficient on mark-up from about -0.3 to -0.2, and on the interaction term from about 0.06 to 0.045. This is an indication that the relationship between mark-up and productivity growth is strongest when looking within a particular country, but the relationship is still evident when all countries are lumped together. Removing the sector fixed effects has surprisingly

Table 4: Alternate fixed effects

	(1)	(2)	(3)	(4)
Mark-up	-0.202	-0.242	-0.640	-0.307
	(-6.44)	(-8.57)	(-9.29)	(-9.78)
Mark-up x log GDP	0.045	0.059	0.112	0.037
	(2.14)	(2.61)	(2.30)	(1.82)
Log GDP per capita	-0.006	-0.030	-0.036	
	(-2.30)	(-1.31)	(-1.56)	
Country FE	No	Yes	No	No
Sector FE	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	No
Country-sector FE	No	No	Yes	No
Country-year FE	No	No	No	Yes
Observations	35031	35031	35031	35031
R-squared	0.086	0.110	0.173	0.340

Note: t-values in parentheses. Productivity growth is measured from time $t-1$ to t. We instrument for mark-up in $t-1$ with mark-up in $t-2$. The unit of observation is a country-sector-year.

little impact on our estimated coefficients.

We also consider specifications with finer-grained fixed effects. With country-sector and year fixed effects, we are comparing French clothing manufacturing to French clothing manufacturing at different dates, but not two different French manufacturing sectors or two different countries. The coefficient on mark-up approximately doubles to -0.6, and the interaction term also becomes stronger, with a coefficient of 0.11, further evidence that the relationship between mark-up and productivity growth is strongest when looking within countries rather than between them. If we use country-year and sector fixed effects, meaning we compare data from Chile in 1980 but not across countries or years, the coefficient on mark-up is about the same as the primary specification, at -0.31, while the coefficient on the interaction is only 0.037. In every case, there is significance on both.

One advantage to this strategy is that we can rule out the possibility that all of the change in productivity growth is being driven by variation at the country-year level. For example, it is not possible that our results are being driven entirely by the business cycle (or any other national-level panel data variable), because then mark-up would have no relationship with productivity growth when country-year fixed effects were included.

4.2.2 Instrumenting for mark-up

The primary challenge to our claim is that some unobserved variable is causing both high mark-up and low productivity growth. A perfect instrument would affect productivity growth only through the channel of mark-up and vary exogenously in a way that is orthogonal to any unobserved variables. Finding such an instrument is difficult for a data set that covers so many countries and years, as Aghion, Braun, and Fedderke (2008) find. They write that the opening of the economy to trade, the degree of tradability of the industry, and the level of tariffs all were weak instruments. We can add terms of trade shocks to the list of variables that generate weak first stages. Their most successful instrument is import penetration, which is relevant in one of their two datasets, but not in the UNIDO dataset that their paper and ours both use, and it also suffers from some endogeneity concerns.

We propose another instrument for mark-up, which we acknowledge is also not perfect. It is the simple average of mark-up in the other sectors in the same country-year. The main appeal of this as an instrument is that it allows us to rule out at least some of the possible omitted variables that could be driving our results, namely those that are specific to a particular sector. For example, we can rule out a story where new inventions both cause high productivity growth and allow for entry, driving down mark-ups and generating a negative relationship between mark-up and productivity growth. If that were the case, and the effect was limited to the sector that had the invention, then our instrumentation strategy would yield no relationship because the predicted mark-up would not be affected by the invention. The instrument has another desirable quality in that any instrumental-variables procedure can only identify the impact of the mark-up that co-varies with the instrument (Angrist 2004). In this case, the average mark-up in other sectors is likely to capture the mark-up that is driven by the overall business environment, which comes close to the phenomenon that we are trying to uncover in the first place—whether rents for business are good for growth.

Our results with the instrument are presented in tables 5. The first two columns are the first stage results, with the dependent variables of mark-up and mark-up x log GDP. Mark-up in other sectors is highly predictive of mark-up and mark-up in other sectors x log GDP is highly predictive of mark-up x log GDP. The Kleibergen-Paap F statistic is 24.6, above the rule of thumb of 10. The next two are the IV results, with and without an interaction term. In the regression with no interaction term (column 3), the coefficient on mark-up is similar to our main specification that simply instruments with lagged mark-up (-0.37 compared to -0.32). With the interaction term included (column 4), the coefficient on mark-up x log GDP is still significant, but it is much higher than in our main specification (0.34 compared to 0.058). We take this as further evidence that mark-up is most damaging in poor countries, but we should be cautious when making statements about the magnitude of the difference.

4.2.3 Alternate variables

In this section we examine the results from replacing log GDP per capita with ICRG's political stability measure and productivity growth with growth in value added. Political stability and GDP per capita are closely correlated (p = 0.76), which is not surprising as rich countries tend to have more stable, better functioning governments. Political stability is probably a better proxy for the feasibility of rent-seeking than wealth, but GDP per capita has better coverage, so that is what we use in the main specification.

Growth in value added, also defined in percentage terms, is a useful check because we want to make sure that we are really capturing a positive outcome when productivity growth increases. If the output of a manufacturing sector drops by 50% and the employment drops by 75%, then we would say that productivity doubled, even though it is questionable whether the economy is really in a better position,

Table 5: Instrumenting for mark-up with mark-up in other sectors

	(1) 1st: mark-up	(2) 1st: inter.	(3) IV	(4) IV
Mark-up			-0.369 (-2.54)	-0.519 (-3.02)
Mark-up x log GDP				0.335 (2.96)
Mark-up other sectors	0.662 (16.77)	0.207 (2.83)		
Other mark-up x GDP	0.076 (3.40)	0.550 (9.56)		
Log GDP per capita	-0.005 (-0.83)	-0.008 (-0.66)	-0.034 (-1.47)	-0.027 (-1.25)
Observations	35031	35031	35031	35031
R-squared	0.471	0.285	0.118	0.103

Note: t-values in parentheses. The first two columns present the first stage, and the second two present IV results. In the first two columns, the dependent variables are mark-up and mark-up x log GDP respectively, and in the other two it is productivity growth from $t-1$ to t. In the third and fourth columns, simple average of mark-up in the other sectors of the same country ("other mark-up") and other mark-up x log GDP are used as instruments for mark-up and mark-up x log GDP, all in $t-1$. The third and fourth columns should be compared to the second and third columns of table 3. In every column there are fixed effects for country, year, and sector.

especially in light of the fact that productivity in the manufacturing sector tends to be higher than in the overall economy (Rodrik 2013).

Table 6 shows that all of the main results hold when making these substitutions. The only exception is that the interaction term of mark-up x political stability is not significant when the dependent variable is productivity growth.

Table 6: Alternate variables

	(1) Prod.	(2) Prod.	(3) VA	(4) VA
Mark-up	-0.314	-0.348	-0.325	-0.348
	(-9.60)	(-7.53)	(-10.46)	(-8.19)
Log GDP per capita	-0.031		-0.054	
	(-1.39)		(-1.98)	
Mark-up x log GDP	0.058		0.082	
	(2.71)		(3.63)	
Political stability		0.001		-0.001
		(0.80)		(-1.26)
Mark-up x pol. stab.		0.003		0.008
		(1.30)		(2.99)
Observations	35031	18587	41816	21964
R-squared	0.119	0.126	0.118	0.118

Note: t-values in parentheses. The dependent variables (productivity and value added growth) are measured from time $t-1$ to t. We instrument for mark-up in $t-1$ with mark-up in $t-2$. The unit of observation is a country-sector-year. Political stabilty is ICRG's "political risk rating," with high numbers representing stronger political systems (PRS Group, 2012). There are fixed effects for country, year, and sector.

4.3 Credit constraints

The evidence thus far indicates that high rents slow productivity growth, particularly in poor countries, but perhaps we can find subsamples where they are beneficial. We are looking for a case where rents could alleviate credit constraints, which is most likely in a sector where finance is important and in a country where the financial system is unlikely to provide loans in the absence of rents. Our measure for the external finance required in a sector is from Rajan and Zingales (1998), who use firm-level data to characterize sectors by the amount of capital they require, and we split the 18 sectors into the nine with more and less capital required. Our proxy

Table 7: Mark-up and productivity growth in sub-samples

	(1)	(2)	(3)	(4)
Mark-up	-0.351	-0.196	-0.457	-0.446
	(-7.50)	(-4.77)	(-5.58)	(-5.17)
Log GDP per capita	-0.082	0.053	-0.086	0.022
	(-2.31)	(1.68)	(-2.51)	(0.94)
Finance required	Low	Low	High	High
Financial sector development	Low	High	Low	High
Observations	8956	8242	8903	8814
R-squared	0.108	0.156	0.121	0.224

Note: t-values in parentheses. The dependent variable, productivity growth, is measured from time $t-1$ to t. We instrument for mark-up in $t-1$ with mark-up in $t-2$. The unit of observation is a country-sector-year. External finance required is from Rajan and Zingales (1998) and M2/GDP is from WDI (2013). There are fixed effects for country, year, and sector.

for financial market development is M2 as a fraction of GDP, from the WDI (2013), and we split countries based on their overall average M2/GDP, so that a country does not move between categories in different years.

Table 7 gives the results of our primary specification broken down into the quadrants of high and low finance required and financial market development. If rents can be useful, we would expect mark-up to be least damaging where finance is important and difficult to acquire (column 3) and most damaging in the opposite case (column 2). In fact, we see the reverse, where the coefficient on mark-up is most negative is column 3 and least negative in column 2. We cannot say that mark-up is most damaging in column 3, as the coefficient is very close to the one in column 4 when external finance needs are also high but financial market development is better, but we can reject the hypothesis that the coefficients in columns 2 and 3 are equal at the 1% confidence level.

We interpret this as evidence that barriers to entry raise the returns for incumbents to keep a sector uncompetitive. This is consistent with our model, where firms divert more resources towards rent-seeking when it is easier to keep entrants out. It may also provide one explanation for the surprising finding (Singh 1997) that firms in emerging markets were less likely to use retained earnings to finance growth than developed-country firms: when retained earnings are high, they don't need to grow at all.

5 Mechanism

The focus in the previous sections was that anticompetitive practices damage productivity growth. Here we argue that this occurs through the political economy channel. We test through the only potential country-sector variable on rent seeking for which we have data, tariffs, and find that tariffs fall more slowly in sectors with rents. Tariffs are not a direct measure of barriers to entry of other domestic firms, but they do affect the cost of imported substitutes. We also test for an alternate channel broadly consistent with the main specification in the previous section, which is lazy management. That is, firms in high-rent sectors can rest on their laurels. Although our data coverage is limited, we do not find support for the hypothesis that slower growth is due to weaker management.

5.1 Tariffs

Tariff rates have been falling on average, but they are less likely to fall when firms are earning higher profits. This should be a surprise, since the main argument in favor of tariffs is to protect fledgling industries that need help in getting established. Tariff data come from the TRAINS database, published by the United Nations Conference on Trade and Development (2013). Tariffs are weighted averages, either for the actual tariffs applied (labeled AHS in the dataset), or for the tariffs applied to countries without a special trade agreement (MFN). Both cover the years between 1988 and 2008.

The dependent variable is the percentage change in the tariff rate, so that a change from 100% to 50% is considered the same as the change from 20% to 10%. The most extreme 1% of values on both ends for the change in tariff rate are

Table 8: Mark-up and change in tariffs

	(1) AHS	(2) AHS	(3) MFN	(4) MFN
Mark-up	0.240	0.257	0.093	0.104
	(3.47)	(3.72)	(2.44)	(2.74)
Log GDP per capita	-0.268	-0.268	0.151	0.149
	(-2.19)	(-2.20)	(2.13)	(2.10)
Mark-up x log GDP	0.107	0.117	0.029	0.036
	(2.24)	(2.28)	(1.24)	(1.46)
Level of tariffs		-0.079		-0.050
		(-2.17)		(-2.38)
Observations	5082	5082	5088	5088
R-squared	0.152	0.155	0.141	0.147

Note: t-values in parentheses. The dependent variable is percentage change in tariff levels, either effective (AHS) or the rate for countries with no special agreement (MFN). Tariff data is from UNCTAD (2013). There are fixed effects for country, year, and sector.

replaced with the 1st and 99th percentile values to reduce the influence of outliers, and the results of these regressions are in table 8. In columns 2 and 4, the level of the tariffs is also included as a control to rule out the possibility that sectors with high profits have low tariffs already, making further reductions unlikely. Adding this control has a very small effect on the other coefficients, so we conclude this is not what is happening.

The coefficients on mark-up in both regressions are signficant and positive in both regressions. The positive sign on the interaction term (significant in one pair of regressions but not the other) is a puzzle, because it says that mark-up prevents tariff reduction more strongly in rich countries than in poor countries, which is the opposite of what we would expect. We suspect this may be driven by nontariff barriers being the protectionist vehicle of choice in poor countries (Michalopoulos 1999).

5.2 Management

Here we consider an alternate mechanism through which rents could depress productivity growth: lazy or satisficing managers, as in Hart (1983). We consider the hypothesis that mark-up is driving the slower productivity growth of profitable firms by controlling for management style and considering the effect on the measured coefficient on mark-up. Bloom and Van Reenen (2010) conducted telephone surveys of senior managers of over 6,000 firms in 12 countries starting in 2006, asking open-ended questions and coding them from 1 (worst) to 5. Because there is a relatively small number of firms in each country-sector-year combination, we collapse all available data down to the country-sector level, and in the following regressions, we only include data from after 2006. The results, reported in table 9, do not give any indication that management style is the true variable of interest, but this comes with a number of caveats. We only have management data on a relatively small number of countries, one measurement for management in each country-sector, and there is no guarantee that the firms surveyed were representative of their industries. That said, we do not find evidence for the management channel.

6 Growth

We have found that high rents or mark-up is damaging to growth within a manufacturing sector, and the level of mark-up in other manufacturing sectors in a country positively predicts the level of mark-up in a manufacturing sector and negatively predicts the growth in that sector. But manufacturing is a relatively small share of the economy, particularly in most developing countries (Rodrik 2013). What goes on in manufacturing may have no overall bearing on the economy at large. This may be especially the case for the formal-sector firms that are picked up in the UNIDO data. After all Rodrik (2013), with the same UNIDO dataset, documents unconditional convergence in manufacturing but does not find evidence for the rest of the economy.

However, the rent-seeking channel that this paper models and attempts to test is a political economy channel that we have no reason to believe is only expressed in formal manufacturing. For example, protectionist measures in Liberia limit access

Table 9: Management

	(1) Prod. growth	(2) Prod. growth	(3) Management score
Mark-up	-0.321	-0.326	-0.098
	(-1.35)	(-1.39)	(-0.58)
Log GDP per capita	2.873	2.872	-0.024
	(3.65)	(3.66)	(-0.41)
Management score		-0.016	
		(-0.43)	
Observations	184	184	654
R-squared	0.625	0.625	0.579

Note: t-values in parentheses. Management scores range from 1 (worst) to 5, from Bloom and Van Reenan (2010). There are fixed effects for country, year, and sector.

to such sectors as video clubs and tire repair shops (U.S. Department of Commerce 2012), and in the Philippines to recruiting firms and radio stations (Werker et al. 2013).

We take a simple average of the mark-up ratios in each of the manufacturing sectors and, using data from teh WDI, include it as a control variable in the standard growth regressions: a non-overlapping ordinary least squares (OLS) Barro growth regression as well as an overlapping generalized method of moments (GMM) model. Table 10 presents the results. The first column includes only the average mark-up and initial GDP per capita, and the effect of the mark-up is negative and significant; the coefficient of -0.047 means a one standard deviation decrease in average mark-up is predicted to add 0.38 percentage points of growth. In contrast, the coefficient on initial income is essentially zero, consistent with a lack of convergence in the sample. The next column includes mark-up as well as some of the usual suspects in the growth regressions: government spending, school enrollment, population growth, and life expectancy. These are chosen to follow the regressors used by Bekaert et al. (2005), who in turn is following Barro (1997), all with the aim of reducing the possibility of data-mining. With the other controls in column 2, the coefficient on initial income is now negative and significant, consistent with conditional convergence. The coefficient on mark-up remains statistically significant and almost unchanged in size at -0.049, meaning a one standard deviation decrease in average mark-up leads to a 0.39 percentage point improvement in GDP growth. Among the other variables, population growth is significant and negative, and life expectancy is positive. In four additional unreported regressions, we included one of the four control variables along with mark-up, and mark-up remains statistically significant in all cases, with a a coefficient ranging from -0.038 to -0.054.

The growth penalty from a one standard deviation increase in mark-up is about half of the growth advantage from a one standard deviation reduction in GDP, indicating that the benefits of catch-up growth from being poor are larger than the costs of having a bad political economy. Column 3 includes an interaction term between mark-up and initial income to test whether the effect of rents is worse for growth in poorer countries. The coefficient is positive, suggesting that the effect may be worse in poor countries, but the coefficient is imprecisely measured.

Columns 4 and 5 are similar to 2 and 3, except we use GMM, following Caselli, Esquivel, and Lefort (1996). OLS estimates may be inconsistent due to correlated individual effects and endogenous explanatory variables, for which the method in Caselli, Esquivel, and Lefort (1996) (and used by many researchers since then) is designed to correct. The results are very similar to the OLS. The countries exhibit conditional convergence, with a negative and significant coefficient on initial wealth. The effect of the average mark-up remains negative and significant. The interaction term between wealth and mark-up in column 2 is also positive but statistically insignificant.

Taken together, these results suggest that the rents we measure in the manufacturing sector may be indicative of an overall environment in which incumbents rent-seek to prevent challengers, which lowers the overall growth of the economy. Whether or not we control for initial income, countries in which businesses are able to maintain high profit margins grow slower, in spite of the fact that these countries might otherwise enjoy some of the "advantages of backwardness" (Gerschenkron 1962) consistent with a lower level of economic development. Of course income

Table 10: GDP growth and mark-up: non-overlapping OLS and overlapping GMM

	(1) OLS	(2) OLS	(3) OLS	(4) GMM	(5) GMM
Average mark-up	-0.047	-0.049	-0.050	-0.044	-0.044
	(-2.63)	(-2.45)	(-2.45)	(-2.60)	(-2.62)
Initial log GDP pc	0.001	-0.006	-0.006	-0.004	-0.004
	(0.78)	(-3.10)	(-3.06)	(-2.47)	(-2.41)
Gov spending/GDP		-0.145	-0.121	-0.203	-0.191
		(-0.52)	(-0.41)	(-0.85)	(-0.79)
Sec school enrollment		-0.010	-0.015	-0.001	-0.000
		(-0.09)	(-0.14)	(-0.01)	(-0.00)
Population growth		-0.003	-0.003	-0.003	-0.003
		(-1.98)	(-2.12)	(-2.36)	(-2.38)
Log life expectancy		0.057	0.058	0.046	0.046
		(2.49)	(2.52)	(2.19)	(2.21)
Avg mark-up x log GDP pc			0.014		0.011
			(0.88)		(0.78)
Observations	420	326	326	1586	1586
R-squared	0.023	0.087	0.090	0.069	0.071

Note: t-values in parentheses. See text for sources. In the first three columns, we consider non-overlapping 5-year periods, and use OLS. In the last two, we consider overlapping 5-year periods with GMM. There are no fixed effects.

and mark-up are inversely correlated. This suggests a recasting of the usual view of convergence, and may explain why convergence has not generally been a feature of economic development (Pritchett 1997). We find that developing countries are both poor (which provides a growth boost, once some other factors are controlled for) but also have a higher mark-up, indicative of a worse political economy of business (which provides a growth drag).

7 Conclusion

This paper has attempted to test the question of whether rents are good for development—brought to the forefront of scholarship and policy by North, Wallis, and Weingast (2009)—by using a rich dataset on manufacturing sectors and applying the methods from the competition-and-growth literature of Aghion and co-authors. While the results cannot be seen as incontrovertable due to the challenges of endogeneity and the presence of a strong alternative hypothesis (management) that cannot be discounted completely, the evidence all points in one direction.

Rents, as measured by a high-markup which is also an indication of low competition, seem to slow growth in productivity or output. The effect is strongest in poor countries. Higher rents are associated with a slower removal of tariffs, indicative of the channel in our model: firms rent-seek to prevent competition and maintain their high margins. This investment in rent-seeking may be in lieu of investment in innovation or new productive assets, which slows the overall growth of the sector. In industries in which high profits should be essential in generating growth, those sectors that would otherwise need external finance but in a country with weak financial markets, the negative impact of rents on growth is especially strong. We do not find evidence (although our data availability is limited) to support the alternative hypothesis most consistent with the data, that sectors with higher rents have inefficient managers. Finally, we find that countries with more rents in the manufacturing sector grow slower, even when other controls are introduced.

Ideally, this paper would have looked at other measures of rents, or excess profits, like return on assets and return on equity. Unfortunately, the data coverage for these variables is much weaker, particularly across time in the less developed countries which are our focus in this paper. That said, this remains an avenue for future work. In addition, North, Wallis, and Weingast (2009) focus on political stability whereas we have restricted our attention to productivity and economic growth as outcome variables that proxy for welfare. It may be the case, as suggested in North et al. (2012, p. 9), that many non-converging developing countries are politically “held together” by their rents even as those same rents prevent them from generating prosperity for their non-elites. Another important research question that this paper leaves unanswered is what allows a country to be able to escape from an equilibrium of limited but non-expanding profits (Pritchett and Werker 2012).

References

Acemoglu, Daron, "Reward Structures and the Allocation of Talent," *European Economic Review*, 1995, *39* (1), 17–33.

Ades, Alberto and Rafael Di Tella, "Rents, Competition, and Corruption," *American Economic Review*, 1999, *89* (4), 982–993.

Aghion, Philippe and Rachel Griffith, *Competition and Growth. Reconciling Theory and Evidence*, Cambridge, Mass.: MIT Press, 2005.

__ **, Matias Braun, and Johannes Fedderke**, "Competition and Productivity Growth in South Africa," *Economics of Transition*, 2008, *16* (4), 741–768.

__ **, Peter Howitt, Rachel Griffith, Richard Blundell, and Nick Bloom**, "Competition and Innovation: An Inverted-U Relationship," *Quarterly Journal of Economics*, 2005a, *120* (2), 701–728.

__ **, Rachel Burgess, Stephen Redding, and Fabrizio Zilibotti**, "Entry Liberalization and Inequality in Industrial Performance," *Journal of the European Economic Association*, 2005b, *3* (2-3), 291–302.

Angrist, Joshua D., "Treatment Effect Heterogeneity in Theory and Practice," *Economic Journal*, 2004, *114* (494), 52–83.

Arrow, Kenneth, "Economic Welfare and the Allocation of Resources to Invention," in R.R. Nelson, ed., *The Rate and Direction of Economic Activity*, N.Y.: Princeton University Press, 1962.

Baland, Jean-Marie and Patrick Francois, "Rent-seeking and Resource Booms," *Journal of Development Economics*, 2000, *61* (2), 527–542.

Balli, Hatice Ozer and Bent E. Sørensen, "Interaction effects in econometrics," *Empirical Economics*, 2013, *45* (1), 583–603.

Barro, Robert J., *Determinants of Economic Growth: A Cross-country Empirical Study*, Cambridge, Mass.: MIT Press, 1997.

Baum, C.F., M.E. Schaffer, and S. Stillman, "ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML and k-class.," 2010. http://ideas.repec.org/c/boc/ bocode/s425401.html.

Bekaert, Gaert, Campbell R. Harvey, Christian T. Lundblad, and Stephen Siegel, "What Segments Equity Markets?," *Review of Financial Studeies*, 2011, *24* (12), 3841–3890.

Bekaert, Geert, Campbell R. Harvey, and Christian T. Lundblad, "Does Financial Liberalization Spur Growth?," *Journal of Financial Economics*, 2005, *77* (1), 3–55.

Bloom, Nicholas and John Van Reenen, "Why Do Management Practices Differ across Firms and Countries?," *Journal of Economic Perspectives*, 2010, *24* (1), 203–224.

Carlin, Wendy, Mark Schaffer, and Paul Seabright, "A Minimum of Rivalry: Evidence from Transition Economies on the Importance of Competition for Innovation and Growth," *Contributions in Economic Analysis & Policy*, 2004, *3* (1), 1–45.

Caselli, Francesco, Gerardo Esquivel, and Fernando Lefort, "Reopening the Convergence Debate: A New Look at Cross-Country Growth Empirics," *Journal of Economic Growth*, 1996, *1* (3), 363–389.

Chacar, Aya S., William Newburry, and Balagopal Vissa, "Bringing Institutions into Performance Persistence Research: Exploring the Impact of Product, Financial, and Labor Market Institutions," 2010.

Chari, Muralli D. R. and Parthiban David, "Sustaining Superior Performance in an Emerging Economy: An Empirical Test in the Indian Context," *Strategic Management Journal*, 2012, *33* (2), 217–229.

Foster, Lucia, John Haltiwanger, and Chad Syverson, "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?," *American Economic Review*, 2008, *98* (1), 394–425.

Galunic, Charles and Simon Rodan, "Resource recombinations in the firm: knowledge structures and the potential for Schumpeterian innovation," 1997. INSEAD.

Gerschenkron, Alexander, *Economic Backwardness in Historical Perspective, a Book of Essays.*, Cambridge: Cambridge, Belknap Press of Harvard University Press, 1962.

Gorodnichenko, Yuri, Jan Svejnar, and Katherine Terrell, "Globalization and Innovation in Emerging Markets," *American Economic Journal: Macroeconomics*, 2010, *2* (2), 194–226.

Hart, Oliver D., "The Market Mechanism as an Incentive Scheme," *The Bell Journal of Economics*, 1983, *14* (2), 366–382.

Hicks, J. R., "Annual Survey of Economic Theory: The Theory of Monopoly," *Econometrica*, 1935, *3* (1), 1–20.

Hidalgo, Cesar A. and Ricardo Hausmann, "The Building Blocks of Economic Complexity," *Proceedings of the National Academy of Sciences of the United States of AME*, 2009, *106* (26), 10570–10575.

Kleibergen, Frank, "Generalizing Weak Instrument Robust IV Statistics Towards Multiple Parameters, Unrestricted Covariance Matrices and Identification Statistics," *Journal of Econometrics*, 2007, *139* (1), 181–216.

— **and Richard Paap**, "Generalized Reduced Rank Tests Using the Singular Value Decomposition," *Journal of Econometrics*, 2006, *133* (1), 97–126.

Lerner, Abba P., "The Concept of Monopoly and the Measurement of Monopoly Power," *The Review of Economic Studies*, 1934, *1* (3), 157–175.

Levine, Ross, "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature*, 1997, *35* (2), 688–726.

Michalopoulos, Constantine, "Trade Policy and Market Access Issues for Developing Countries: Implications for the Millennium Round," *World Bank Publications*, 1999. Vol. 2224.

Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny, "Why Is Rent-Seeking So Costly to Growth?," *The American Economic Review*, 1993, *83* (2), 409–414.

Nickell, Stephen J., "Competition and Corporate Performance," *Journal of Political Economy*, 1996, *104* (4), 724–746.

North, Douglass C., John Joseph Wallis, Steven B. Webb, and Barry R. Weingast, *Limited Access Orders in the Developing World: A New Approach to the Problems of Development*, Vol. 4359, The World Bank, 2007.

North, Douglass, John Wallis, and Barry Weingast, *Violence and Social orders: A Conceptual Framework for Interpreting Recorded Human History*, New York: New York: Cambridge University Press, 2009.

Pritchett, Lant, "Divergence, Big Time," *The Journal of Economic Perspectives*, 1997, *11* (3), 3–17.

— **and Eric Werker**, "Developing the guts of a GUT (Grand Unified Theory): elite commitment and inclusive growth," 2012. ESID Working Paper Series no. 16/12.

PRS Group, Inc., "International Country Risk Guide," 2012.

Rajan, Raghuram G. and Luigi Zingales, "Financial Dependence and Growth," *American Economic Review*, 1998, *88* (3), 559–586.

Rodrik, Dani, "Unconditional Convergence in Manufacturing," *Quarterly Journal of Economics*, 2013, *128* (1), 165–204.

Schumpeter, Joseph Alois, *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle,*, Cambridge, Mass.: Cambridge, Mass., Harvard University Press, 1934.

Shleifer, Andrei and Robert W. Vishny, *The Grabbing Hand: Government Pathologies and Their Cures*, Harvard University Press, 2002.

Singh, Ajit, "Financial Liberalisation, Stock Markets and Economic Development," *Economic Journal*, 1997, *107* (442), 771–782.

Stigler, George J., "The Theory of Economic Regulation," *The Bell Journal of Economics and Management Science*, 1971, *2* (1), 3–21.

United Nations Conference on Trade and Development, "TRAINS Database," 2013. Accessed June 22, 2013.

United Nations Industrial Development Organization, "INDSTAT2, Industrial Statistics Database," 2013. Accessed Oct 9, 2013.

United States Department of Commerce, "Doing Business in Liberia: Commercial Guide to U.S. Companies," 2012. Accessed Jan 11, 2014. URL: http://photos.state.gov/libraries/liberia/328671/pdfs/2012_country_commercial_guide.pdf.

Werker, Eric, Yasmin Mandiwala, Henry Motte-Munoz, and Arthur Wit, "Ayala Corporation and the Philippines: Asset Allocation in a Growing Economy (A).," 2013. Harvard Business School Case Study 713-093.

World Bank, "World Development Indicators," 2013. Accessed Feb 18, 2013.