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**Knowing the Right Person in
the Right Place: Political
Connections and Economic
Growth**

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Knowing the right person in the right place: political connections and economic growth*

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Abstract

We develop a model of Schumpeterian growth where political connections with long-term politicians can be exploited by low-quality producers to defend their monopoly position and prevent innovation and entry of high-quality competitors. Through personal relationship developed with the incumbent politicians, connected firms are able to reduce bureaucratic costs that are set by the politicians in order to affect their chances of re-election. We focus on the stationary Markov perfect equilibria that are generated by the strategic interaction between politicians, firms and voters and show the dependence of the equilibrium on technological and political parameters. Under certain configurations, a political equilibrium arises where the politician secures re-election by setting high bureaucratic costs and firms invest in network blocking innovation and entry. Though inefficient, this equilibrium is supported by voters who prefer the status quo. Thus, the model provides a possible explanation for the persistence of inefficient democracies where these reflect shared rather than conflicting interests.

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1 Introduction

In several countries the existence of long-lived political and economic elites is often blamed for the low rate of technological innovation, economic growth and social mobility. Politicians and major economic actors are perceived as an inaccessible and self-sufficient core that rules the country by means of long-lasting personal relations, contacts and acquaintances, preventing access to power by more dynamic (and young) individuals and creating a *relationship-based system* where economic outcomes tend to be driven by “knowing the right person in the right place” more than by the market. This relationship-based system is likely to oppose technological innovation, especially when innovation implies radical changes in the status quo and destruction of incumbent (political and economic) rents.

To capture how connections between politicians and firms can explain political persistence and hinder economic growth, in this paper we use a simple dynamic model of growth with quality improvements à la Aghion and Howitt [5]. In the intermediate good sector, the leading-edge quality is exogenously available in each period and is used by final-good producers to generate output. Firms in the intermediate good sector engage in Bertrand price competition and the quality leader employs a limit-pricing strategy to make it unprofitable for the next best quality to be produced. A significant departure from this literature comes from the political side of the model. We assume that production costs are affected by the extent of red tape and bureaucracy which is strategically chosen by the politician in office at the beginning of each period, seeking re-election. The incumbent monopolist chooses whether to invest in a network with the incumbent politician or to invest in the adoption of a more advanced technology. Investment in network allows the firm to reduce the production costs of the current vintage and pays off provided that the incumbent politician is confirmed in office. Although the connected firm faces competition from outsiders that may enter the market with a leading-edge technology, it might succeed in keeping competitors out of the market as the latter cannot benefit from cost reductions generated by the network with the politician.

Focusing on the stationary Markov Perfect Equilibria of an infinitely-repeated dynamic game, we show that the strategic interaction between politician, monopolist and voters (that is, workers) yields two possible equilibrium outcomes, depending on structural parameters. In the “bad” equilibrium, which emerges when quality improvements are low, the politician introduces distortionary red-tape costs, the monopolist invests in network and the economy is locked in a stagnant equilibrium with no innovation and no growth. The incumbent politician never loses elections and the incumbent monopolist never loses

its market. When quality improvements are large the “good” equilibrium arises, where red tape costs are negligible, new technologies are always adopted and there is sustained growth. Moreover, there is turnover of politicians and firms.

Rather than being imposed on the society by the political-economic elite (as, for instance, in Acemoglu, Ticchi and Vindigni [3]), our “bad” equilibrium, where the level of bureaucracy is inefficiently high and innovation is low, is supported by voters who value the static gains of cost reductions delivered by the political network more than the dynamic loss of blocked innovation. Although new and more advanced technology is freely available, all economic agents prefer to keep the status quo and the current technology in order to exploit the advantages of the network in the presence of high bureaucratic costs.¹

Our model describes a world in which inefficient democracies are particularly difficult to reform and persist over time as they reflect shared rather than conflicting interests. By moving first, politicians have the opportunity to gain political support for an inefficient policy which is a (welfare reducing) second-best policy but increases chances of re-election. When called upon to decide in a democratic way whether to confirm the incumbent politician or not, voters choose the “inefficient” incumbent. This strategic interpretation of the use of bureaucracy to gain electoral advantage is reminiscent of the one put forward by Golden [14] in a political-science analysis of postwar Italian politics, “bureaucratic inefficiency, excessive legislation and widespread bureaucratic corruption were features of Italian public administration that were *deliberately designed by legislators and intended to enhance re-election prospects for incumbents* [our italics] by providing them with opportunities for extensive constituency service” (p. 189).

Our framework allows to solve for the equilibrium level of red-tape costs and to study how the Markov equilibrium depends on the structural parameters of our economy. Specifically, the “bad” equilibrium is more likely to emerge the higher is the responsiveness of voters to economic policies and the lower is the probability that the incumbent firm is successful in innovation, which we interpret as a proxy for economic competition in the intermediate sector. However, when economic competition increases, the equilibrium level of inefficient bureaucracy, which is chosen by the politician to increase the chances of remaining in power, decreases.

These results yield some interesting political economy implications. On the one hand, when responsiveness of voters is low, the good equilibrium can arise even in cases where

¹Acemoglu, Ticchi and Vindigni [3] provide a different explanation for the emergence and persistence of inefficient states based on the strategic use of patronage politics by the elite of the rich who try to limit provision of public goods and redistribution.

voters would support the bad equilibrium since, once bureaucratic costs are in place, they are better off by supporting the network between the politician and the firm. However, in this situation the incumbent politician internalizes the cost of bureaucracy and prefers to implement the first best. On the other hand, when responsiveness of voters is high, the good equilibrium emerges even in cases where the politician would rather set high bureaucratic costs and prevent innovation. Political accountability through elections is a credible threat which induces the politician to reform bureaucracy.

The rest of the paper is organized as follows. Section 2 presents some motivating evidence and discusses the related literature. Section 3 introduces the theoretical model and Section 4 analyzes the politico-economic equilibrium. Section 5 concludes.

2 Motivating evidence and related literature

2.1 Motivating evidence

According to the theoretical framework developed in the Introduction, as political connections are lost when the incumbent politician is removed from office, low turnover of politicians should be associated to low growth in heavily regulated economies (e.g. Italy), as political persistence implies the perpetuation of the network and the blocking of innovation in these countries, while it would be less relevant for growth in countries where regulation is low (e.g. the US).

As it is well known, there are large cross-country differences in the extent and efficiency of bureaucracy, even considering democratic countries at similar levels of development. According to Doing Business 2009, dealing with licenses (in the construction industry) takes on average 257 days in Italy and 40 days in the US, with a cost of 136.4% of income per capita in Italy and 13.1% in the US. Starting a business requires a cost of 18.5% of income per capita in Italy compared to only 0.7% in the US.

In this Section, we investigate empirically the relationship between political persistence and growth in democracies and provide evidence of a negative association between political persistence and economic growth in countries with high red tape costs. Consistently with our idea, we find weaker or no evidence of a relationship between persistence and growth in countries where these costs are low.

Using information from the Database of Political Institutions (DPI), we measure political persistence as the percentage of main political entities (“veto players”) who remain in place in the government in any given year, relative to the previous one.² In line with our

²Veto players are defined as the chief executive (counted twice if she’s competitively elected) and the

theoretical framework, we restrict our investigation to democracies, and focus on political turnover that takes place through democratic institutions.³

We use the index of Bureaucratic Quality (*BQ*) constructed in the International Country Risk Guide (ICRG) as a proxy for red-tape costs⁴. As the within country variation of *BQ* is very low, we consider it a country-specific fixed effect and define a dummy variable d_i^H for high red-tape costs. In particular, we consider a country having high (low) red-tape costs, and set $d_i^H = 1$ ($d_i^H = 0$), if the value of *BQ* in 1984 (the first available observation for most countries) is below (above) 3.5 (the OECD average is 3.56).

Observations for political persistence are available starting in 1975. We construct six 5-year periods between 1975 and 2004. Since we will regress growth on lagged persistence and always include country fixed effects, observations are included if a country is democratic for at least three consecutive periods between 1975 and 2004, giving rise to an unbalanced panel of 205 observations for 56 countries. For 51 of these countries we have information on *BQ* starting in 1984 (see the Data Appendix for the list of countries). The growth rate (*GROWTH*) is defined as the average annual per capita GDP growth rate at constant 2005 PPP USD over 5-year periods using data from World Development Indicators (WDI) and *PERS* is average persistence over 5-year periods.

We begin by estimating the following equation:

$$GROWTH_{it} = \beta_1 PERS_{it-1} + v_i + \eta_t + \varepsilon_{it} \quad (1)$$

where i denotes country, t the time period, $PERS_{it-1}$ is lagged persistence, v_i are country fixed effects, η_t are time fixed effects and ε_{it} is the error term. Column (1) in Table 1

opposition if it controls the legislature. In addition, each chamber (unless the chief executive controls the lower house through a closed list system) and each of the party allied with the president is a veto player in presidential systems. In parliamentary systems, veto players are those parties that are necessary for the winning coalition to keep the absolute majority in the government and those parties in the government coalition that are ideologically nearer to opposition parties. It is worth emphasizing that, differently from widely used definitions of political stability, our measure captures political changes not only in electoral years but also during the legislature.

³According to DPI, country i is defined democratic in year t if legislative and executive competitiveness both take their maximum value in country i in year t .

⁴The *BQ* index takes values between 0 and 4, with 0 denoting lowest quality. This variable captures one determinant of red-tape costs, that is a weak and inefficient bureaucracy. We prefer this measure to alternative proxies of red-tape costs - such as measures of government effectiveness from the World Bank's Worldwide Governance Indicators (Kaufman et al.[16]) and indicators of the cost of setting up and operating a business (Doing Business: Measuring Business Regulations [19])- since it is available for a longer time span.

(see the Data Appendix) reports results obtained by LSDV estimation. The coefficient for lagged *PERS* is negative and marginally significant.

Notice that finding a *negative* association between political persistence and economic growth contrasts with the results of the existing literature on political instability and growth, as surveyed in Carmignani [8]. In fact, by using measures of political instability based on data on revolutions, coups and assassinations, these studies find a *positive* effect of stability on growth. On the contrary, we find that when government change occurs through democratic institutions, political turnover (i.e. instability) is positively associated with growth.

We now turn to explore the possibility that the relationship between political persistence and growth may be different when red-tape costs are high, that is when the administrative burden imposed on firms is high and/or the bureaucracy is inefficient, and when these costs are low. As discussed above, our idea is that when red-tape costs are high, political persistence should hinder innovation and growth, as it implies perpetuation of the network. Instead, political persistence should not be related to growth when red-tape costs are low.

Column (2) in Table 1 replicates the baseline regression of column (1) considering the 51 countries for which data on *BQ* are available since 1984. The coefficient for lagged *PERS* is again negative and significant at 5% level. In columns (3) and (4) we split the sample into low and high red-tape cost countries, respectively⁵. Consistently with our view, the negative correlation is present only in the group of countries with high red-tape costs, while it disappears in the other group. Conditional distributions and fitting lines of *PERS* and *GROWTH* for low and high cost countries are reported in panel (a) and (b) of Figure 1, respectively.

Column (5) reports estimation results for the equation:

$$GROWTH_{it} = \beta_1 PERS_{it-1} + \beta_2 (d_i^H * PERS_{it-1}) + v_i + \eta_t + \varepsilon_{it} \quad (2)$$

where $d_i^H * PERS_{it-1}$ is the interaction between the dummy variable for high red-tape costs and lagged persistence. The null hypothesis $\beta_1 = 0$ and $(\beta_1 + \beta_2) < 0$ cannot be rejected at 5% confidence level, again indicating that political persistence is negatively correlated with growth in high cost countries but is uncorrelated with growth in low cost countries. Note that the correlation between *PERS* and *GROWTH* is not only statistically significant, but also sizeable: in fact the point estimates for the high cost countries indicate

⁵ Approximately 54% of the observations in our sample belong to the group of countries with high red-tape costs using our threshold.

that a one standard deviation *increase* in political persistence is associated with roughly 0.5% *decrease* in the growth rate.

In order to verify the robustness of these results, we run again our estimates including the initial (log of) GDP per capita as well as several standard controls in growth regressions, such as investment/GDP and government expenditure/GDP (from Penn World Tables 6.1), average schooling years in total population (from Barro and Lee), fertility rate (from WDI) and a proxy for corruption (from ICRG)⁶. Estimation of equations (1) and (2) including these controls yields similar estimated coefficients for our variables of interest (estimation results not shown).⁷ We also tried different thresholds to classify countries into high and low cost, with threshold values ranging between 3.1 and 3.9. Estimation results are qualitatively similar (not shown), as very few countries are affected by these changes.

As estimation results of equation (2) are particularly relevant for our purposes, we proceed further to deal with possible sources of bias due to omitted variables and endogeneity.

We start by performing 2SLS instrumental variable estimation of equation (2). To this end, in order to gain information, we rely on yearly observations in the period 1984-2004. As *PERS* is very irregular when observed on a yearly basis (recall that we used 5-years averages in the previous exercises), we define a new measure of political persistence in year t , which we call “smooth” persistence (*SPERS*), using the moving average of *PERS* calculated between $t - 1$ and $t - 4$. More precisely:

$$SPERS_{it} = \sum_{m=1}^M PERS_{i(t-m)}$$

with $M = 3$. To minimize missing information, we include all yearly data for countries that show an average degree of democracy over the sample period higher than 0.7, where country i in year t receives value 1 if democratic or 0 if not democratic. As before, we classify a country as having high (low) red-tape costs and set $d_i^H = 1$ ($d_i^H = 0$) if the initial value of BQ (that is the value of BQ in 1984 or the first available observation) is

⁶This variable, named control of corruption, is an index ranging from 0 to 6 (where 0 corresponds to low control of corruption) that measures mainly actual or potential corruption in the form of excessive patronage, nepotism, job reservations, favor exchange, secret party funding, and suspiciously close ties between politics and business.

⁷In order to alleviate estimation bias due to measurement error and reverse causation, all these controls are taken at the beginning of each period, with the exception of *EDU* which is the average over the current and previous 5-year periods.

below (above) 3.5. Our new sample includes 55 countries⁸.

Using additional data from DPI, we construct two variables that will be used as instruments for *SPERS*. The first is a dummy variable, *LAG_LEG*, taking value one (zero) when legislative elections took (did not take) place in the previous year. The second variable, *PAST_EL*, counts the number of years since the last legislative or executive election.

As the empirical literature on political business cycles finds no evidence of a systematic association between growth and election dates, we expect the timing of elections to be uncorrelated with growth. Instead, we expect *LAG_LEG* to be positively related and *PAST_EL* to be negatively related with *SPERS*. As most changes in veto players take place in elections years, persistence should be high in the subsequent year. Instead, the longer the time span between the last election and the year in which persistence is measured, the more likely that some veto players have changed.

We start by estimating the reduced form equation:

$$GROWTH_{it} = \beta_1 SPERS_{it} + \beta_2 (d_i^H * SPERS_{it}) + \gamma_i t + v_i + \eta_t + \varepsilon_{it} \quad (3)$$

where *GROWTH* is the yearly per capita GDP growth rate at constant 2005 PPP USD and $\gamma_i t$ denotes country-specific trends. Column (1), Table 2, reports estimation results by LSDV. Here, contrary to our previous findings, political persistence appears to be negatively associated with growth only in countries with low red-tape costs, though the coefficient is only marginally significant. However, as shown in column (2), once *LAG_LEG* and $d_i^H * LAG_LEG$ are used as instruments for *SPERS* and $d_i^H * SPERS$, we recover the result that political persistence is negatively associated with growth in countries with high red-tape costs, while it is uncorrelated with growth in countries with low red-tape costs. In fact, as in column (5), Table 1, the null hypothesis $\beta_1 = 0$ and $(\beta_1 + \beta_2) < 0$ cannot be rejected (at 10% confidence level). In column (3) we add *PAST_EL* and $d_i^H * PAST_EL$ in the set of instruments: this improves significance of the estimated coefficient of $(\beta_1 + \beta_2)$. The F- test and Sargan test suggest that our instruments are relevant and there is no overidentification. In column (4) we use lagged (rather than smooth) persistence with the same set of instruments as in column (3): results are very stable in terms of estimated coefficients and statistical significance. However, the R^2 is sensibly smaller and the power of the instruments is not as evident as before. In column (4), d^H is defined as the average level for each country: estimation results are unchanged. In order to estimate the

⁸This new sample is very similar to the one used to estimate equation (2). In particular 49 out of the 51 original countries are still present. New entries are Bahamas, Germany, Czech Republic, Papua New Guinea, Slovakia and Slovenia. Instead, Poland and Senegal are no longer present.

coefficient of red-tape costs, we also run regressions allowing d^H to vary over time, setting $d_{it}^H = 1$ ($d_{it}^H = 0$) when $BQ < 3.5$ ($BQ > 3.5$) in country i in year t : d_{it}^H is not significant in the second stage (estimation results not shown) and its estimated coefficient is very close to zero.

Finally, we take into account the possible source of bias related to the LSDV estimation of growth regressions which include country fixed effects. To tackle this issue, we rewrite (3) as follows:

$$GDP_{it} = \delta_1 GDP_{it-1} + \beta_1 SPERS_{it} + \beta_2 (d_{it}^H * SPERS_{it}) + \gamma_i t + v_i + \eta_t + \varepsilon_{it} \quad (4)$$

and estimate equation (4) using Arellano-Bond GMM estimator that is precisely designed for dynamic panels of this sort. Among the excluded instruments we add *LAG_LEG* and *PAST_EL* as in specifications (3) - (5) of Table 2. Column (1), Table 3, reports the benchmark case in which we estimate (4) by means of 2SLS, where only *SPERS* (and its interaction) are instrumented. As before, the hypothesis $\beta_1 = 0$ and $(\beta_1 + \beta_2) < 0$ cannot be rejected (at 5% confidence level). The autoregressive term is strongly significant and smaller than one. The first stage is reliable ($F = 33.73$) and overidentification is not an issue. Column (2) presents results for Arellano-Bond GMM estimations, where the lagged differences used as instruments are of second order. Since with yearly data autocorrelation is usually large and the AR(2) test in column (2) rejects the hypothesis of no serial correlation of second order, in column (3) we also add the $(t-3)$ lag of differences among instruments. Both columns show that, if any, the estimation bias induced by the omission of the correlation between lagged *GDP* and the error term is small. Again, we cannot reject the null hypotheses $\beta_1 = 0$ and $(\beta_1 + \beta_2) < 0$ (at 5% and 1% confidence level, respectively). However, some concerns arise about the overidentification of our regressions.⁹

To summarize, our empirical analysis provides evidence that political persistence is negatively associated with growth in high red-tape costs countries, while we find weaker or no evidence of a relationship between persistence and growth in low costs countries. This result, which is robust to several sources of estimation bias, provides motivation for the theoretical analysis that we will develop in the following section.

⁹Adding lags up to the $(t-5)$ order does not qualitatively change results, although the number of degrees of freedom decreases when we add further lags.

2.2 Related literature

Besides contributions already cited in the Introduction, our paper is related to several strands of literature. First, Acemoglu and Robinson [2] analyze inefficient institutions by developing a political economy model where political elites may block innovation for fear of losing political power, as innovation reduces the cost of replacing the incumbent. Their main result is a non-monotonic relationship between a measure of political competition and the incentive to block innovation. Our model emphasizes the strategic interaction between the politician (political elite), the firm (economic elite, absent in AR model) and voters, showing the conditions under which a “blocked” society with persistent networks of politicians and entrepreneurs can be supported by a vast majority of forward-looking voters. Moreover, we endogenously determine the level of inefficient bureaucracy that the politicians use to perpetuate their power and highlight the (static) costs versus the (dynamic) gains of breaking up the status quo.

Second, in a Schumpeterian framework with innovation and technology adoption, Acemoglu, Aghion and Zilibotti [1] and Aghion, Alesina and Trebbi [4] incorporate a political-economy model where firms lobby the government to reduce economic competition (AAZ) and entry threat (AAT). Our analysis differs in many respects as we consider the firm’s choice between network and innovation, and focus on the strategic interaction between politicians, firms and voters in democracies where political accountability through voting constrains the policy choices of the politician.

Third, recent empirical contributions investigate the relevance of political connections on firms’ performance. From a cross-country perspective, Faccio [10] documents the widespread existence of political connections and that these connections significantly add to company values. Faccio et al. [11] find that politically-connected firms are significantly more likely to be bailed out than similar non-connected firms. More importantly for our contribution, in a recent paper Desai and Olofgard [9] investigate the consequences of political connections on about 10.0000 firms surveyed in 40 developing countries and find that influential firms face fewer administrative and regulatory burdens and invest and innovate less.

Finally, our empirical results are related to the existing literature on political instability and economic growth. Almost all contributions use data on revolutions, coups and assassinations to construct a measure of political instability (see, for instance Alesina et al. [6] and the survey of the literature in Carmignani [8]). Not surprisingly, these studies find a positive effect of stability on growth.¹⁰ On the contrary, our findings suggest that,

¹⁰An exception is the paper by Feng [12], who distinguishes between irregular and regular government

when government change occurs through democratic institutions, political turnover (i.e. instability) rather than political persistence (i.e. stability) is positively associated with growth in countries where red-tape costs are high, while no robust correlation emerges when red-tape costs are low.

3 The model

3.1 The environment

Consider a two-sector economy populated by a continuous mass of infinitely-lived agents. Time is discrete with $t = 0, 1, \dots, \infty$. Utility is linear in consumption and future consumption is discounted at the subjective discount factor $\beta = 1/(1+r)$ where r is the interest rate. This implies that, in each period, consumption is equal to income.

The intermediate good is produced using the final good by means of a one-to-one linear technology. At time 0 there exists an incumbent firm which produces as a monopolist in the intermediate sector.

In each period t output in the final good sector is given by:

$$Y_t = \tilde{x}_t^\alpha L_t^{1-\alpha} \tag{5}$$

where L_t is labor, $\tilde{x}_t = \sum_{q=0}^{Q_t} \gamma^q x_q$ is a quality-adjusted intermediate input, with q denoting quality rung of intermediate good x_q that has quality γ^q . Q_t denotes the highest quality level in use at time t . We will take the final good as numeraire and normalize its price to one. We assume no population growth and normalize $L = 1$. The final good sector is perfectly competitive.

To keep the economic side of the model simple and focus on the relationship between innovation, growth and political persistence, we abstract from endogenous innovation determined by R&D and from the potential catching up associated to distance to frontier. Specifically, we assume that in each period exogenous technological progress makes a higher quality version of the intermediate good available. Technological upgrade is limited to the next higher quality good (step-by-step innovation). Thus, if technology Q is the highest quality adopted in the previous period, only technology $Q + 1$ can be adopted in

changes and finds that stability enhances growth in the case of irregular changes, but is *negatively* associated with growth in the case of regular changes. Our empirical analysis, using a completely different dataset and exploiting the time dimension, shows that the negative relation between political persistence (stability) and growth is robust solely in countries that we classify as having high red-tape costs.

the current period, although other superior technologies may be available. For reasons that will become clear later, technology adoption will be related to political outcomes.

At the beginning of period t , there is an incumbent monopolist who owns technology Q_{t-1} and an incumbent politician who was appointed at $t - 1$. The incumbent politician sets the level of red-tape costs $\sigma_t \geq 1$ that are related to norms and regulations to carry out production in the intermediate good sector. Bureaucracy and excessive regulation impose external costs on firms as information on bureaucratic requirements are costly to acquire and bureaucratic processes are time consuming. In our model, these costs will proportionally affect marginal costs of production. Specifically, given our technology in the intermediate good sector, marginal cost of production is constant and equal to one. Due to bureaucratic requirements, effective production costs become equal to σ_t . Note that we are assuming that, in order to affect production in period t , the level of red-tape costs must be chosen at the *beginning* of the period. This assumption is meant to capture the idea that reforms of bureaucracy take time to be designed and implemented.

The incumbent monopolist and politician are potentially connected. We have in mind a system of personal relationships between the operating firm and the politician in office whereby the politician serves as facilitator by providing information on how to approach the bureaucracy or directly intervening in bureaucratic processes. By knowing the right person in the right place (“a rolodex effect”), the firm can more easily deal with bureaucratic requirements and acquires a competitive advantage over the outsiders.

We model the benefit of being politically connected by assuming that connected firms can enjoy lower marginal costs of production relative to unconnected firms. Specifically, the marginal cost of production can be reduced to the minimum level equal to 1 for the connected firm, if it exploits the network (thus acquiring a cost advantage $\sigma_t - 1$ over unconnected firms). Notice that, if the politician sets $\sigma_t = 1$, there is nothing to gain from a network with the politician.

In period t , in order to exploit the network advantage, two conditions must be satisfied. First, the incumbent politician must win period- t election and be re-elected. Second, the incumbent firm must devote resources (in particular, spend time) to maintain its network. In this case, the incumbent will face competition from an unconnected firm with superior technology, but it might still be able to keep its monopoly by exploiting the network advantage. The alternative option for the incumbent firm is to spend time to adopt the new technology. In this case, the existing network is lost and the firm survives in the market (that is, it becomes the sole owner of the leading-edge technology) with probability λ . If the incumbent monopolist is unsuccessful, a new unconnected leader enters the market

with probability one.

In other words, the incumbent firm faces a trade-off between “learning-by-knowing” and innovation. In the former case, the firm exploits the repeated interaction and relationship with the politician to produce with the current technology at lower costs; in the latter case, the investment in innovation might lead the firm to adopt the leading-edge technology and reach the technological frontier. Notice that the “learning-by-knowing” option is available only to the incumbent firm and can be effective only if the incumbent politician is confirmed in office. This captures the idea that it takes time to build relationships and makes the incumbent politician intrinsically different from the opponent in the eyes of economic agents.¹¹

According to a standard assumption in the literature on Schumpeterian models of growth (see Grossman and Helpman [15]), in the intermediate good sector owners of different vintages compete à la Bertrand. Since intermediate inputs are perfect substitutes in the production of the final good, if all producers faced the same marginal costs of production σ_t , the technological leader would become monopolist by setting a limit price $p_t = \gamma\sigma_t$. In this case, output would be given by:

$$Y_t = \gamma^{\frac{\alpha(Q_{t-1}+1)}{1-\alpha}} \left[\left(\frac{\alpha}{\gamma\sigma_t} \right)^{\frac{\alpha}{1-\alpha}} - \sigma_t \left(\frac{\alpha}{\gamma\sigma_t} \right)^{\frac{1}{1-\alpha}} \right] \quad (6)$$

and the monopolist would earn profits equal to:

$$\Pi_t = \alpha^{\frac{1}{1-\alpha}} \gamma^{\frac{\alpha(Q_{t-1}+1)}{1-\alpha}} (\gamma\sigma_t)^{\frac{1}{\alpha-1}} (\gamma\sigma_t - \sigma_t) \quad (7)$$

In our model, however, the incumbent producer, if *politically connected*, can prevent entry of more advanced but unconnected competitors by setting a limit price equal to $p_t = \sigma_t/\gamma$ where $\sigma_t > 1$ is the marginal cost of production of the competitor (recall that in this case the marginal cost for the incumbent is equal to 1).¹² Notice that the incumbent

¹¹Our description of the specific role of the incumbent politician in aiding firms to deal with bureaucracy is reminiscent of political-science contributions on excessive bureaucracy in representative democracies. For instance, Fiorina and Noll [13] argue that “As the public bureaucracy grows larger, the importance of the performance of facilitation will grow, and a legislator who is a good facilitator will be increasingly likely to be reelected. ...Because part of facilitation is the possession and use of information which is acquired through experience, and because seniority enhances the influence of a legislator in determining the fate of an agency, incumbents can be more effective facilitators than their challengers” (p. 257).

¹²Limit pricing requires that $\alpha\sigma < \gamma < 1/\alpha$. The first inequality ensures that the connected firm cannot keep the leading-edge competitor out of the market by setting the monopoly price $1/\alpha$. Similarly, the second inequality ensures that the technological leader cannot keep competitors out of the market by setting the monopoly price σ/α .

firm can make non-negative profits at this price if and only if $\gamma \leq \sigma$.¹³ Output would be given by:

$$Y_t = \gamma^{\frac{\alpha Q_{t-1}}{1-\alpha}} \left[\left(\frac{\alpha\gamma}{\sigma_t} \right)^{\frac{\alpha}{1-\alpha}} - \left(\frac{\alpha\gamma}{\sigma_t} \right)^{\frac{1}{1-\alpha}} \right] \quad (8)$$

and profits:

$$\Pi_t = \alpha^{\frac{1}{1-\alpha}} \gamma^{\frac{\alpha Q_{t-1}}{1-\alpha}} \left(\frac{\sigma_t}{\gamma} \right)^{\frac{1}{\alpha-1}} \left(\frac{\sigma_t}{\gamma} - 1 \right) \quad (9)$$

Remark 1 *Given σ_t , aggregate income Y_t is higher when the operating firm is politically connected.*

Proof. See the Appendix. ■

This preliminary result highlights an important feature of our economy. In any period, if bureaucratic costs are larger than the technological jump (that is, $\sigma_t > \gamma$), then the economy benefits from the network between the firm and the politician as the former can produce at lower costs. In this case, the potential benefit from technological upgrade is not large enough to compensate for the cost reduction delivered by the network. Although the first best is reached when $\sigma_t = 1$ and the network is useless (in this case Y_t is maximum), once σ_t has been set larger than γ , the (static) second best is reached through the network. As we will show in the next section, this result implies a crucial trade-off for agents (workers in particular) who will decide whether to replace the incumbent politician or not by comparing the short-run gain of supporting the network with the long-run gains of technological upgrade.

Elections are held in each period and voters decide whether to confirm the incumbent or replace her with the opponent. Voters choose politicians in order to maximize their lifetime utility. As workers represent the majority of the electorate, we will focus solely on their political preferences to determine electoral results. Specifically, we assume that, if keeping in office the incumbent politician yields higher utility for workers than replacing her, the incumbent will be re-elected with probability one. If, instead, voters are indifferent between the economic outcomes delivered by the two candidates, the incumbent faces a probability of being re-elected equal to $\pi \in (0, 1)$ which is related to non-economic benefits and could be thought of a bias in favor (if larger than $1/2$) or against (if smaller than $1/2$) the incumbent. The electoral gain $(1 - \pi)$ can then be interpreted as a measure of the

¹³If the latter inequality were not satisfied, network advantage could never prevent entry of the technological leader and the incumbent firm would always prefer to invest in innovation rather than networking. Then, innovation would certainly occur. In the next section, we will show that the endogenously determined σ is indeed larger than γ .

responsiveness of voters to economic policies. When $(1 - \pi)$ gets higher, voters become more responsive and the incumbent can capture more additional votes with an economic platform that provides higher utility for workers than the opponent's platform.¹⁴

Taking into account the last two paragraphs, let us consider a one-period version of our model. It should be clear that, in this case, if $\sigma < \gamma$ and the network is useless, the two candidates deliver exactly the same economic benefits to workers, aggregate income is maximized and the probability of re-election for the incumbent is equal to π . If instead $\sigma > \gamma$, the incumbent politician guarantees higher economic benefits than the opponent and is re-elected with probability one, although aggregate income would be lower than in the previous case. The illustration of this static case will be useful to better understand the results of the following section.

3.2 The game

Each period t starts with technology Q_{t-1} inherited from period $t - 1$. The timing of the events is the following. (1) At the beginning of period t , the incumbent politician sets red tape costs $\sigma_t \in \Sigma = [1, \infty)$. (2) The incumbent firm decides whether to invest in networking or innovation by choosing $z_t \in Z = \{N, I\}$. (3) Elections are held and voters (workers) decide whether to confirm the incumbent in office or replace her by choosing $v_t \in V = \{M, R\}$ where M denotes voting for the incumbent and R replacing her. (4) Production and consumption take place.

The history of the game in period t is a vector

$$h_t \equiv (t, Q_{-1}, \dots, Q_{t-1}, \sigma_{1\dots}, \sigma_{t-1}, z_{1\dots}, z_{t-1}, v_{1\dots}, v_{t-1})$$

The set of all possible history is denoted by H_t . The future in period t is the sequence of future actions and states $(t + 1, \dots, Q_t, \dots, \sigma_{t+1}, \dots, z_{t+1}, \dots, v_{t+1}, \dots)$. We denote by

¹⁴We are assuming a simple voting model, where probability of politician i to be elected is equal to:

$$\begin{aligned} \pi_{it} &= 1 \text{ if } u_{it}^w > u_{jt}^w \\ \pi_{it} &= \pi \text{ if } u_{it}^w = u_{jt}^w \\ \pi_{it} &= 0 \text{ if } u_{it}^w < u_{jt}^w \end{aligned}$$

where j is the opponent politician, u^w is the utility of workers (voters) and $\pi_{jt} = 1 - \pi_{it}$. The model could be easily generalized to $\pi_{it} = 1 > \pi' > \pi$ if $u_{it}^w > u_{jt}^w$. The simplifying assumption here is that π_{it} is a step function which will reduce the optimal choice of the politician to two possible levels of σ . In the Appendix we show how our voting model can be obtained using a probabilistic voting model à la Persson-Tabellini ([18], ch. 3).

$H(h_t, \sigma_t, z_t, v_t)$ the set of all possible histories h_{t+1} generated by $h_t, \sigma_t, z_t,$ and v_t . Finally, $h_0 \equiv (0, Q_{-1})$ and time 0 begins with an incumbent politician and an incumbent firm.

A strategy for the politician is a sequence of actions $\sigma : H_t \rightarrow \Sigma$ which depends on history at time t . A strategy for the firm is a sequence of actions $z : H_t \times \Sigma \rightarrow Z$ which depends on history and the action of the politician. Finally, a strategy for voters is a sequence of actions $v : H_t \times \Sigma \times Z \rightarrow V$ which depends on history, the action of the politician and the choice of the firm.

With history h_t , the expected pay-off for the politician of an action σ_t is given by:

$$u^p(h_t, \sigma_t, z_t, v_t) = E_t \sum_{s=0}^{\infty} \beta^s R_{t+s} \quad (10)$$

where E_t is the expectations operator conditional on information available at time t and R_{t+s} is a variable which takes value $Y_{t+s} = \gamma^{\frac{\alpha(Q_{t+s})}{1-\alpha}} \left[\left(\frac{\alpha}{p_{t+s}} \right)^{\frac{\alpha}{1-\alpha}} - c_{t+s} \left(\frac{\alpha}{p_{t+s}} \right)^{\frac{1}{1-\alpha}} \right]$ when the incumbent is elected (where c_{t+s} is the marginal cost of production for the active firm) and 0 otherwise. In other words, we assume that the politician is benevolent and cares about aggregate welfare provided that she remains in office.¹⁵ To simplify the analysis, we will assume that when is not re-elected, the politician no longer runs for office.

The expected pay-off for the firm of an action z_t is given by:

$$u^f(h_t, \sigma_t, z_t, v_t) = E_t \sum_{s=0}^{\infty} \beta^s \Pi_{t+s} \quad (11)$$

where $\Pi_{t+s} = \alpha^{\frac{1}{1-\alpha}} \gamma^{\frac{\alpha(Q_{t+s})}{1-\alpha}} p_{t+s}^{\frac{1}{\alpha-1}} (p_{t+s} - c_{t+s})$ if the incumbent monopolist is still active at time $t + s$ and 0 otherwise. Finally, the expected pay-off for the voter of an action v_t is given by:

$$u^w(h_t, \sigma_t, z_t, v_t) = E_t \sum_{s=0}^{\infty} \beta^s w_{t+s} \quad (12)$$

where $w_{t+s} = (1 - \alpha) \alpha^{\frac{\alpha}{1-\alpha}} \gamma^{\frac{\alpha(Q_{t+s})}{1-\alpha}} p_{t+s}^{\frac{\alpha}{\alpha-1}}$ denotes the wage rate at time $t + s$.¹⁶

4 The politico-economic equilibrium

We will now characterize the equilibrium of our infinitely repeated game. We limit the analysis to stationary Markov perfect equilibria (SMPE). Given the structure of our

¹⁵In general, we need politicians' preferences to be defined over Y_t and π_t . In our simple specification, politician's instantaneous utility is linear in income.

¹⁶Notice that, from an economic point of view, the only feature that distinguishes the two politicians in the eyes of the voters is the potential connection with the operating firm. If this connection is absent, the two politicians would necessarily deliver the same economic outcome.

infinite-horizon model, time is not part of the payoff relevant state so that it seems natural to focus on stationary strategies that do not depend on calendar time (see Maskin and Tirole [17]). Moreover, given the economics of the model, the state of technology at the end of the previous period Q_{t-1} is the appropriate state variable since current payoffs (and therefore current actions) depend crucially on the inherited level of technology. Accordingly:

Definition 1 (Stationary Markov Perfect Equilibrium) *The Markov strategies*

$$\sigma^*(Q_{t-1}), z^*(Q_{t-1}, \sigma_t(\cdot)), v^*(Q_{t-1}, \sigma_t(\cdot), z_t(\cdot))$$

form a Stationary Markov Perfect Equilibrium (SMPE) if and only if:

(i) for all Q_{t-1} and all $\sigma_t(\cdot)$ and $z_t(\cdot)$, $v^*(Q_{t-1}, \sigma_t(\cdot), z_t(\cdot))$ is a solution to:

$$\arg \max_{v_t \in \{M, R\}} u^w(Q_{t-1}, v_t)$$

(ii) for all Q_{t-1} and $\sigma_t(\cdot)$:

$$u^f(Q_{t-1}, z_t^*, v_t^*) > u^f(Q_{t-1}, \hat{z}_t, \hat{v}_t)$$

for any $\hat{z}_t \neq z_t^*$, where v^* and \hat{v} are best response actions to z^* and \hat{z} respectively.

(iii) for all Q_{t-1} :

$$u^p(Q_{t-1}, \sigma_t^*, z_t^*, v_t^*) > u^p(Q_{t-1}, \bar{\sigma}_t, \bar{z}_t, \bar{v}_t)$$

for any $\bar{\sigma}_t \neq \sigma_t^*$, where z^*, v^* and \bar{z}, \bar{v} are best response actions to σ^* and $\bar{\sigma}$ respectively.

We are now ready to characterize the SPME of our dynamic game. Before stating our main proposition, let us define a threshold level of the technological jump:

$$\gamma_1 \equiv \left(\frac{1-\beta}{\beta} \right)^{\frac{1-\alpha}{\alpha}}$$

which will be crucial for our next result. Then, we can write the following:

Proposition 1 (Equilibrium) *The SMPE exists, is unique and entails constant actions.*

Specifically, there exists $\gamma^ > 1$ independent of Q such that:*

(i) if $\gamma < \min[\gamma_1, \gamma^*]$ the only SMPE is (σ_0, N) , where:

$$\sigma_0 = \frac{\gamma}{1 - \frac{\lambda(1-\beta)(\gamma-1)}{\gamma^{1-\alpha}(1-\lambda\beta\gamma^{1-\alpha})}} > \gamma$$

and the incumbent politician is re-elected with probability one.

(ii) if $\gamma > \min[\gamma_1, \gamma^*]$, the only SMPE is $(1, I)$ and the incumbent politician is re-elected with probability π .

Proof. See the Appendix. ■

As this Proposition shows, the economy can follow two equilibrium trajectories. In the first one, red-tape costs are high, the incumbent politician is always in power, and technology is never upgraded as the incumbent firm exploits the network with the politician. In the second one, red-tape costs are lowest, the incumbent is re-elected with a probability smaller than one, and technology is upgraded in every period.

In the first equilibrium (henceforth called “bad”), the politician deliberately chooses to maintain a high level of bureaucratic costs to maximize the probability of being re-elected, thus creating an incumbency advantage, at the cost of economic stagnation. When the politician sets $\sigma_0 > \gamma$, the incumbent monopolist finds it profitable to exploit the network thereby preventing entry of technologically advanced competitors. In turn, voters (workers) confirm the incumbent politician and benefit from lower prices generated by the cost reduction enjoyed by the connected firm. In the second equilibrium (henceforth called “good”), the politician does not introduce bureaucratic distortions ($\sigma = 1$) as she finds it worthwhile to maximize growth despite the lower chances of being re-elected. As already discussed, the good equilibrium represents the first best of our economy, where aggregate income is maximized: the deviation from the first best is ultimately due to the re-election strategy of the politician.

Several comments are in order here. First, the Proposition highlights the crucial role of two threshold levels, γ_1 and γ^* . The former is related to the indifference condition of voters between choosing the incumbent and supporting the status quo or electing the opponent and breaking the network. Note that, for the bad equilibrium to be sustained, the subjective discount factor of voters must be sufficiently low so that the short-run benefit of the network outweighs the long-run cost of stagnation. In other words, voters cannot be excessively forward-looking.¹⁷ The latter threshold γ^* is instead related to the indifference condition of the incumbent politician between setting σ_0 and maximize probability of re-election or implementing the first best and the high-growth path.

Whenever γ is lower than both thresholds, voters and politician are better off in the bad equilibrium which is, in this case, the only SMPE of the game. However, as soon as γ is larger than either of the two thresholds, the good equilibrium emerges. Specifically, if $\gamma^* < \gamma < \gamma_1$, the good equilibrium emerges as the politician does not find it worthwhile to set high red-tape costs although the voters would support them. If $\gamma_1 < \gamma < \gamma^*$ the good

¹⁷Note that $\gamma < \gamma_1$ can be written as $\beta \leq 1/(1 + \gamma^{\frac{\alpha}{1-\alpha}})$ where $\gamma^{\frac{\alpha}{1-\alpha}}$ is the rate of growth of wages in the “good” equilibrium. A necessary condition for the latter to hold is that $\beta\gamma^{\frac{\alpha}{1-\alpha}} < 1$, which ensures that the discounted utility of workers in the good equilibrium is bounded.

equilibrium emerges as the voters would vote against an incumbent who set high costs.

Second, our model allows us to fully characterize the level of distortion σ_0 that emerges in the “bad” equilibrium as a function of the structural parameters of the economy. This turns out to be the *minimum* level necessary to induce the incumbent firm to invest in the network so that re-election is achieved at the minimum cost in terms of welfare. Third, as we discussed in the Introduction, it is worthwhile to emphasize again that our “bad” equilibrium is voluntarily supported by voters: once the politician has opted for a high level of red-tape costs, and the firm has not invested in innovation, it is optimal for voters to confirm the incumbent. In this case, the status quo is *unanimously* preferred by all agents and therefore particularly hard to break up.

To conclude this section, let us discuss how the equilibrium outcome depends on the main parameters of our model, and in particular on parameters related to economic competition and electoral results. By simple inspection of σ_0 it is easy to verify that higher λ (that is, lower economic competition) implies higher σ_0 . The intuition is pretty simple. The higher is the expected return from innovation for the incumbent firm (which depends positively on λ), the higher is the network advantage $\sigma_0 - 1$ that the firm must enjoy to be induced to invest in networking rather than innovation. We can also prove (see the Appendix) that higher λ implies lower γ^* so that the good equilibrium becomes more likely to emerge.¹⁸ As the politician takes into account the higher welfare loss that has to be imposed on the society to induce the firm to invest in networking, she will be willing to set higher red-tape costs and prevent innovation only if the increase in aggregate income associated to technological upgrade is lower. Turning to elections, if responsiveness of voters to economic policies decreases (that is, π increases) the electoral gain of the network for the incumbent politician decreases and she will be more willing to lower bureaucratic costs and reform the inefficient state. Again, γ^* decreases and the good equilibrium is more likely to occur.

To summarize, we can write the following:

Proposition 2 (Comparative statics) *The good equilibrium is more (less) likely to emerge the higher (lower) is λ and the higher (lower) is π .*

Proof. See the Appendix. ■

Further elaborating on the previous results, we can prove (see the Appendix) that there always exists $\hat{\pi} \in (0, 1)$ such that $\gamma^* = \gamma_1$. This result has interesting implications

¹⁸Clearly, as λ increases, the set of γ such that $\gamma > \gamma^*$ enlarges when $\gamma^* < \gamma_1$. In the opposite case, changes in λ have no effect on the set of γ for which either equilibrium can occur.

in terms of political economy. Consider Figure 2a. When $\gamma \in (\gamma_A^*, \gamma_1)$, although voters *would support* the second-best equilibrium and vote for the incumbent politician, the latter is benevolent enough to internalize the cost of inefficient bureaucracy and to implement the first-best. This occurs as the share of additional voters that could be captured through the network is low and it is not worthwhile for the politician to distort the economy. Consider now Figure 2b. Here, when $\gamma \in (\gamma_A^*, \gamma_1)$, the incumbent politician sets high bureaucratic costs to ensure re-election and is supported by voters. Thus, the set of γ for which the second-best equilibrium arises is larger. Interestingly, for $\gamma \in (\gamma_1, \gamma_B^*)$, the first best is achieved through elections: although the politician would be better off by setting σ_0 , in this case voters would overthrow the incumbent and elect the opponent to benefit from technological innovation. Notice that this outcome could not occur in political economy models (such as Acemoglu, Aghion and Zilibotti [1] and Aghion, Alesina and Trebbi [4]) where the politician responds only to firms' interests and is not constrained by voters' actions.

5 Conclusions

Excessive regulatory and administrative burdens due to cumbersome regulatory and administrative requirements and/or inefficient bureaucracy are often pointed out as a major hindrance to growth as they subtract resources to investment and innovation and might represent a barrier to entry for new firms and superior technologies.

In this paper, we consider red-tape as a production cost for firms that can be mitigated through political connections in a relationship-based system (“knowing the right person in the right place”). As establishing connections requires time but no extra resources, connected firms face lower marginal costs than potential competitors. Thus, incumbent firms may be able to prevent entry of competitors with superior technology if they can exploit their political connections, that is, if politicians do not change too frequently. For the society as a whole, this creates a trade-off between the short-run benefits of enjoying low production prices by keeping the status quo and the long-run costs of retarding and preventing technological upgrade.

Our model shows that the interaction between politicians, firms and voters generates political equilibria that involve either perpetual innovation and replacement of the incumbent politician or stagnation and political persistence. By keeping an inefficient bureaucracy, the incumbent politician can induce the incumbent firm to spend time in establishing connections with the politician (which help to deal with bureaucracy, a sort

of “learning-by-knowing”) rather than innovating. As a result, voters may support the incumbent politician and the status quo to enjoy the lower production prices delivered by the connected firm. In this stagnation trap, a unanimous socioeconomic block emerges, which prevents the adoption of new technologies and leads to economic backwardness.

Ceteris paribus, when facing similar technological opportunities (same γ), countries are more likely to end up in the stagnation trap the more responsive to economic policies are voters (lower π) and the lower is the probability of success for the incumbent firm when it invests in innovation (lower λ). However, the welfare loss associated to stagnation is lower (lower σ_0) for lower λ .

The results of our model are consistent with a negative association between political persistence and economic growth in presence of high red-tape costs that we documented in the first part of the paper. In the bad equilibrium, a change in the politician in office breaks the network between politicians and firms and ensures that an outside firm endowed with the leading-edge technology enters the market. In this case, there is technological upgrade and high growth. In the good equilibrium, technological upgrade occurs regardless of electoral results: even if the incumbent wins the elections, an efficient bureaucracy guarantees that the quality leader enters the market.

Our theoretical analysis could be extended in different ways. First, we could extend the analysis of voters’ behavior, in order to provide a fully-fledged probabilistic voting model (along the lines of Persson and Tabellini [18], ch. 3) which could allow us to enlarge the set of structural parameters of our model and to incorporate additional political-economy issues. Second, an overlapping-generations version of our model could highlight interesting political and economic conflicts between short-sighted and long-sighted agents, which would give rise to intergenerational conflicts between the young (more inclined to political turnover and economic change) and the old (supporting the status quo). We could then use the model to shed light on important policy aspects, such as the issue of gerontocracy, low socioeconomic mobility and economic backwardness.

APPENDIX

A1. A probabilistic voting model (see Persson and Tabellini [18], ch. 3).

Suppose that individual worker i has the following preferences:

$$\tilde{u}^i(P, \sigma) = u^i(P, \sigma) + \theta^i(P) \quad (13)$$

when politician $P \in \{I, O\}$ is elected and the policy σ is implemented (by the incumbent politician at the beginning of the period).

The term $\theta^i(P)$ captures the non-economic related benefits that individual i enjoys if politician P is elected (for instance, related to ideology). Let us normalize $\theta^i(I) = 0$ so that $\theta^i > 0$ implies that individual i has a bias in favor of politician O while $\theta^i = 0$ denotes an ideologically neutral voter. Moreover, let us assume that the parameter θ is distributed uniformly on the interval $[a, b]$ with $a < 0$ and $b > 0$.

Individual i prefers politician I if

$$u^i(\sigma_I) > u^i(\sigma_O) + \theta^i + \delta \quad (14)$$

where δ measures the average relative popularity of O in the population. Assume that δ has a uniform distribution on

$$\left[-\frac{1}{2\psi}, \frac{1}{2\psi} \right]. \quad (15)$$

It can be easily verified that the total vote share for the incumbent is given by:

$$v = \frac{1}{2} + \frac{2\tilde{\theta} - (a + b)}{b - a} \quad (16)$$

where $\tilde{\theta} = u^i(\sigma_I) - u^i(\sigma_O) - \delta$. The probability that the incumbent is elected is therefore given by:

$$\pi = \Pr_{\delta} \left[v \geq \frac{1}{2} \right] = \frac{1}{2} + \psi \left[u^i(\sigma_I) - u^i(\sigma_O) - \frac{a + b}{2} \right] \quad (17)$$

Note whenever $u^i(\sigma_I) = u^i(\sigma_O)$ (as for instance in the good equilibrium where $\sigma = 1$), the probability that the incumbent is re-elected is

$$\pi = \frac{1}{2} - \frac{\psi(a + b)}{2} \quad (18)$$

which is larger (smaller) than $1/2$ if $a+b$ is smaller (larger) than 0. If instead the incumbent sets $\sigma > 1$, we have

$$u^i(\sigma_I) - u^i(\sigma_O) = (1 - \alpha) \alpha^{\frac{\alpha}{1-\alpha}} \gamma^{\frac{\alpha(Q+1)}{1-\alpha}} \sigma^{\frac{\alpha}{\alpha-1}} \left[\frac{\beta \gamma^{\frac{\alpha}{1-\alpha}} - 1}{1 - \beta} - \gamma^{\frac{\alpha}{\alpha-1}} \right] \quad (19)$$

which is positive whenever $\gamma < \gamma_1$. Clearly, in this case, π is *decreasing* with σ . Thus, the incumbent will choose between σ_0 and 1 by computing the probability of being elected when $\sigma = \sigma_0$ in equation (19). For the sake of simplicity, in our model we assume that $\sigma = \sigma_0$ implies $\pi = 1$, that is:

$$(1 - \alpha)\alpha^{\frac{\alpha}{1-\alpha}}\gamma^{\frac{\alpha(Q+1)}{1-\alpha}}\sigma_0^{\frac{\alpha}{\alpha-1}}\left[\frac{\beta\gamma^{\frac{\alpha}{1-\alpha}} - 1}{1 - \beta} - \gamma^{\frac{\alpha}{\alpha-1}}\right] \geq \frac{1/\psi + a + b}{2}. \quad (20)$$

A2. Proof of Remark 1

Equation (6) can be written as:

$$Y_t = \gamma^{\frac{\alpha Q_{t-1}}{1-\alpha}} \left[\left(\frac{\alpha}{\sigma_t}\right)^{\frac{\alpha}{1-\alpha}} - \frac{\sigma_t}{\gamma} \left(\frac{\alpha}{\sigma_t}\right)^{\frac{1}{1-\alpha}} \right]$$

Comparing this expression with equation (8), it can be easily noted that the latter is larger as $\sigma_t > \gamma$.

A3. Proof of Proposition 1.

The proof is divided into three parts. First, we show that there are only two possible equilibria, characterized by constant actions of all players. Second, we show that the equilibrium exists and is unique for given configurations of parameters. Third, we prove that $\sigma_0 > \gamma$.

1) (i) Any equilibrium strategy profile must have $z_t = I$ when $\sigma_t = 1$. Given $\sigma_t = 1$, best response for firm is to play I . (ii) Any equilibrium strategy profile must have $z_t = N$ when $\sigma_t > 1$. If the strategy profile of the firm had $z_t = I$ when $\sigma_t > 1$, then the politician would be better off by deviating and playing 1 to which the firm would respond by playing I (see i). There is no incentive for the politician to keep high red tape costs when the firm is not investing in networking. When the incumbent firm invests in innovation, voters are indifferent between the two politicians, the probability of being re-elected is π and cannot be affected by an increase in σ . (iii) Any equilibrium strategy profile must have $v_t = M$ when $z_t = N$. If the strategy profile of the voters had $v_t = R$ when $z_t = N$, then the firm would be better off by deviating and playing I as the network would be broken anyway. In this case, there is no reason for the firm to invest in networking as there is no network advantage. (iv) We are left with equilibrium strategies profiles that yield either (σ_t, N, M) or $(1, I)$ and voters confirm the incumbent with probability π , $\forall t$. (v) Suppose that at time 0 the politician chooses $\sigma_0 > 1$. Then, we know that players' actions are given by (σ_0, N, M) and Q does not change. By stationarity, from time 0 onwards players will always play (σ_0, N, M) . (vi) Suppose instead that at time 0 the politician chooses

$\sigma_0 = 1$. Then, players' actions are given by $(1, I)$ and the incumbent wins elections with probability π . In period 1, Q has changed and two possibilities arise. Either the politician chooses $\sigma_1 > 1$ and actions are given by (σ_1, N, M) or she chooses $\sigma_1 = 1$ and actions are given by $(1, I)$. The first possibility cannot be an equilibrium action as it would imply:

$$\pi \left(Y_0^H + \sum_{t=1}^{\infty} \beta^t Y_1^L \right) > \sum_{t=0}^{\infty} \beta^t Y_0^L \quad (21)$$

$$\pi \left(Y_1^H + \sum_{t=1}^{\infty} \beta^t Y_2^L \right) < \sum_{t=0}^{\infty} \beta^t Y_1^L \quad (22)$$

where Y_t^L denotes the low level of aggregate income in period t when $\sigma = \sigma_1$ and Y_t^H denotes the high level of aggregate income in period t when $\sigma = 1$. The first inequality follows from 1 being preferred to σ_1 in period 0. The second follows from σ_1 being preferred to 1 in period 1. Since $Y_{t+1}^L = \gamma^{\frac{\alpha}{1-\alpha}} Y_t^L$ and $Y_{t+1}^H = \gamma^{\frac{\alpha}{1-\alpha}} Y_t^H$, the two inequalities cannot hold together. Thus, if equilibrium actions are $(1, I)$ in period 0 it must also be the case that equilibrium actions are $(1, I)$ in period 1 and in all subsequent periods. In all periods the incumbent will be re-elected with probability π .

2) Consider the following Markov strategy profile for the voters, the firm and the politician: $v^*(Q, \sigma, N \mid \sigma > 1) = M$, $z^*(Q, \sigma \mid \sigma \geq \sigma_0) = N$, $z^*(Q, \sigma \mid \sigma < \sigma_0) = I$, and $\sigma^*(Q) = \sigma_0$. Moreover, recall that, whenever voters are indifferent between the economic outcomes delivered by the two politicians (that is, whenever $z = I$ and/or $\sigma = 1$), we assumed that they will vote for the incumbent with probability π . To prove that these are Markov equilibrium strategies, we apply the one-stage deviation principle. (i) For voters not to deviate when politician plays σ_0 and firm plays N it must be true that:

$$w^R(Q, \sigma_0, N) + \sum_{s=1}^{\infty} \beta^{t+s} w^M(Q', \sigma_0, N) \leq \sum_{s=0}^{\infty} \beta^{t+s} w^M(Q, \sigma_0, N)$$

where $Q' = Q + 1$, w^R is the wage rate when the voters choose the opponent and a new unconnected entrant with high production costs replaces the incumbent firm, and w^M is the wage rate when the voters choose the incumbent and the connected firm produces at low production costs. The LHS represents voters' utility if they vote for the opponent in period t and then vote for the incumbent for all subsequent period. The RHS represents voters' utility if they vote for the incumbent in all periods. After some algebra the latter inequality reduces to:

$$\gamma^{\frac{\alpha}{1-\alpha}} \geq \frac{1 - \beta}{1 - \beta \gamma^{\frac{\alpha}{1-\alpha}}} \quad (23)$$

The left-hand side represents the ratio w^M/w^R . Given σ_0 , this term measures the static efficiency gain from the network. The right-hand side represents the dynamic loss of the network, related to the blocking of innovation that leads to stagnant wages and income. If the latter inequality does not hold, workers would value the long-run gain of technological upgrades more than the short-run benefit of reducing production costs through the political network. Inequality (23) can be easily rewritten as:

$$\gamma < \left(\frac{1-\beta}{\beta}\right)^{\frac{1-\alpha}{\alpha}} \equiv \gamma_1 \quad (24)$$

(ii) Consider now the firm. The firm would not deviate by playing I when the politician sets σ_0 if and only if:

$$\lambda \left[\Pi^I(Q, \sigma_0) + \sum_{s=1}^{\infty} \beta^{t+s} \Pi^N(Q', \sigma_0) \right] \leq \sum_{s=0}^{\infty} \beta^{t+s} \Pi^N(Q, \sigma_0) \quad (25)$$

where Π^N is the profit when the firm invests in networking and Π^I is the profit when the firm invests in innovation. The LHS represents firm's utility if it invests in innovation in period t (and survives with probability λ) and invests in networking in all subsequent periods. The RHS represents firm's utility if it invests in networking in all periods. After some algebra, the above inequality can be rewritten as:

$$\sigma \geq \frac{\gamma}{1 - \frac{\lambda(1-\beta)(\gamma-1)}{\gamma^{\frac{1}{1-\alpha}}(1-\lambda\beta\gamma^{\frac{\alpha}{1-\alpha}})}} \equiv \sigma_0 \quad (26)$$

To prove that $\sigma_0 > \gamma$ it is sufficient to show that

$$\frac{\lambda(1-\beta)(\gamma-1)}{\gamma^{\frac{1}{1-\alpha}}(1-\lambda\beta\gamma^{\frac{\alpha}{1-\alpha}})} < 1 \quad (27)$$

We will prove that this inequality holds for all $\gamma \leq \gamma_1$ (which is a necessary condition for the bad equilibrium to exist). Recall that $1 - \lambda\beta\gamma^{\frac{\alpha}{1-\alpha}} > 0$ by previous assumption (see footnote 21), so that the above inequality can be written as:

$$\gamma \leq 1 + \frac{\gamma^{\frac{1}{1-\alpha}}(1-\lambda\beta\gamma^{\frac{\alpha}{1-\alpha}})}{\lambda(1-\beta)} \quad (28)$$

The second term on the RHS is strictly concave and positive for $\gamma < \left(\frac{1}{\lambda\beta}\right)^{\frac{1-\alpha}{\alpha}}$. Moreover, the second term reaches its maximum at $\gamma = \left(\frac{1}{\lambda\beta(1+\alpha)}\right)^{\frac{1-\alpha}{\alpha}}$. Thus, there exists $1 < \hat{\gamma} < \left(\frac{1}{\lambda\beta}\right)^{\frac{1-\alpha}{\alpha}}$ such that $\hat{\gamma} = 1 + \frac{\hat{\gamma}^{\frac{1}{1-\alpha}}(1-\lambda\beta\hat{\gamma}^{\frac{\alpha}{1-\alpha}})}{\lambda(1-\beta)}$ and $\gamma < 1 + \frac{\gamma^{\frac{1}{1-\alpha}}(1-\lambda\beta\gamma^{\frac{\alpha}{1-\alpha}})}{\lambda(1-\beta)}$ when $\gamma < \hat{\gamma}$.

Notice also that $\sigma_0 \rightarrow \infty$ when $\gamma \rightarrow \hat{\gamma}$. Now consider $\gamma = \gamma_1$. It is easy to verify that $\lambda(1 - \beta)(\gamma_1 - 1) < \gamma_1^{\frac{1}{1-\alpha}}(1 - \lambda\beta\gamma_1^{\frac{\alpha}{1-\alpha}})$. Thus $\gamma_1 < \hat{\gamma}$ which ensures that $\sigma_0 > \gamma$. Finally, when the politician sets $\sigma = 1$, the firm certainly chooses I (the alternative N would imply zero profits). (iii) The politician will not deviate by setting $\sigma = 1$ for any Q if and only if:

$$\pi \left[Y^H(Q, 1) + \sum_{s=1}^{\infty} \beta^{t+s} Y^L(Q', \sigma_0) \right] < \sum_{s=0}^{\infty} \beta^{t+s} Y^L(Q, \sigma_0) \quad (29)$$

where $Y^H(Q, 1)$ is the high level of income when $\sigma = 1$ and there is innovation (given by eq. 6 with $\sigma = 1$) and $Y^L(Q, \sigma_0)$ is the low level of income when $\sigma = \sigma_0$ and innovation is blocked (given by eq. 8 with $\sigma = \sigma_0$). The latter inequality can be rewritten as:

$$\frac{Y^L(Q, \sigma_0)}{Y^H(Q, 1)} \geq \frac{\pi(1 - \beta)}{1 - \pi\beta\gamma^{\frac{\alpha}{1-\alpha}}} \quad (30)$$

Notice that:

$$Y^L(Q, \sigma_0) = \left(\frac{\alpha\gamma}{\sigma_0} \right)^{\frac{\alpha}{1-\alpha}} - \left(\frac{\alpha\gamma}{\sigma_0} \right)^{\frac{1}{1-\alpha}} \quad (31)$$

has a unique maximum for $\sigma_0/\gamma = 1$ (that is, for $\gamma = 1$) and, as it can be easily verified, σ_0/γ is monotonically increasing with γ . Also:

$$Y^H(Q, 1) = \alpha^{\frac{\alpha}{1-\alpha}} - \frac{\alpha^{\frac{1}{1-\alpha}}}{\gamma} \quad (32)$$

is monotonically increasing with γ . Thus, the LHS is strictly decreasing with γ and LHS = 1 for $\gamma = 1$, LHS $\rightarrow 0$ when $\gamma \rightarrow \hat{\gamma}$. Moreover, the RHS is monotonically increasing with γ , and $0 < \text{RHS} < 1$ when $\gamma = 1$. Thus, there exists a unique $\gamma^* \in (1, \hat{\gamma})$ such that inequality (30) holds if and only if $\gamma \leq \gamma^*$. Clearly, $Y^L(Q, \sigma_0)/Y^H(Q, 1)$ does not depend on Q so that γ^* also cannot depend on Q . It remains to show that no other deviation can be profitable for the politician. Clearly, the politician would not set $\sigma > \sigma_0$ as there would be no electoral gain but only an efficiency loss. Finally, any $\sigma \in (1, \sigma_0)$ is dominated by $\sigma = 1$ as the network would be broken in any case, the probability of re-election would be π and the politician would be better off by minimizing the distortionary costs.

A4. Proof of Proposition 2.

- (i) Consider equation (26). It can be easily verified that $\partial\sigma_0/\partial\lambda > 0$. Then, for any γ , $Y^L(Q, \sigma_0)$ decreases and the LHS of equation (30) shifts upward so that γ^* decreases.
- (ii) If π increases, the RHS of (30) decreases and γ^* decreases.

A5. Proof of the existence of $\hat{\pi}$.

Let $\pi = 1$. Then, the RHS of (23) and (30) are equal. Consider the LHS. We can show that LHS of (30) $<$ LHS of (23). This inequality can be written as:

$$\frac{\left(\frac{\alpha\gamma}{\sigma}\right)^{\frac{\alpha}{1-\alpha}} - \left(\frac{\alpha\gamma}{\sigma}\right)^{\frac{1}{1-\alpha}}}{\alpha^{\frac{\alpha}{1-\alpha}} - \frac{\alpha^{\frac{1}{1-\alpha}}}{\gamma}} < \gamma^{\frac{\alpha}{1-\alpha}} \Leftrightarrow \left(\frac{\alpha}{\sigma}\right)^{\frac{\alpha}{1-\alpha}} - \gamma \left(\frac{\alpha}{\sigma}\right)^{\frac{1}{1-\alpha}} < \alpha^{\frac{\alpha}{1-\alpha}} - \frac{\alpha^{\frac{1}{1-\alpha}}}{\gamma} \quad (33)$$

which holds since $\left(\frac{\alpha}{\sigma}\right)^{\frac{\alpha}{1-\alpha}} - \left(\frac{\alpha}{\sigma}\right)^{\frac{1}{1-\alpha}} < \alpha^{\frac{\alpha}{1-\alpha}} - \alpha^{\frac{1}{1-\alpha}}$. Thus, $\gamma^* < \gamma_1$. Let now $\pi = 0$. Then, from eq. (30) we get $\gamma^* \rightarrow \infty$. By $\frac{\partial \gamma^*}{\partial \pi} < 0$ and continuity, it yields that there exists $\hat{\pi} \in (0, 1)$ such that $\gamma^* = \gamma_1$.

DATA APPENDIX

List of variables

BQ: bureaucratic quality index (0-4 scale).

CORR: control of corruption index (0-6 scale).

EDU: average schooling years in total population.

FERT: log of total fertility rate (births per woman).

GDP: log of gross domestic product per capita (constant 2005 PPP USD).

GOV: government expenditure as share of *GDP*.

GROWTH: average annual growth rate of gross domestic product per capita (constant 2005 PPP USD).

INV: investment as share of *GDP*.

PERS: 1- share of veto players that drop from the government in any given year.

Countries

Our basic sample includes 56 democratic countries for which data are available for *PERS* and *GROWTH* in the 1975-2004 period. Countries are listed below, together with the number of observations available in the 1980-2004 period (in parentheses). Information for *BQ* is available for 51 countries since 1984.

Low red-tape costs countries: Australia (5), Austria (5), Belgium (5), Canada (5), Denmark (5), Finland (5), France (5), Iceland (5), Ireland (5), Japan (4), Netherlands (5), New Zealand (5), Norway (5), South Africa (2), Sweden (5), Switzerland (5), UK (5), USA (5).

High red-tape costs countries: Argentina (3), Bolivia (2), Brazil (3), Chile (2), Colombia (5), Costa Rica (5), Cyprus (2), Ecuador (4), El Salvador (3), Greece (4), Guatemala (2), Honduras (3), India (3), Israel (5), Italy (4), Korea (3), Malaysia (2), Mexico (3), Nicaragua (3), Panama (3), Paraguay (2), Peru (3), Poland (2), Portugal (4), Senegal (2), Spain (4), Sri Lanka (3), Thailand (2), Trinidad and Tobago (2), Turkey (3), Uruguay (3), Venezuela (4).

Remaining countries for which we have no information on BQ in 1984 are: Bahamas (3), Germany (5), Luxembourg (5), Madagascar (2), Malta (5).

Descriptive Statistics

Tables A and B report descriptive statistics and pairwise correlations for the 5-year periods dataset.

Variable	Full Sample			Low Cost Countries			High Cost Countries		
	Obs.	Mean	Std.Dev.	Obs.	Mean	Std.Dev.	Obs.	Mean	Std.Dev.
<i>PERS</i>	187	0.84	0.12	86	0.85	0.12	101	0.83	0.12
<i>GROWTH</i>	187	1.88	2.00	86	1.84	1.45	101	1.91	2.37
<i>GDP</i>	187	9.43	0.87	86	10.10	0.28	101	8.87	0.81
<i>EDU</i>	187	7.54	2.47	86	9.44	1.37	101	5.92	2.01
<i>GOV</i>	185	15.34	8.01	86	11.91	6.10	99	18.32	8.31
<i>INV</i>	187	20.14	6.65	86	23.37	4.49	99	17.34	6.97
<i>FERT</i>	187	0.79	0.38	86	0.58	0.16	101	0.98	0.41
<i>CORR</i>	181	4.61	1.92	83	5.98	1.81	98	3.45	1.05
<i>BQ</i>	187	2.83	1.28	86	3.94	0.16	101	1.89	1.04

Table A: Descriptive statistics

	<i>PERS</i>	<i>GROWTH</i>	<i>GDP</i>	<i>EDU</i>	<i>GOV</i>	<i>INV</i>	<i>FERT</i>	<i>CORR</i>
<i>GROWTH</i>	-0.06	1.00						
<i>GDP</i>	0.10	-0.06	1.00					
<i>EDU</i>	0.20**	0.07	0.80**	1.00				
<i>GOV</i>	-0.20**	-0.11	-0.54**	-0.41**	1.00			
<i>INV</i>	0.04	-0.04	0.69**	0.58**	-0.41**	1.00		
<i>FERT</i>	-0.06	-0.18*	-0.82**	-0.65**	0.52**	-0.64**	1.00	
<i>CORR</i>	-0.01	-0.05	0.51**	0.50**	-0.11	0.37**	-0.43**	1.00
<i>BQ</i>	0.06	0.01	0.73**	0.63**	-0.39**	0.54**	-0.63**	0.59**

Table B. Pairwise correlations; * significant at 5% level; ** significant at 1% level

Estimation results

	(1)	(2)	(3)	(4)	(5)
	LSDV	LSDV	LSDV	LSDV	LSDV
PERS _{t-1}	-0.024*	-0.032**	-0.001	-0.054**	-0.017
	[0.014]	[0.015]	[0.015]	[0.022]	[0.023]
$d^H * \text{PERS}_{t-1}$					-0.026
					[0.030]
Observations	205	187	86	101	187
Countries	56	51	18	33	51
R^2	0.138	0.128	0.363	0.293	0.133
$\widehat{\beta}_1 + \widehat{\beta}_2$					-0.043**
					[0.020]
** p<0.05, * p<0.10. Standard errors in parenthesis					

Table 1. Dependent variable: 5-year average annual growth rate of per capita GDP (constant 2005 PPP USD). Country and time dummies are included.

	(1)	(2)	(3)	(4)	(5)
	LSDV	2SLS	2SLS	2SLS	2SLS
$SPERS_t$	-0.022*	-0.012	-0.015	0.015	-0.002
	[0.013]	[0.057]	[0.050]	[0.038]	[0.052]
$d^H * SPERS_t$	0.016	-0.033	-0.070	-0.062	-0.048
	[0.015]	[0.061]	[0.054]	[0.044]	[0.057]
d^H					
$\widehat{\beta}_1 + \widehat{\beta}_2$	-0.007	-0.044*	-0.055**	-0.047**	-0.050**
	[0.007]	[0.023]	[0.022]	[0.022]	[0.021]
R^2	0.19	0.16	0.16	0.05	0.17
Observations	1069	1069		985	1022
Number of countries	55	55	55	55	55
F		23.52	15.69	7.71	14.26
Sargan test			1.14	1.37	0.48

** p<0.05, * p<0.1. Std. err. in parenthesis.

Table 2. Dependent variable: annual growth rate of per capita GDP (constant 2005 PPP USD). Country and time dummies and country specific time trends are included.

	(1)	(2)	(3)
	2SLS	Arellano Bond GMM (L2)	Arellano Bond GMM (L3)
GDP _{t-1}	0.8239*** [0.0196]	0.8121*** [0.0457]	0.6676*** [0.0294]
SPERS _t	0.0131 [0.0493]	-0.0209 [0.0244]	0.0023 [0.0184]
d ^H *SPERS _t	-0.0604 [0.0493]	-0.0183 [0.0339]	-0.0432* [0.0253]
$\widehat{\beta}_1 + \widehat{\beta}_2$	-0.0473** [0.0217]	-0.0392** [0.0171]	-0.0409*** [0.0119]
R ²	0.96		
Observations	1022	1022	1022
Number of countries	55	55	55
F	33.73		
Sargan test	0.61	0.00	0.00
AR(2) test		0.00	0.00

*** p<0.01, ** p<0.05, * p<0.10. Standard errors in parenthesis

Table 3. Dependent variable: log of per capita GDP (constant 2005 PPP USD). Country and time dummies and country specific time trends are included.

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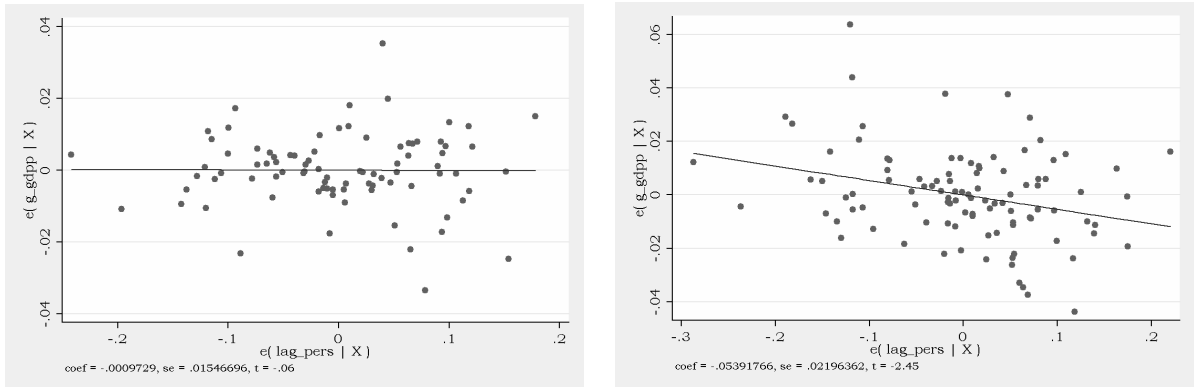


Figure 1. Conditional plots of *PERS* and *GROWTH* for low (panel (a)) and high costs countries (panel (b)).

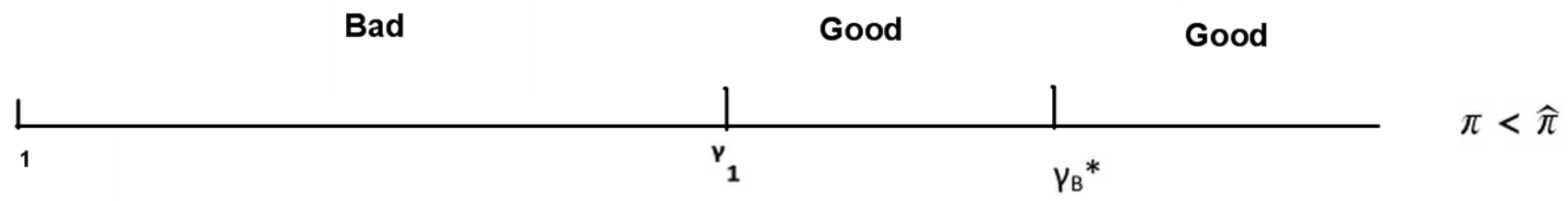


Figure 2

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