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REVOLUTIONS, GROWTH, AND DEMOCRACY

Democratic and undemocratic pathways according to a dynamic political-economic model

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Despite being one of the most widely studied fields within comparative politics, there is yet no consensus in the current literature regarding how economic development and political leadership affect one another. Determining how they interact will reveal important answers in how to improve the lives of many people in terms of both economic prosperity as well as humane living conditions. In recent years, it has become increasingly popular to study these questions with the help of political-economic models trying to ascertain their underlying mechanisms. Yet, most studies looking at the transition to democracy do not take into account that democratizations occur at mostly low levels of development whereas consolidation is common at higher levels of development. By introducing the possibility for citizens to commit to a revolution or coup to the model developed by Seim and Parente in 2013, this thesis is able to incorporate these important empirics to the strand of theory studying the interaction between democracy and economic development. In terms of policy, the results imply that the road to democracy is a difficult one where many synergies have to be created. Nonetheless, they also indicate that there are things which can be done. With the right policies and leadership, economic development can be created and with the right interventions, a society will eventually deem it more profitable to become democratic according to the results of this study.

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1 Introduction

How to consolidate democracy is an ever pressing subject. Not least today in the wake of the Arabic Spring having resulted in one successful democratization in Tunisia but several fallbacks into instabilities and dictatorships (Goldstone 2014, pp. 117-130). Which policies and approaches to promoting democracy will actually work? Finding the mechanisms behind democratization is important in many aspects, not least in regards to human rights and general well-being since, as Przeworksi et al. (2000, pp. 271-272) point out:

> Although democracies are far from perfect, lives under dictatorships are grim and short. Dictatorships are regimes in which political rulers accede to power and maintain themselves in power by force. They use force to prevent people from expressing their opposition and to repress workers.

Economists entered this field of study with much eagerness in the wake of Lipset's (1959) groundbreaking article, showcasing a positive relationship between democracy and economic development. His research is commonly said to have given rise to the biggest subfield within comparative politics (Diamond and Marks, 1992). If his theory that democracy leads to higher growth holds true, the importance of democratization becomes even more acute.

The research following Lipset focused on trying to confirm or reject his hypothesis. Empirical literature from the 60s and onward have hence looked into whether democracy causes growth (Londregan and Poole, 1990; Przeworski and Limongi, 1993; Barro,1996 are some examples), if it rather is growth that causes democracy (Eichengreen and Leblang, 2008; Fidrmuc, 2003; Haan and Sturm, 2003; Milner and Kubota, 2005 naming a few), or if the correlation can be explained by a third factor, such as institutions (Acemoglu and Robinson, 2001, 2006, 2007; Spolaore and Wacziarg, 2009; Chanda and Putternman, 2004). However, this empirical approach is not likely to reach any consensus in the near future as to which factors affect democracy. Furthermore, given the current data availability, it is difficult to closely study the actual mechanisms behind both growth and democratic success.

In the 2000s, researchers began introducing dynamic models into the field and thereby moved away from empirics. The main argument being that such an approach can uncover the driving mechanisms of a transition since the researcher has the possibility to observe how the modelled society reacts to different, well specified, scenarios.

What most of them have in common is that the democratization process takes place after an economy has improved its welfare to a certain extent (Shen, 2007; Paltseva, 2008; Huang, 2012; Seim and Parente, 2013), building on the well-established relationship between economic growth and democracy first observed by Lipset (1959). However, when studying the relationship between the *Polity IV* index, ranking how democratic or autocratic an economy is from the post World War II era and onward, and per capita GDP data, beginning in 1960, it becomes clear that most democratization processes have been taking place in countries with less than 10% of the US per capita GDP. Thus, the empirics describe a situation in stark contrast to the above models.

In their study from 2000, Przeworksi et al. showcase the relationship between GDP and democracy and find positive relationships between growth and the likelihood of a democratization process to last but also a positive relationship between negative growth and the likelihood to revert to an autocratic society. Building on this, Persson and Tabellini (2009) introduce the concept of democratic capital in order to explain why some revolutions lead to long lasting democracies and others fall back into autocracies. Acemoglu and Robinson (2006) on the other hand argue for democracies to depend on historical institutions.

This thesis will use a model-approach to further investigate the relationship between political regimes and growth. By introducing a dynamic model where the economy interacts with policy making, the aim is to investigate the interaction between democratization, including the consolidation of democratic forms of government, and the level of economic development

A possible explanation to the observed relationships between growth and democracy is that the likelihood of revolution is tightly connected to the costs such an act entails. What if people are more willing to revolt when they earn less and experience low growth because the costs of a revolution is relatively lower than the possible gains of succeeding? This would also imply that citizens are less prone to revolt when they experience positive growth and could hence possibly explain why some long lasting autocracies and democracies experience high levels of growth whereas poor economies tend to face periods of consecutive revolutions and, therefore, also political instability oscillating between democracy and autocracy. Therefore, the introduction of revolutions to a dynamic political-economic will be the first approach in order to try to answer the research question at hand.

The rest of the paper is organized as follows: the next section will take a closer look at the current literature within the field. Thereafter the method and model used in this thesis will be presented. The following section will present the results of the model which will give the necessary basis for the discussion held in section five. The thesis will end with conclusions and comments on possible future research.

2 Background Theory

This section will cover the current state of the art. It will begin by looking into the empirical approaches trying to solve the puzzle of how democracy and economic development relate to one another. Thereafter, the modeled-approaches used to solve this puzzle will be introduced. Thirdly, some data analyses will be presented as a compliment to the two above. Lastly, the contribution provided by this paper will be presented.

2.1 Empirics

The empirical studies trying to ascertain how political structures and economic patterns interact have reached no consensus regarding which effects run in which direction.

Examples of articles arguing against democracy's effect on growth are, the often cited, Mulligan, Gil, and Sala-i-Martin (2004) and Barro (1996). The latter uses panel regressions and finds that once controlling for rule of law, free markets, small government consumption and high human capital, all positive effects of democracy on growth disappear. Mulligan, Gil and Sala-i-Martin (2004) instead focus on the potential effect democracy may have on welfare spending. However, they only find one significant difference between economically and demographically similar democracies and non-democracies. Democracies namely have a less redistributive personal income tax in general. Nevertheless, these approaches risk being subject to omitted variables biases and hence their contributions to the field far from conclude the matter.

Other research point to the importance of institutions, commonly championed by Acemoglu and co-authors (Acemoglu and Robinson 2001, 2006, 2007; Acemoglu, Johnson, and Robinson 2008) but also by Spolaore and Wacziarg (2009) and Chanda and Putternman (2004). The two latter underline how important institutions and policy are for an economy's growth, as highlighted by the immense growth in democratic countries during the post-World War period. To support the institution hypothesis, Acemoglu, Johnson, and Robinson (2008) use two approaches, one OLS regression controlling for country

fixed affects as well as an IV approach to deal with possible omitted variable biases. They show that the positive correlation between democracy and growth is considerably weakened when date of independence, early constraints on the executive, and religion are controlled for.

Yet, there are several studies which stand in opposition to this view. Gundlach and Paldam (2008) directly challenge Acemoglu, Johnson, and Robinson (2008) and argue that there is a Type I error in their results. They argue that Acemoglu, Johnson, and Robinson (2008) in their specification only allow for income to affect democracy in specific short-run movements. These movements are naturally very small, and will hence force this income specification to become insignificant. Benhabib et al. (2011) furthermore use an improved dataset and thereby find that country income does explain democracy. The earlier work by Glaeser et al. (2004) also argue against the institutional approach in general with their main remark being that the instrumental variable techniques are flawed. Furthermore, they argue for the importance of human capital, good policies, and improvements in political institutions as viable paths to improve economic development, something which would not change the development path according to the institutions view (Glaeser et al. 2004).

Another important subfield is the one trying to see how political leadership affects growth. Some of the most recent studies are Jones and Olken (2005), Rodrik and Wacziarg (2005), Papaioannou and Siourounis (2008), and Giuliano, Mishra, and Spilimbergo (2013). Jones and Olken (2005), study exogenous transitions in leadership and mean that leaders do matter for growth, especially in autocratic regimes, but less so in democratic settings. The two other argue that democracy per se spurs economic growth. Rodrik and Wazciarg (2005) find that democratization usually follows periods of low growth but that the reverse causation does not hold true. Democratic transitions are rather associated with a decreasing volatility of growth. Hence, the authors promote the view that democracy has a positive impact on economic development. Papaioannou and Siourounis (2008) deem that a permanent democratization is associated with between 0.5 and 1 % increase in annual per capita growth, which could be argued to be even larger considering an initial transition cost of democratization. Lastly, Giuliano, Mishra and Spilimbergo (2013) use a new dataset which they argue gives evidence of a causal relationship between democracy and economic reforms. However, the authors do not allow for different policies to be pursued in a dictatorial setting and thus miss that autocracies have been found to be both the best as well as the worst performers in terms of economic growth (Almeida and Ferreira, 2002).

To conclude, the current empirical literature is inconclusive as to what factor drives the other, or if a third factor drives them both, in the democracy and growth relationship. Hence, up to date, the empirical approach seems to be unable to establish any consensus regarding which policies to promote in order to push global democratization. Furthermore, given the current data availability, it is difficult to closely study the actual mechanisms behind both growth and democratic success. Is it possible that economic theory is able to give more clear cut answers? The next section will look further into this question.

2.2 Theory

The economic literature using modelled societies in an attempt to better understand the transition to democracy, and also why a country remains autocratic, makes assumptions as to which mechanisms are driving change. They thereafter compare their results to the empirics in order to see whether their assumptions can be extrapolated to be the drivers of human behaviors in the real world. A benefit of the model approach is that it facilitates studying whether there are causalities running from both the economy to politics as well as the other way around. This since one has the possibility of introducing several periods of interplay. First, however, some modelled approaches that have been important to the field of research without using this dynamic method will be looked into.

Several studies argue that it is not mainly economic progress which fosters democratization. Persson and Tabellini (2009), Glaeser, Ponzetto, and Shleifer (2007) as well as Acemoglu and Robinson (2006) each represent a different standpoint within the strand of literature assuming that economic progress is not a main driver of democratization.

Persson and Tabellini (2009) introduce the concept of democratic capital, measured by an economy's past experience of democracy and how usual democracy is in its neighborhood. Regime transitions are determined in an equilibrium setting where each individual chooses whether or not to attack autocracy in a period ruled by a dictator, or whether or not to defend democracy in a period characterized by democracy. The decision depends on the society's endowment of democratic capital where higher democratic capital reduces the risk of regime change and hence this stabilizing effect will be positive for growth. It also proposes that different regimes are more efficient depending on the history of the nation. According to the authors, it seems as though democratic capital always reduces the probability of autocracy. Income reduces the probability of autocracy in democracies but does not reduce the risk of autocracy in existing autocracies. The authors propose the possibility of a virtuous cycle where long-time democratic experience favors economic development through physical capital accumulation which makes the democracy more robust, in turn helping spur more democratic capital, and the cycle starts over. This may help explain the pattern seen in the empirics where democracy seems to be a good indicator of economic development, without being the sole determinant.

Through a model setup, Acemoglu and Robinson (2006) describe how the threat of revolution from the working class can force elites to democratize against their will. They investigate several different scenarios and build on their assumption that historical institutions will lead to a certain path dependency. Among other factors, they argue that democratization is more likely to occur in an industrialized society where the elite own physical and human capital as compared to a more agrarian society where the elites own more land (Acemoglu and Robinson, 2006, p. 32). They also argue that revolutions are more likely to occur when inequality is high but that consolidation to democracy is more likely to happen in an equal society. However, although they deem that democratization is more likely in an equal society they also claim that Singapore's success as a dictatorship is due to people not wanting to revolt since there are not enough inequalities (Acemoglu and Robinson, 2006, p.38). Therein, equality is argued to be important for the consolidation of both democracies as well as for dictatorships. However, the main assumption of the book, just as their earlier and later work, is that it is institutions which shape the path to democracy or autocracy and economic development. According to the authors, institutions is not something which can easily be changed, and hence a society relies on a path dependency in both its economic as well as political evolution. Even though the authors briefly touch upon whether economic factors may affect democracy they judge that it is the institutions rather than the level of income that has an effect (Acemoglu and Robinson, 2006, pp. 296-316).

Glaeser, Ponzetto, and Shleifer (2007) try to assess the apparent links between education and democracy which have also been emphasized by Przeworski (2000, p. 101). The authors create a society where education raises the benefits of civic participation, and more so in democratic participation than participation in dictatorship. As education rises, the likelihood of a successful democratic revolution increases, and the success of anti-democratic coups is reduced.

Nonetheless, none of these authors formally reject an interplay between economic development and political transition. Acemoglu and Robinson (2006, pp. 296-316) briefly touch upon economic factors and democracy but judge that:

> Despite the interesting examples of correlations among democratizations, coups, and changes

> in economic institutions that we discuss in this section, this is a primary reason that we have not analyzed them in detail [...]. Once created, institutions, both political and economic have strong tendencies to persist (Acemoglu and Robinson 2006:p. 316).

Hence the question remains: what if there indeed is an interplay between economic development and political transition? As already pointed out, a clear advantage of models is that it is fairly straightforward to construct them to observe causalities running in multiple directions. To my knowledge there are only four articles with political economic models who allow for such a two sided causality; Paltseva (2008), Seim and Parente (2013), Huang (2012) and Shen (2007).

Paltseva (2008) as well as Seim and Parente (2013) have assumed a peaceful transition path driven by economic change. Paltseva (2008) constructs an infinite horizon model to envisage the growth path in autarkies with natural resource endowments. Capital accumulation and growth are to a large extent determined by the autocrats' incentives to cling to power or not. The main result being that there can only be private capital accumulation if the autocrat does not enjoy too high control over the factors of production in the economy (as they do when the economy has a high abundance of natural resources).

Seim and Parente (2013) try to better understand why democracy seems to be a middle ground whereas the best and worst growth rates in the Post World War II period can be attributed to autocracies. Furthermore, they emphasize that no long-lived autocracy is currently rich whereas every long-lived democracy is. In an infinite horizon model, where each agent, divided into peasant and elite citizens, as well as each leader, are assumed to live one period and hence maximize their utility for that one period. Just as Shen (2007), Seim and Parente (2013) recognize that autocrats can be of different types and divide them into *good*, *bad* and *elite*. In this set-up, the authors show that once the elites' returns from investment becomes so large that their land income matters less, they will voluntarily transit to democracy. Hence, Seim and Parente (2013) provide a model for a voluntary transition to democracy. They also show that elite autocrats will create more growth than democracies, since there are administrative losses in a democracy, but that a kleptocrat leader will make growth stagnate as investment becomes unattractive for the agents.

Nevertheless, not every transition to democracy is peaceful, and some scholars have decided to look more thoroughly into what potential mechanisms can be at work when it is revolutions and coup d' états involved in the transition process. Shen (2007) and Huang (2012) both look at the dynamics between economic development and revolutions as drivers for democracy.

Huang (2012) uses an overlapping generations model with fixed population size where co-evolution of political and economic development is driven by shifts of which production factors are favored and political conflicts among those endowed with different factors. The main source of wealth starts of as land, then shifts to physical capital and, lastly, human capital. As the factor owners; landlords, capitalist and workers, respectively gain political power as the shifts occur, the economy moves from monarchy to oligarchy and lastly democracy. The transition path resembles that of many OECD countries and one main point of the article is that political development will only occur when human capital is a main driver of the economy.

Shen (2007) introduces the possibility of different kinds of dictators, one being *good* and therein implementing growth enhancing policies, another one being *bad* and hence a kleptocrat. In an infinite horizon model where growth depends on private investment the author tries to model an autocrat's tradeoff between trying to take as much output in each period as possible, and hence distorting the incentives to invest, or implementing growth enhancing policies and therein being able to collect more tax at a lower tax rate, but also risking being subject to a revolution as the people get more willing to transition to a democracy when they are better off. The author also finds that the higher the returns from private

investment, the autocrat becomes more likely to be a kleptocrat - which is in line with the natural resource argument put forth by both Paltseva (2008) and Huang (2012).

Based on these results, it would seem as economic development and income indeed are in interaction. Nonetheless, these articles have missed some important empirics in the construction of their models. Foremost, all models that allow the economy to interact dynamically with policy decisions (Acemoglu and Robinson, 2006; Persson and Tabellini, 2009; Glaeser, Ponzetto, and Shleifer, 2007 all assume the economy to be static) make the assumption that democratization occurs once the economy has reached a certain level of development, in accordance with Lipset's modernization theory. However, as showed by Przeworski and Limongi (1997) as well as Przeworski et al. (2000), a democratization process can occur at every point of development. The correlation observed and used as an argument for growth fostering democracy seems to be a result of economies consolidating and surviving longer when the economy is stronger (Przeworski and Limongi, 1997).

When looking at data from the *Polity IV* database together with GDP data from the World Bank, Przeworski and Limongi (1997) and Przeworski et al.'s (2000) findings hold true up to date. I constructed a binary measure of democracy or autocracy from the *Policy IV* database ranging from 1946 and onwards. I defined all levels of autocracy ranging from -10 to 0 as autocratic (0), all levels of democracy ranging from > 0 to 10 as democratic (1) and then all changes from autocracy to democracy as a democratization process. Thereafter, the World Bank's *Development Indicators* are able to provide a country's GDP per capita from 1960 and onwards. By taking a country's GDP per capita at the year when the democratization according to the Polity IV index indicates and dividing this by the GDP per capita in the US at the same point of time it is possible to compare the size of the economies across time. This is a method commonly used, among others, by Persson and Tabellini (2009) and Przeworski and Limongi (1997). Figure 1 shows the outcome of this exercise and, as can be seen, most countries experiencing a democratization process have an economy smaller than 10% of the US counterpart.

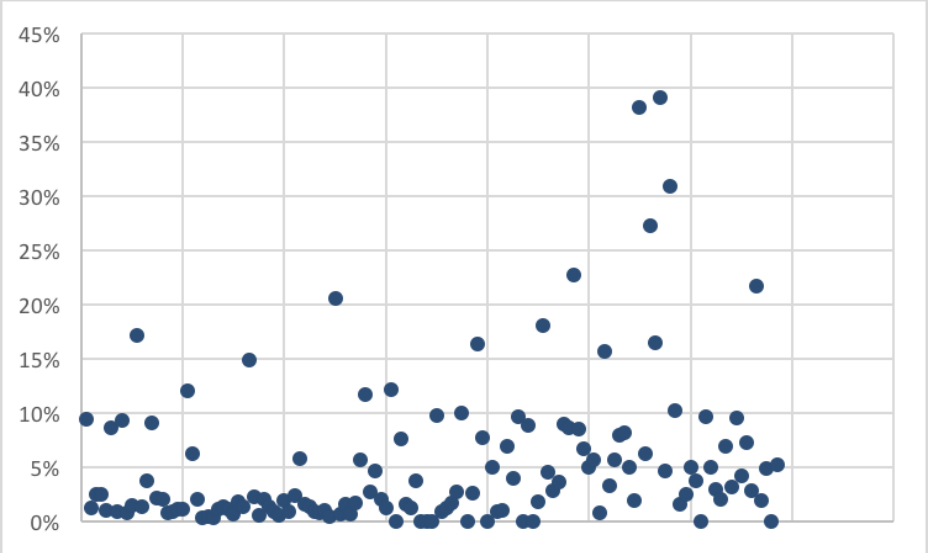


Figure 1 **Size of economy where democratization has taken place since 1960, measured in % of US GDP/capita. Data from the Polity IV database and the World Bank's Development Indicators.**

2.3 Research gap

The literature up to date has, as close as the data permits, investigated the patterns and synergies between economic development and form of state. However, the empirical literature remains inconclusive as to what fosters what or if there is a third factor causing both economic development and democratization simultaneously. As a response, several scholars have developed dynamic models in order to see how the economy and political playing field interact with one another. One key assumption of the existing models is that democratization takes place in a developed economy, and hence they are overlooking empirics showing how democratization occur in mostly poor economies. The models which have accounted for this are all economically static, and are therefore quite unable to observe any potential two-way causalities running between income and politics. It is this gap that this thesis aims to fill. The research question is hence:

> *Is it possible to alter an existing dynamic political-economic model to better match the empirical patterns showing that democratization takes place at low levels of development but consolidation occurs at higher levels of economic development?*

As a first approach to answer the research question, a dynamic economic-political model which allows for revolutions and coups to take place at low levels of development will be constructed. By adding this aspect to the already established models, will they be able to behave in a way that will match the data showing that democratization processes take place at low levels of development but that these economies have a tendency of falling back into autocracy again? Will it also be able to predict democratic consolidation at higher levels of development?

3 Method and model

This section describes which method is used to answer the research question at hand. Thereafter it goes through the dynamic model set-up in detail and ends by showcasing the alternations of the model used in this thesis.

3.1 Model

Since the aim is to model an economy where policy decisions and economic development interact in several periods, it is important to chose one that lets all of these variables interact. Seim and Parente (2013) provides such a workhorse model why theirs have become the foundation of the model used in this thesis. Furthermore, it gives room for different kind of autocrats, which is of interest since it seems to be one crucial factor in driving change. The economic as well as political structure will be examined in turn.

3.1.1 Economic structure

The economic structure of the model is an exact copy of the economic set-up used in Seim and Parente (2013) and nothing will differ from their assumptions in this section. It uses the Hansen and Prescott (2002) development and growth structure which includes the possibility of both a Malthus technology as well as a Solow technology. This naturally provides the basis for a variation between undeveloped economies and more developed economies and models the variation in structure between real world economies quite well. The set-up differs from Hansen and Prescott (2002) in that Seim and Parente (2013) make every agent live during merely one period. Accordingly, the agents are not capable of, and have no interest in, foreseeing the future beyond their lifetime. Nonetheless, they gain utility from leaving capital to the next generation of agents since their utility function is a *warm glow* one. Moreover, there

are two types of agents who differ in their endowments; one peasant class who does not own land, and one elite class, who does. Just as Seim and Parente (2013), my model does not take into account population growth. In the original Hansen and Prescott (2002) paper, population growth was a necessary feature to understand why living standards remained constant up until the mid-1700s to thereafter increase, whereas this aspect is of no interest when modeling how politics and the economy interact.

The elites are endowed with land so as to provide a necessary split between the elites and the peasants (Seim and Parente, 2013, based on Sokoloff and Engermand, 2000). As the economy modernizes, the elites will loose profits from land and, hence, might want to inhibit the evolution of the economy. Furthermore, the peasants will be relatively worse off in an undeveloped autocracy whereas the elites will be less inclined to move towards a democracy when they have to give away a larger share of their endowments. Hence, a divide between the classes is more pronounced and the threat of a revolution becomes more viable (Acemoglu and Robinson, 2006, p. 32).

In every period, the vector $(\tau_k, k_g, Tr_k, \tau_l, Tr_l, \epsilon_s)$ specifies the economic policy of that period. τ_k represents the tax rate on households' capital, k_g denotes the capital tax confiscated by the ruler in each period and Tr_k is the the transfer of capital from the elites to the peasants in each period. The following two elements of the vector describes the land side of the economy: τ_l denotes the land tax imposed on an elite household and Tr_l is the tax transfer of land to peasant household. The last element of the vector, ϵ_s, represents a law that will prohibit Solow technology. Since no active decision of how much administrative cost is associated with capital redistribution is taken, it is not part of the economic policy, even though it plays a role in the model. This cost, $\rho(\tau_k)$ is a share of the tax rate τ_k.

When it comes to the taxation policies, the capital tax is denoted in fraction of capital instead of in capital income since this allows for the transfer to take place in the same period as the tax is paid. Both the tax and the transfer are paid and received at the end of each period, meaning that they grow as much as the capital has during that same period. The administration cost is constructed in the same way, whereas the potential blockage of the Solow technology will occur at the start of the period (Seim and Parente, 2013).

Regarding land taxation, the taxes are instead denoted in terms of income and are also paid at the end of each period. This since a taxation in terms of acres would lead the offspring of peasants to gain income from their new acres in the periods to come and thereby increase the complexity of the model without yielding any analytical benefits. The leader will neither confiscate land. Seim and Parente (2013) argue that they do not allow the leader to confiscate land since they believe that in order for land to bear fruit there is a need for the presence of some sort of land owner and that the administration of the ruler would not be able to handle this. Another way to argue for this feature is that by prohibiting confiscation of land, the landed elite become more pro-dictatorship as they are less opposed to the policies of the leader. This is a viable assumption seeing that concentration of landowners is negatively correlated with democracy (Acemoglu et al., 2006, p. 32).

Business Sector

Moving on to the business sector, it is perfectly competitive and produces a single commodity according to one of two Cobb-Douglas technologies: a Malthus technology or a Solow technology.

Malthus

Land, labor, and capital are used as inputs in the Malthusian sector.

$$Y_{mt} = A_m K_{mt}^{\alpha} H_{mt}^{\phi} L_{mt}^{1-\alpha-\phi}$$

Where Y_{mt} is the output produced in period t, A_m is the total factor productivity (hereafter TFP) in the Malthusian economy, K_{mt}^{α} is the capital, H_{mt}^{ϕ} the labor input and $L_{mt}^{1-\alpha-\phi}$ the land. Worth noting is that in this specification, the Malthusian TFP does not increase across time since this would not lead to a steady state economy in the set-up without population growth (Seim and Parente, 2013).

Solow
Contrary to the Malthusian technology, the Solow technology does not use land as an input in production.

$$Y_{st} = A_{st}K_{st}^{\theta}H_{st}^{1-\theta}$$

Where Y_{st} is the output produced in period t, A_{st} is the TFP in the Solow sector, K_{mt}^{θ} is the capital and H_{mt}^{ϕ} the labor input. The TFP grows at an exogenous rate in all periods, given by:

$$A_{st+1} = (1+\gamma)A_{st}$$

When Solow technology is blocked ($\epsilon_s = 1$), the TFP will decrease and will be represented by:
$A_{st+1} = .95(1+\gamma)A_{st}$ instead.

Solow and Malthus technologies can coincide, so that part of the labor force is working in the Malthusian sector and part of the labor force in the Solow sector. For this to occur, the wage and rents from both sectors have to be equal, or else parts of the labor will move over to one sector or the other until the wages equal one another. This naturally inclines that the Malthusian sector will cease to exist once the Solow wages are pushed above the rate for which the Malthusian technology is profitable.

Household sector
Each agent represents one household living for one period and leaving one offspring behind for the subsequent period. The population is normalized to 1 where a fraction, constant over time, λ, are peasants and a fraction, $1-\lambda$, are elites. In my model $\lambda > 1/2$, a realistic assumption when observing demographics across the world's economies (Seim and Parente, 2013).

Endowments
Both elites and peasants own capital in the economy. Let k_{jt} refer to the capital endowments of each household where $j\epsilon\{e,p\}$ denotes the divide between e, an elite household, and p, a peasant household. The total amount of capital in each period is K_t and hence:

$$K_t = \lambda k_{pt} + (1-\lambda)k_{et}$$

Preferences and utility maximization
Every household $j\epsilon\{e,p\}$ has the same utility function and obtains utility from its own consumption, c_{jt}, as well as the endowments it leaves for its offspring k_{jt+1} (thanks to the warm glow nature of each agent). The utility of each household is given by:

$$U(c_{jt}, k_{jt+1}) = c_{jt}^{\mu_t}k_{jt+1}^{1-\mu_t}$$

Each household will spend fraction μ_t of its income on consumption and invest fraction $1-\mu_t$ in capital for the following generation. This fraction is exogenously given for each period.
Hence:

$$c_{jt} = \mu_t I_{jt}$$

$k_{jt+1} = (1 - \mu_t)I_{jt}$

Where I_{jt} refers to the income of each household $j\epsilon\{e, p\}$, and therefore we can rewrite the utility function as:

$U(c_{jt}, k_{jt+1}) = \mu_t^{\mu t}(1 - \mu_t)^{1-\mu t} I_{jt}$

Elites and peasants will have different incomes since they are endowed with different inputs, but also as a result of different policies. The tax on capital on all households, the tax on land rental on elite households' income, the transfer of capital to peasant households and the transfer of land rents to peasant households are the policies affecting income. As a result, the income of the two household groups can be written as follows:

$I_{et} = w_t + (1 - \tau_{kt})r_{kt}k_{et} + (1 - \tau_{lt})r_{lt}\frac{1}{1-\lambda}$

$I_{pt} = w_t + r_{kt}[(1 - \tau_{kt})k_{pt} + Tr_{kt}] + Tr_{lt}$

Where w_t is the wage earned by each household in period t and r_{kt} as well as r_{lt} are the rents earned from capital and land respectively.

Profit maximization
Profits earned by a Mathusian firm is:

$\pi_m = A_m K_{mt}^{\alpha} H_{mt}^{\phi} L^{1-\alpha-\phi} - w_t H_{mt} - r_{kt} K_{mt} - r_{lt} L_{mt}$

Furthermore, each firm using the Malthusian technology will be maximizing profits by following the conditions:

$r_{kt} = \alpha A_m K_{mt}^{\alpha-1} H_{mt}^{\phi} L_{mt}^{1-\alpha-\phi}$

$w_t = \phi A_m K_{mt}^{\alpha} H_{mt}^{\phi-1} L_{mt}^{1-\alpha-\phi}$

$r_{lt} = (1 - \alpha - \phi) A_m K_{mt}^{\alpha} H_{mt}^{\phi} L_{mt}^{-\alpha-\phi}$

The profits for the Solow firm will instead be:

$\pi_s = A_{st} K_{st}^{\theta} H_{st}^{(1-\theta)} - [w_t H_{st} + r_{kt} K_{st}]$

However, the Solow technology will only be used when it is profitable to do so which is illustrated in the profit maximizing conditions below:

$r_{kt} \geq \theta A_{st} K_{st}^{\theta-1} H_{st}^{1-\theta}$

$w_{st} \geq (1 - \theta) A_{st} K_{st}^{\theta} H^{-\theta}$

Put differently, the Solow technology is not profitable when

$A_{st} \leq [\frac{w_t}{1-\theta}]^{(1-\theta)} [\frac{r_{kt}}{\theta}]^{\theta}$

Equilibrium prices and quantities
The equilibrium economy will be comprised by the firms' allocations $\{Y_{mt}, K_{mt}, H_{mt}, Y_{st}, K_{st}, H_{st}\}_{t=1}^{\infty}$, the households' decisions $\{I_{et}, I_{pt}, k_{et+1}, k_{pt+1}, c_{et}, c_{pt}\}_{t=1}^{\infty}$, as well as the prices $\{w_t, r_{kt}, r_{lt}\}_{t=1}^{\infty}$. The Solow TFP, $\{A_{st}\}_{t=1}^{\infty}$ must also evolve according to the pre-specified path. This leads up to the following optimization equations that need to be satisfied:

a) Household utility maximization.
In period t, (c_{jt}, k_{jt+1}) maximizes the utility of household $j\epsilon\{e, p\}$ in period t given the budget constraint and the household's income I_{jt}.

b) Malthusian firms profit maximize.
Given r_{mlt}, r_{mkt}, w_{mt}, Y_{mt}, K_{mt} and H_{mt}, the Malthusian firm will maximize its profits in each period t.

c) Solow firms profit maximize.
Given r_{skt}, w_{st}, Y_{st}, K_{st} and H_{st}, the Malthusian firm will maximize its profits in each period t.

d) There is Market clearing in the four markets.
The goods market $(\lambda(c_{pt} + k_{pt+1}) + (1-\lambda)(c_{et} + k_{et+1}) = Y_{st} + Y_{mt})$, the land rental market $(L_t = 1)$, the capital rental market $(K_{mt} + K_{st} + k_{gt} = (1 - \rho(\tau_{kt}))K_t)$, and the labor markets $(H_{mt} + H_{st} = 1)$.

e) Policy restrictions hold.
Land reform $(\tau_{lt} r_{lt} L = \lambda T r_{lt})$ and capital taxation and redistribution $(k_{gt} + \lambda T r_{kt} = (\tau_{kt} - \rho_{\tau_k})K_t)$.

f) The Solow technology evolves according to the pre-specified pattern,$A_{st+1} = (1+\gamma)A_{st}$, if Solow production is not blocked, and $A_{st+1} = .95(1+\gamma)A_{st}$, if Solow production is blocked.

3.1.2 Political structure

The other layer of the model constitutes the political decisions of the citizens and it is here the differences between my model and that of Seim and Parente (2013) appear. The possibility to revolt is introduced together with a reduction of the types of dictators from three to two, an *elite* dictator and a *bad* dictator. The elite dictator choses the policy space most profitable for the elite households and the bad autocrat maximizes its own profits. Whenever there is a dictator ruling, the peasant households have the choice to commit to a revolution which, if successful, will lead to democracy. If unsuccessful, the dictator will continue ruling, but with a TFP loss caused by the fighting as in Huang (2012). Whenever there is democracy, the elites can commit to a coup and try to turn the society back into an autocracy but, as in the case of the peasants' revolutions, these are not certain to be successful. The first period in each modelled society will always start out as an autocracy since it is the transition to democracy that is of interest.

Elite autocracy
As in Seim and Parente (2013), the elite autocrat will maximize the income of the elite households and hence will chose neither to impose taxes nor redistribute to the peasants. Nonetheless, in order to let the elites maintain the profits from land, the elite dictator may decide to impose a restriction on the Solow technology if the land rents are higher than the wage gain from capital when transferring to the Solow technology.

Bad autocracy
The bad autocrat will maximize its own wealth. He or she will hence tax capital holdings at the maximum rate and therein personally gaining $k_{gt} = (\tau_k - \rho)K_t$. Therefore, k_{gt} as well as the administrative cost of

ρK_t will both be inaccessible to the productive firms (Seim and Parente, 2013).

Democracy
The democratic situation is also modelled in accordance with Seim and Parente (2013) where the median voter's (the peasants') utility will be maximized. The optimal policy space will depend on the characteristics of the economy. The Solow technology might be blocked if the median voter will gain more from land transfers than wages in the Solow technology. It is clear that the ruler will tax land with the maximum rate. Albeit, taxation is subject to a deadweight loss caused by the administrative cost (ρK_t), why the median voter might prefer not being subjected to a capital tax.

Revolution
Allowing for the violent path of transition is a stark contrast to Seim and Parente (2013). At the start of each period ruled by a dictator, the peasants assess whether they will gain on committing to a revolution against the regime or not. If the revolution is successful, the economy will become democratic at the start of the period. The revolution will, successful or not, be associated with a fighting cost for the peasants representing the loss of income while taking part in the revolution. If the revolution is unsuccessful, the country's TFP will be affected negatively as a representation of the political chaos usually associated with such an event (Przeworski et al., 2000, p. 211). Hence, the peasants will choose to revolt if:

$$I_{dpt} * P_{success} + I_{apt} * (1 - P_{success}) - c_{rev} > I_{apt}$$

Where I_{dpt} denotes peasant income in democracy, I_{apt} denotes peasant income in autocracy after a revolutionary attempt, $P_{success}$ and $(1 - P_{success})$ the probabilities of success or failure, and c_{rev} is the cost of revolution.

Coup
If the period starts off as a democracy, the elites might choose to commit to a coup and try to revert the society back into autocracy. If they commit to a coup, they will lose income during the period of the coup. However, the democracy will not be subject to any TFP shock, based on empirics showing that economic activity in democracies is less affected by political instability (Przeworski et al. 2000, p. 211). The elites will commit to a coup if:

$$I_{aet} * P_{success} + I_{det} * (1 - P_{success}) - c_{rev} > I_{det}.$$

Where I_{aet} denotes elite income in autocracy, I_{det} denotes elite income in democracy, $P_{success}$ and $(1 - P_{success})$ the probabilities of success or failure, and c_{rev} the cost of the coup.

Equilibrium
In order for the model to find an equilibrium path, the following conditions need to be added to the economic equilibrium conditions stated above:

g) The policy $\tau_{kt}(v), k_{gt}(v), Tr(v), \tau_{lt}(v), \pi_{st}(v)$ maximizes the utility of the ruler $v \epsilon \{b, e, d\}$ where b represents a bad autocrat, e an elite autocrat and d a democratic regime.

h) If $v_{t-1} \epsilon \{e, b\}$,the peasants will choose a revolutionary path if $I_{dpt} * P_{success} + I_{apt} * (1 - P_{success}) - c_{rev} > I_{apt}$.

i) If $v_{t-1} \epsilon \{d\}$, the elites will commit to a coup if $I_{aet} * P_{success} + I_{det} * (1 - P_{success}) - c_{rev} > I_{det}$.

3.2 Scenarios

There are three main scenarios which will be analyzed with the help of the model. The first scenario is an economy where the citizens are ruled by either an elite dictator or democracy. Therein, both the elites and the peasants know how the autocrat will behave when they make the decision to stay or try to go back to the other political state. The only difference between the second scenario and the first is that the modelled society is subject to a bad dictator. Distinguishing between the two settings is important since it enables closer analyses of the interaction between specific policies and the economy. Thirdly, probabilities of the different dictatorships will be introduced. Consequently, the citizens will not know if the period will be ruled by a bad or an elite autocrat other than in what probability the different kinds occur. The main point of this exercise is to make the model a bit more realistic.

Furthermore, the modelled society will be subject to a TFP shock. Empirically, this should hinder a consolidation of democracy (Przeworski and Limongi, 1997; Przeworski et al. 2000, pp. 109-112) and is accordingly a good way to test whether the mechanisms of the model hold up to the empirical evidence or not.

3.3 Parametrization

Parametrization is a tricky process since it entails moving a model closer to empirical observations and, thus, it's reliability will depend on the quality of the selected data. As mentioned earlier, democratization is a widely studied field and there is an easy access to high standard databases. However, the observations span over time and countries exhibiting different levels of reliability in data collection methods and also cover parameters which are extremely difficult to ascertain; such as the success rates of coups. It is important to bear this in mind when interpreting the results. All selected data in my thesis have been used in several other studies and come from well reputed sources. In no way does doing so make the initial data concerns less valid, but it is a way to cover one's back as well as the armor permits.

Most of the parameters in this thesis are taken directly from Seim and Parente (2013) and are presented in Table 1. Each agent lives for only one period where every period corresponds to 30 years, abstracting from childhood, education and retirement. Most of the parameters in Seim and Parente (2013) are matched to the British case. The savings rate is, as an example, set to the British average investment rate between 1700-1860 of 7% as calculated by Crafts (1985). These parameters will be left calibrated to the British case since this thesis does not aim to target any specific economy, but rather the tendencies on a larger scale. As a result, I deem it better to keep the parameters already in place to make sure that the results of the model is caused by the possibility of a revolution and it's implications rather than tweaks in calibration.

Table 1 **Parameters**

Parameter	Value	Description
μ	0.91	Crafts (1985) average British investment to output ratio 1700-1860
ϕ	0.67	Historical estimates of labor's share as used in Hansen and Prescott (2002)
α	0.08	Historical estimate of capital's share of income as used in Hansen and Prescott (2002)
A_m	1	To facilitate comparison, normalization
θ	0.33	Capital share of income according to the Solow technology, Hansen and Prescott (2002)
γ_s	0.518	Seim and Parente (2013), gives annual real per capita GDP growth of 2% per year
A_{s0}	5.98	Seim and Parente (2013) making the starting date of industrialization occur in 1770
N	1	To facilitate, normalization
λ	0.95	.05 ratio of elite to commoners for medieval England based on Turchin and Nefedov (2009)
η	0.691	Value for λ
ρ	0.004	Tax administration to tax collection ratio of 1% for Britain as reported in Organization for Economic Cooperation and Development (2004)
τ_k^a	0.90	2007 STAR Initiative estimates of stolen assets in kleptocracies
τ_k^d	0.40	Tax rate on dividends and capital gains of 40% Table II.4, column 10,OECD Tax Database 2012
τ_l	1.0	Complete land reform
c_{rev}	1/30	One year of lost income.
$P_{success}$	0.496	Dataset assessing the success and failures of coups, Powell and Thyne (2011)
P_{bad}	0.29	Probability of drawing a bad autocrat based on Penn World Tables 7.0 and the Polity IV Project
P_{elite}	0.71	Probability of drawing an elite autocrat based on Penn World Tables 7.0 and the Polity IV Project

The newly introduced parameters $P_{success}$ and c_{rev} are, of course, worth giving special attention.

To my knowledge, there are no models incorporating the different likelihoods of a failed or successful revolution or coup. All of the models with a revolutionary approach use methods which show algebraic breaking points of when an economy will shift. Thereby they will not be able to help out in the parameterization process. Hence, I have constructed a measure of the rate of success of a revolution based on Powell and Thyne's (2011) new dataset assessing the success and failures of coups, where coups are defined as:

> Overt attempts by the military or other elites within the state apparatus to unseat the sitting head of state using unconstitutional means[...]there is no minimal death threshold for defining a coup. A coup attempt is defined as successful if the coup perpetrators seize and hold power for at least seven days (Powell and Thyne 2011, p. 252).

With the help of this dataset and calibrating the rate of successful coups divided by the total number of coups the success rate is found to be 0.496. It could be argued that the number of coups will be underreported since a coup attempt might be hidden by a political leader trying to showcase stability. As a result, I have run several versions of successful coups rates which can be seen in the Appendix A.2. For simplicity, the success rate of a revolution in the general set-up is assumed to be the same as the success rate of a coup.

The cost of revolution or coup is calibrated under the assumption that it will take one year to be part of the revolutionary cause and hence give rise to a loss of one year of income. This is and arbitrary

assumption, but changing this cost renders no important differences in the results. Lower costs will make the revolutions and coups continue during more periods, while higher costs will make them stop at an earlier point in time.

The GDP loss when not committing to a successful revolution is the same as when the TFP is reduced by the leader in an attempt to block Solow, corresponding to 5% of total TFP. Versions of this TFP shock will be displayed in the Appendix A.1. However, this loss is only present in the case when there is an unsuccessful revolution against a dictator, but not against a democracy. The logic lies in the empirics, as shown by Przeworski (2000, p. 211), where democracies' growth is not negatively affected by political instability to the same extent as dictatorships are.

Turning to the taxation policies, there is always a binary choice between zero tax and a pre-specified tax for the policymaker, also calibrated in accordance with Seim and Parente (2013). The democratic tax rates τ_{dk} is calibrated according to the personal income tax rate dividends in Britain in 2012 according to the OECD Tax Database. The administration cost, ρ, matches the fraction of tax administration costs to tax collection in 2000's Britain as noted by the OECD Tax Administration Comparative Information Series (2004). Choosing such a recent tax rate may be considered curious, but I will keep it in place seeing my wish to follow the parameterization of Seim and Parente (2013). The taxation of land represents a complete land-reform where all land is given to the peasants and hence τ_l is set to 1.

The tax-rate on capital under autocracy is set as a middle ground between several studies on stolen assets in kleptocracy. The calibrated tax rates corresponds to the capital gains of the kleptocrat (recall that the capital gains are $k_{gt} = (\tau_k - \rho)K_t$) being 8% of the output in the Malthusian steady state (Seim and Parente, 2013).

In order to determine different probabilities of bad or elite autocrats, Seim and Parente (2013) will once again serve as the point of departure. They use annual growth rates from the Penn World Tables 7.0 and polity data from the Polity IV Project from 1960-1996. They classify a dictatorship as a country having been autocratic at least one of the 36 years covered by the data. Thereafter, they calculate the number of autocracies experiencing an average growth rate of less than 0%, a growth rate between $0-2\%$ and a growth rate above 2% (Seim and Parente, 2013). Since my model only has two types of dictators, I will change these numbers to the number of autocracies with less than 0% growth, and above 0%. The fraction of dictators experiencing a growth rate below 0% represents the probability of drawing a bad autocrat and the fraction with a growth rate above 0% will represent the possibility of drawing an elite autocrat. It is clear that this classification is fairly arbitrary, why I will conduct robustness checks to see when the probabilities will change given different results.

4 Results

This section goes through the results generated by the model. All scenarios have been run 10 times and the main findings remain the same in all of the iterations. It would have been possible to run more finely calibrated statistical tests, but seeing that the main pathways are always the same for a specific scenario and since exact timing of consolidations are outside the scope of this thesis, I deem this unnecessary.

In short, the results show that under an elite dictator, the peasants will revolt and the elites will commit to coups until there is a Solow technology put in place. This will occur when the cost of a revolution becomes too high for the peasants as compared to the wage in an elite dictatorship. When there is a bad dictator, the peasants will revolt and the elites will commit to coups until the economy shifts to a Solow production path. This will lead to the elites no longer being interested in committing to coups and the

economy hence consolidates as a democracy. When exposed to a negative TFP shock, the revolutions and coups will carry on for as long as the shock prevails, and thereafter they will follow the same pathway as the ones above. In the scenario where there is uncertainty of what sort of dictator will rule, the outcome depends on the probabilities of being subject to a bad or an elite autocrat. When the probability of being subject to a bad dictator is low enough, the economy will eventually consolidate as a dictatorship. On the other hand, if the probability is high enough, the society will stabilize as a democracy. If the probabilities lie between the two thresholds, the coups and revolutions will continue for the entire timespan.

As the original model in Seim and Parente (2013) starts off in the 1650s, this model will do the same. This aspect allows for analysis regarding the viability of the model. It is now time to go through the results in more detail.

4.1 Elite autocracy

Running the model in a setting where the citizens can be subject to a democracy or an elite autocrat yields interesting results. Until the early 1900s, both the peasants as well as the elites choose to revolt when they have the possibility to do so. By observing Figures 2 and 3 we can see that this behavior continues as long as the Mathusian technology is the dominant factor in the economy. As can be seen from Figure 4, the unsuccessful revolution in period 7 (1830-1860) entails a cost which forces the economy back into a state of Malthusian technology. However, the Solow technology is taken back into use in the consecutive periods. Following the transition to Solow technology, it seems as though a revolution becomes too costly for the peasants who settle into an elite autocracy as the growth continues on the predetermined path. Hence, when their income becomes sufficiently large, the potential costs of a revolution outweigh the potential gains.

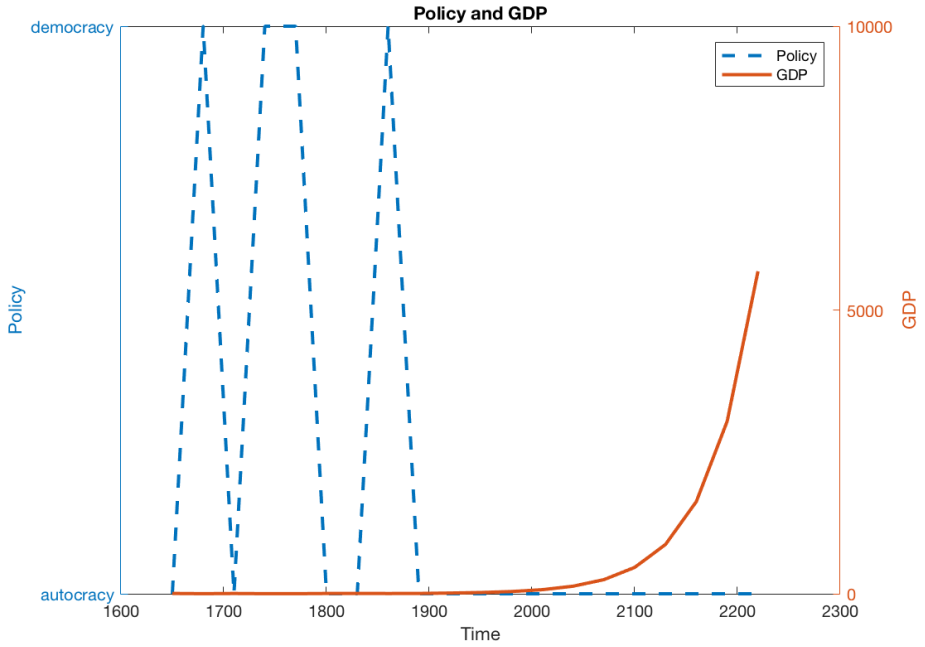


Figure 2 **Policy and GDP in the elite-democratic economy**

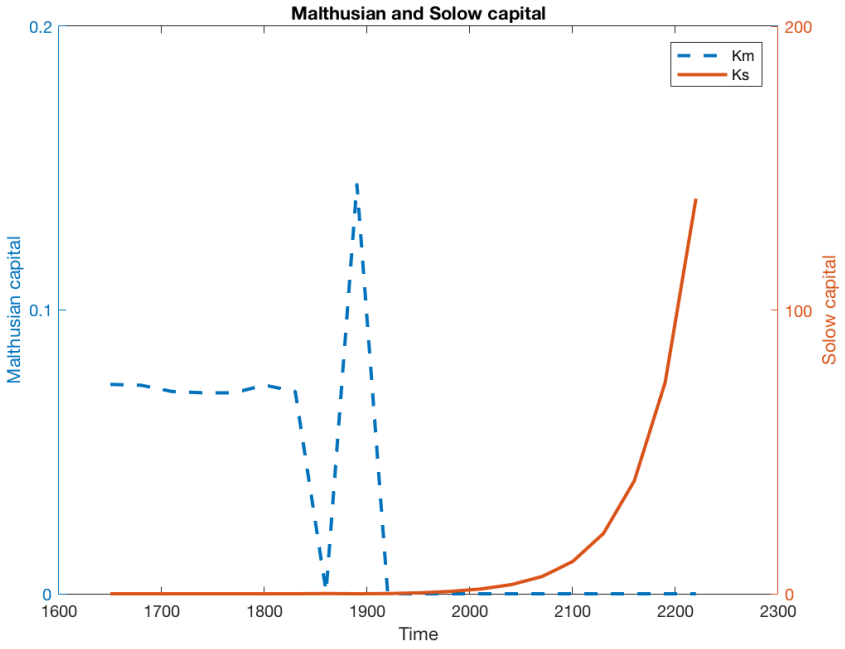


Figure 3 **Malthusian and Solow capital in the elite-democratic economy**

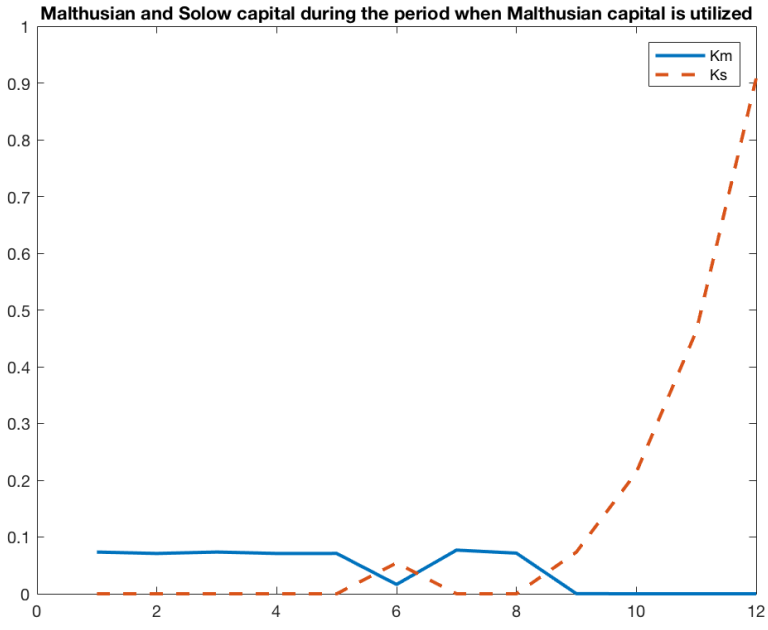


Figure 4 **Malthusian and Solow capital in the elite-democratic economy during the periods that Malthusian capital is being used.**

4.2 Elite autocracy subject to productivity shock

As has been seen by the empirics, negative growth is correlated with a prolonged period of political instability. In order to see if the model can predict this behavior, I have created an alternative growth path, where the economy experiences a negative growth shock that corresponds to 95% of the growth that would have been observed otherwise in the periods that saw a transition in the above model. When imposing this technology shock between 1860-1980, the period of political instability is substantially prolonged until the beginning of the 2000s. As shown in Figures 6 and 7, in period 6 (1800-1830), the economy experiences a technology shift from the Malthusian technology to the Solow technology, but reverts once again to the Malthusian technology when the negative growth shock hits. Once the shift back to Solow technology occurs, the peasants stop committing to revolutions and political stability is gained in an elite autocracy until the last period as shown in Figure 5. Hence, it would seem as though economic activity is closely related to political stability. In this case, the policy always stabilizes to an autocratic leader governing the country. When trying different levels of TFP shocks, the results do not differ in any substantial way as can be seen in the Appendix A.1. However, would it be different if the autocrat behaved differently? Next, a scenario where the autocratic leader is a *bad* one will be examined.

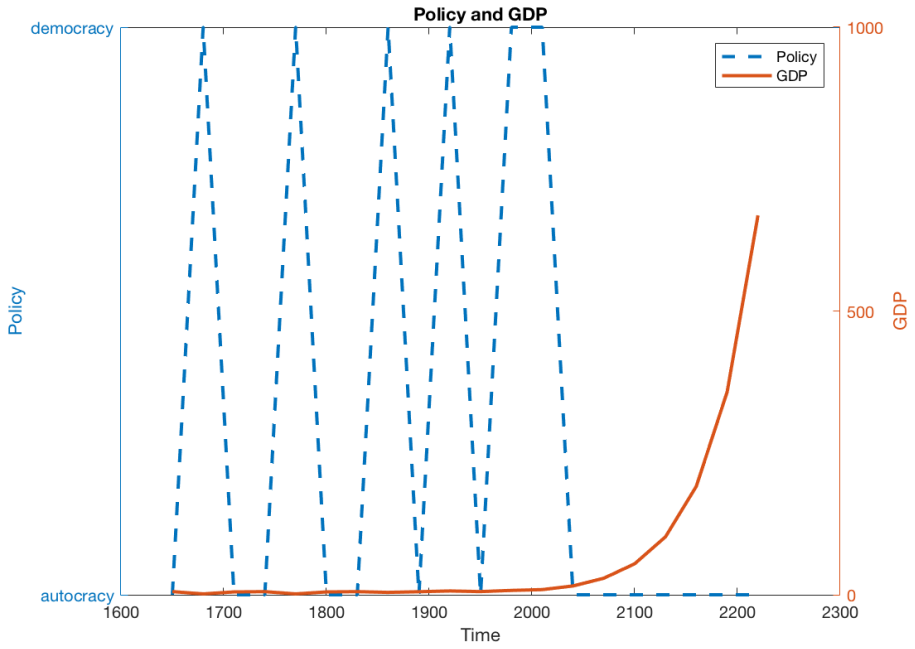


Figure 5 **Policy and GDP in the elite-democratic economy subject to a TFP shock in periods 9-11.**

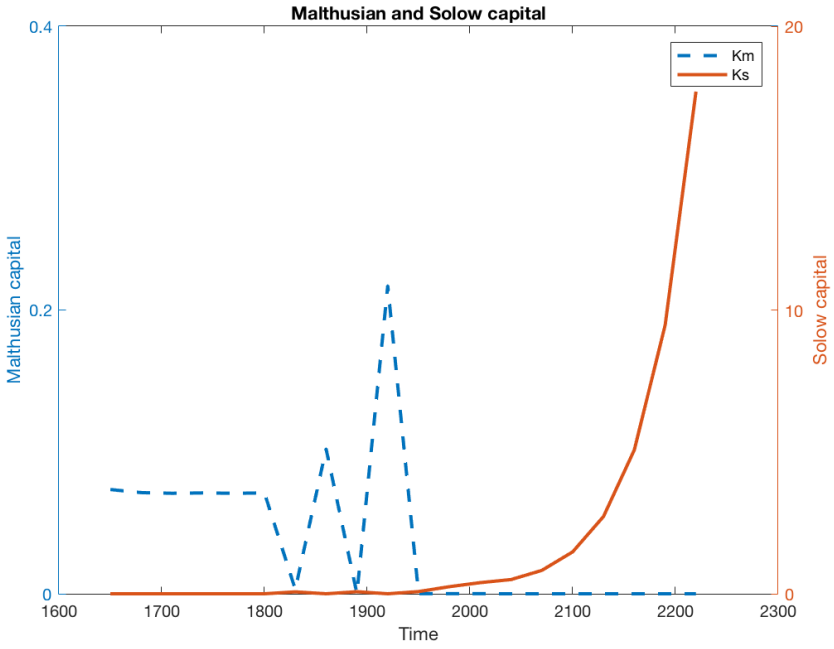


Figure 6 **Malthusian and Solow capital in the elite-democratic economy subject to a TFP shock in periods 9-11**

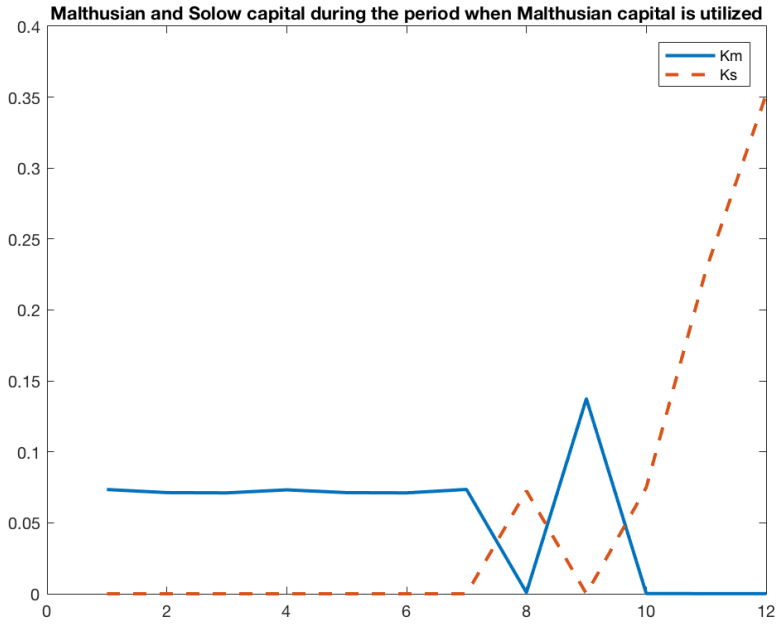


Figure 7 **Periods 1-12, Malthusian and Solow capital in the elite-democratic economy subject to a TFP shock in periods 9-11**

4.3 Bad autocracy

When the peasant and elite classes can live in either a bad autocracy or a democracy, the pattern is fairly similar to what has been described above with one marked difference, political stability is obtained through democracy. Until the late 1800s, the elites will always prefer being autocratic in order to enjoy large returns from their land holdings without being taxed from them, while the peasants will always prefer living in a democratic state where they experience tax transfers from both land and capital. However, since the kleptocrat seizes most of the capital holdings, illustrated in periods 1-7 (1650-1860) in Figure 10, it becomes an unattractive economy even for the elites as the technology shifts more towards capital income with the Solow production function. Hence, it becomes preferable for the elites to transit back to autocracy after the production technology has shifted away from the Mathus economy. This implies, yet again, that political stability and economic activity according to the model are deeply entwined. It would be interesting to see how this type of economy reacts to a negative TFP shock as the one above, why this scenario will be examined next.

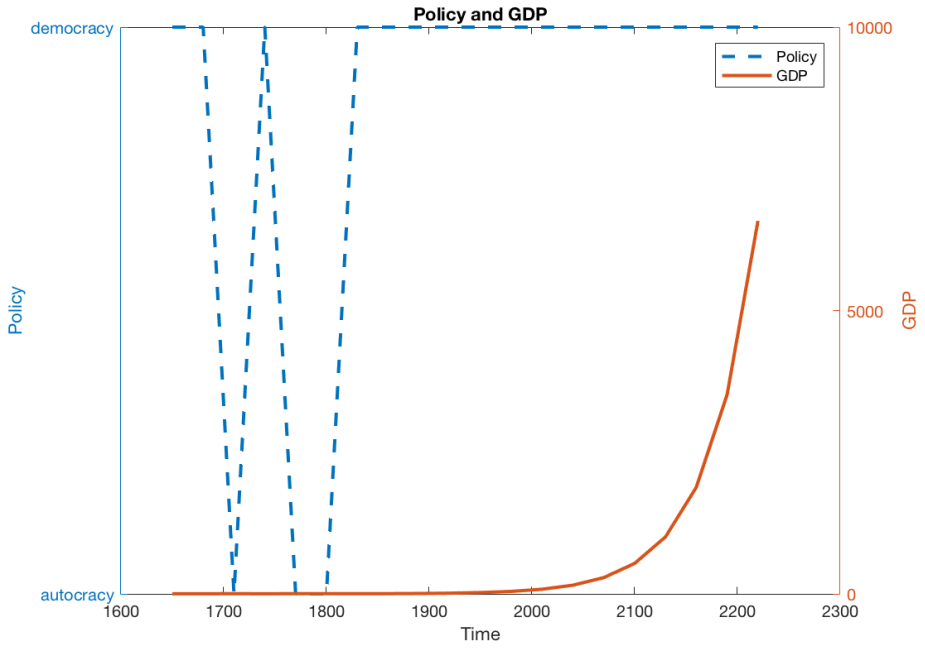


Figure 8 **Policy and GDP in the bad-democratic economy.**

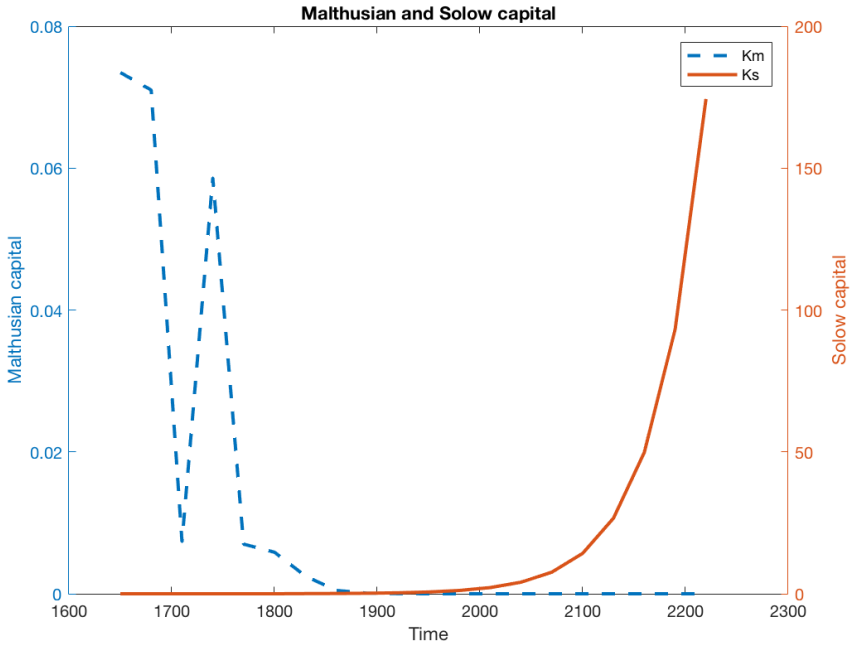


Figure 9 **Malthusian and Solow capital in the bad-democratic economy.**

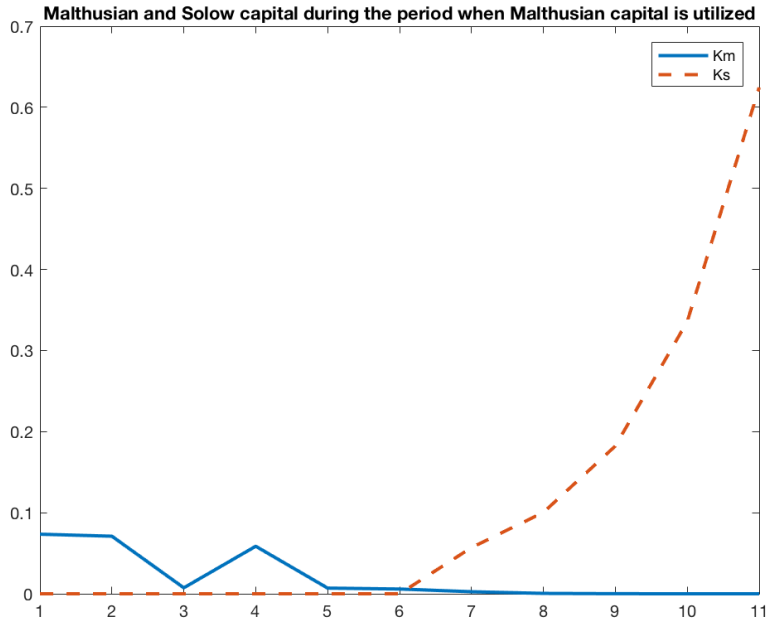


Figure 10 **Periods 1-12, Malthusian and Solow capital in the bad-democratic economy.**

4.4 Bad autocracy subject to productivity shock

The bad autocrat economy experiences the same transition path as the elite autocrat economy when exposed to a TFP shock, with the distinct difference that the policy stabilizes at democracy. The political revolts continue another 3-4 periods when the TFP experiences a negative shock of 5%. Interesting in this case is that the elites will choose to revolt even though the technology is Solow production as long as the level of capital is low enough, as can be seen by comparing Figures 11 and 13. Once again, the level of the TFP shock implies no structural change in results as shown in the Appendix A.1.

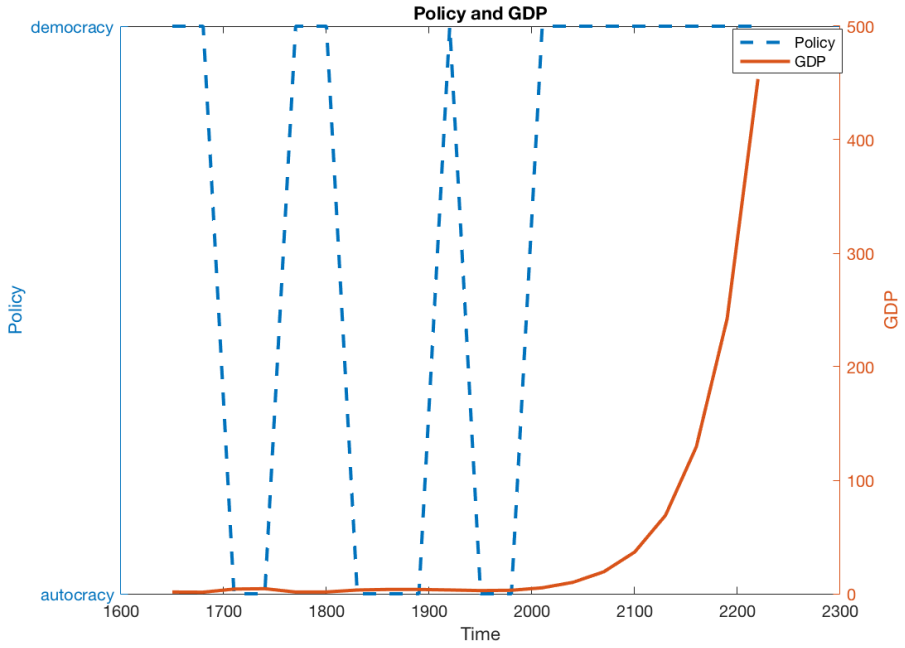


Figure 11 **Policy and GDP in the bad-democratic economy subject to a TFP shock in periods 7-11.**

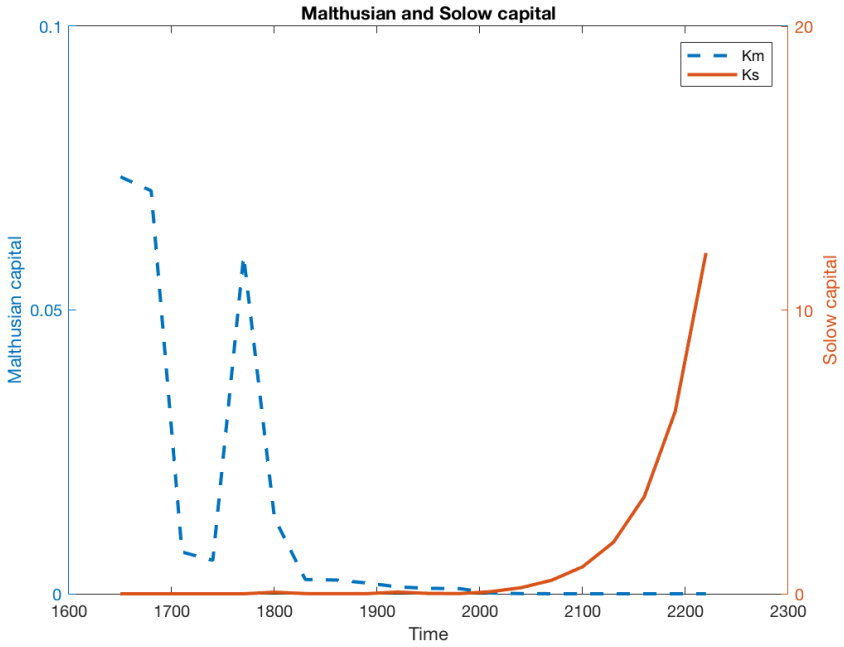


Figure 12 **Malthusian and Solow capital in the bad-democratic economy subject to a TFP shock in periods 7-11.**

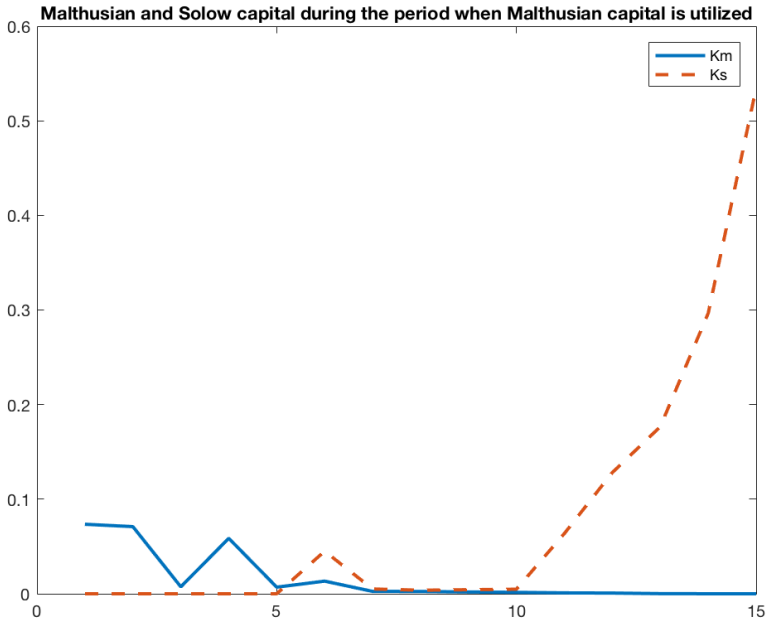


Figure 13 **Periods 1-12, Malthusian and Solow capital in the bad-democratic economy subject to a TFP shock in periods 7-11.**

4.5 Two kinds of dictators

In the combined economy, the starting point is the scenario discussed in the parameterization section. In accordance with Seim and Parente (2013), there is a 21 % likelihood of being subject to a bad dictator and a 71% chance of getting an elite dictator if the citizens find themselves in a dictatorial period. As can be seen from Figure 14, the scenario is much less straightforward as compared to the previous settings. It seems as though the peasants will never want to be subject to a dictator if the risk of finding themselves under the rule of a bad autocrat is high enough, whereas the elites will always want to be in a dictatorship since the gains from the elite dictator is preferable enough for them.

If the probabilities of being subject to a bad or an elite dictator are tweaked, the outcomes will change in quite predictable ways with three possible outcomes. By lowering the probability of being subject to a bad dictator by 1 percentage point at a time, a shift will eventually occur and the society will reach a stable political equilibrium in dictatorship. This can be explained by the elites wanting to have a dictator more than the peasants fear a rule under a bad autocrat. The threshold values are 22% likelihood of being subject to a bad autocrat and a 78% likelihood of being ruled by an elite dictator and this scenario is described in Figure 15 below. Conducting a similar exercise but in the other direction, that is increase the probability of being subject to a bad dictator by 1 percentage point at a time, a stable political equilibrium of democracy will be reached at 34% risk of falling prey to a bad autocrat and 66% likelihood of being ruled by an elite autocrat. See Figure 16 for a more detailed account of the evolution of the economy in this scenario. The logical reasoning behind this result is that, eventually, the elites' benefits from a democracy are larger than their benefits from dictatorship. Hence, when the likelihood of being subject to a bad dictator is low enough the economy will eventually end up in a dictatorship and if the likelihood of being subject to a bad autocrat is high enough the economy will transfer to a democracy. In between these thresholds, the economy will find itself in a constant battle between the peasants' urge to transfer to democracy and the elites' want to revert the economy into an autocracy, as symbolized in Figure 14.

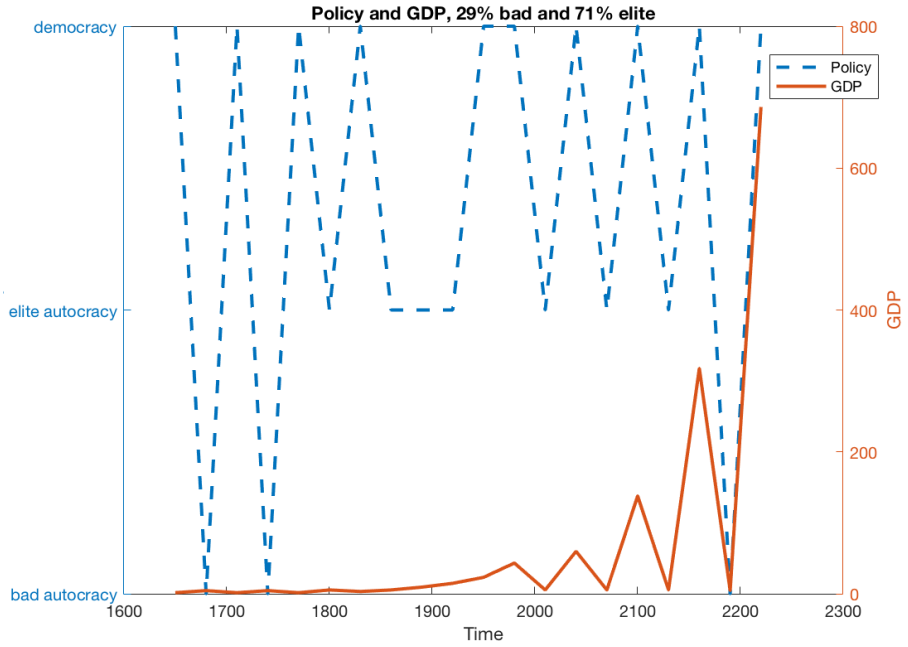


Figure 14 **Policy and GDP in the autocratic-democratic economy with a 29 % risk of getting a bad dictator and 71% chance of getting an elite dictator if the citizens choose to be ruled by an autocrat.**

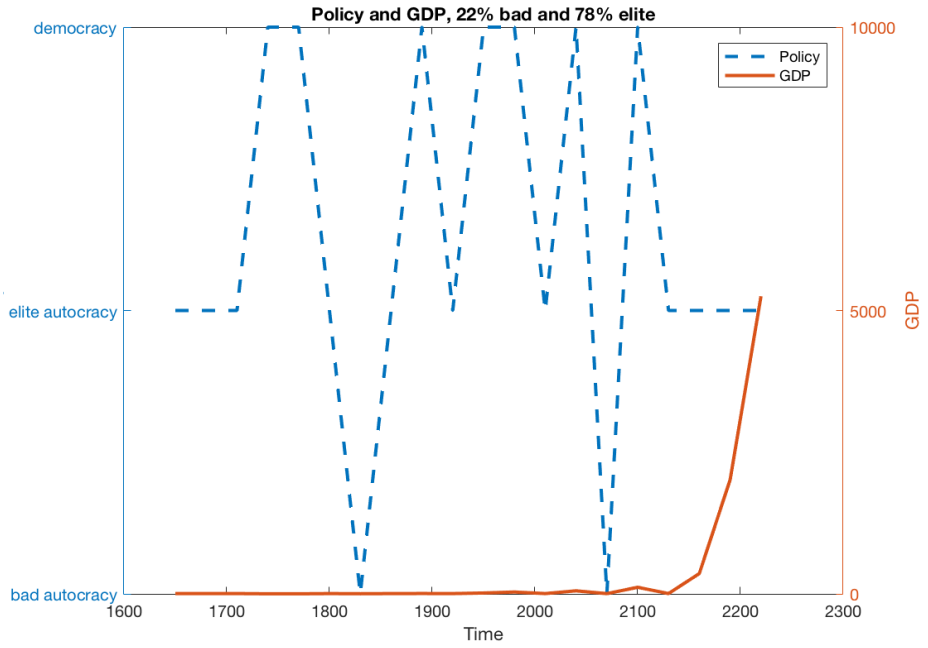


Figure 15 **Malthusian and Solow capital in the autocratic-democratic economy with a 22 % risk of getting a bad dictator and 78% chance of getting an elite dictator if the citizens choose to be ruled by an autocrat.**

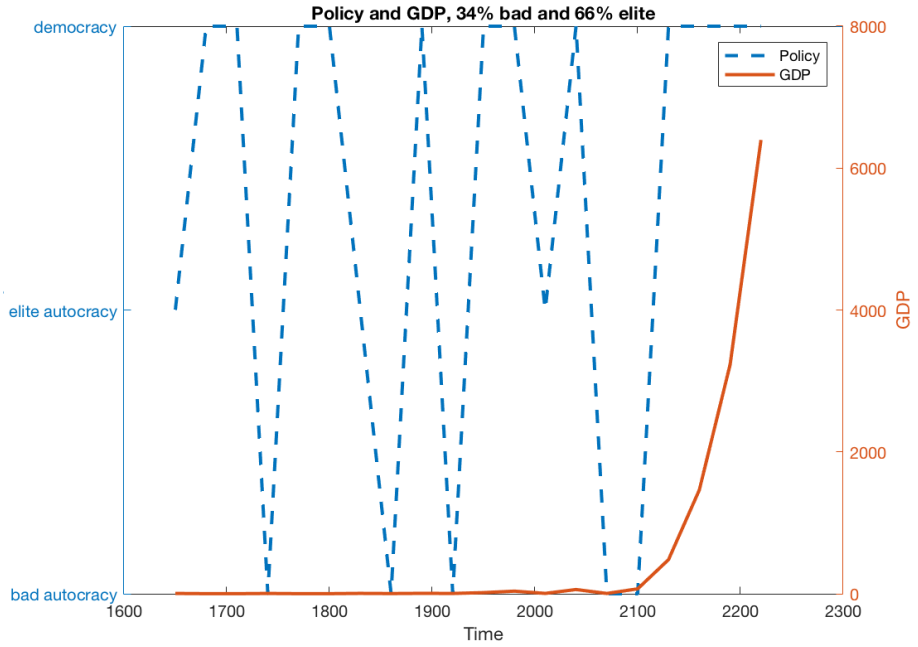


Figure 16 **Malthusian and Solow capital in the autocratic-democratic economy with a 34 % risk of getting a bad dictator and 66% chance of getting an elite dictator if the citizens choose to be ruled by an autocrat.**

5 Discussion and analysis

This section will use the results of the model to compare them to previous research and discuss their viability in order to address the research question:

> *Is it possible to alter an existing dynamic political-economic model to better match the empirical patterns showing that democratization takes place at low levels of development but consolidation occurs at higher levels of economic development?*

5.1 Interpretation of the model

The findings support the view of Seim and Parente (2013) arguing for the double causality running between economic development and political leadership. Furthemore, it can be seen that the introduction of revolutions in the model indeed creates a society which closely mimics the empirics showing that democratizations take place at low levels of income whereas consolidation occurs at higher levels of the same. Hence, it seems as though the general mechanisms of their model cannot be dismissed based on these empirics.

If we dig a bit deeper into the results of this thesis, we see that the driving factor of political change does not seem to be levels of income as such, but rather when the production technology shifts from Malthusian to Solow. This shift creates a different power-balance between the peasants and elites creating new scopes for political stability. Przeworksi et al. (2000, p. 115) state that economic crises are not enough to bring regimes down and are hence in line with my model's emphasis on the need of a technological transition instead of mere income related changes. Furthermore, my results could be argued

to lie close to Acemoglu and Robinson (2006, p. 316). However, they tend to assume that these institutions will persist and that democracy is path dependent, whereas my results require no such assumption. Historically, many countries have developed from an agrarian society into a more technologically based one. Britain, and France are two such countries both being largely dependent on agriculture until the mid 1800s, where both economies transferred more and more production to more technological sources (Findlay and O'Rourke, 2007, p. 323). France is particularly interesting in this case, since their path to democracy was a violent one oscillating between revolution and dictatorship until reaching a stable democratic state in 1870 (Nord, 1995, p. 1). This scenario especially well matches the bad-autocrat scenario of my model which ends up as a democracy in the 1800s.

One other major difference between my results and those of Acemoglu and Robinson (2006) is that their model predicts democratic consolidation every time there is a shift in economic institutions, whereas my model more accurately predicts that this need not be the case. If there is a bad dictator in power, the citizens will prefer to shift to democracy but if there is an elite dictator in place, the elites will always prefer to live in an autocracy, why a technology shift can occur with a dictator in power. This provides explanations for countries such as Singapore and Hong Kong who have seen immense growth and development during the last 60 years without diverting from their dictatorial path (Paldam, 2002). In this sense, the model in this paper lies closer to the strand of literature arguing for the importance of political leaders in determining a country's development path (Glaeser et al., 2004; Jones and Olken, 2005).

In short, my findings seem to emphasize the importance of the economic structure of a society as well as political leadership for an economy to move out of dictatorship and into democracy. If democracy is deemed more attractive by all citizens then this will push for a move to a democracy. According to my model, this will occur when the economy has moved away from Malthusian technology and when the policies in democracy are deemed more attractive than the policies in dictatorship by both elite and peasant households. In this regard, my findings are quite similar to those of Seim and Parente (2013). The main difference being that conflict pushes for democratization at earlier stages of development in my model, although it remains unconsolidated until higher levels of development. Before turning to the implications for policymaking, the next section will discuss the limitations of the model.

5.2 Limitations of the model

All models have their limitations, and mine is not an exception to this rule. Although it does predict scenarios corresponding fairly close to to the empirics it misses out on some important examples. This section will discuss some of these limitations, but also argue why the model remains relevant.

The model is calibrated to the specific British setting while it is aiming to answer more general questions. I chose to keep the parametrization as a means to compare my results with those of Seim and Parente (2013) but would strongly encourage future research to calibrate the model to several more cases in order to see if it is possible to observe transitions that behave according to these economies' experiences.

Some parts of the model may not be ideally shaped to reflect the reality. For example, the rule that allows the leader to block Solow is described as a TFP reduction. In reality, a leader is not able to affect the productivity of an economy directly but rather via taxes, transfers and regulations. However, since this is the original set-up by Seim and Parente (2013), I decided to keep this definition of the Solow blockage. The main reason being that such a change in the economic set-up would make the comparability between the original model and the introduction of revolutions in mine less effective.

The model fails to predict that several dictatorships have fallen at high levels of development (Przeworski et al. 2000, p. 106). It is possible, and even highly likely, that other factors than economic ones

affect the behavior of the citizens of a society. As other models and theories have explored, factors such as education, natural resources, a heterogenous elite class, widespread anger caused by bad and untimely leadership, and support from international allies play important roles(Persson and Tabellini, 2009; Paltseva, 2008; Goldstone, 2014, pp. 10-25). In solely focusing on economic utility, my model misses out on any utility the agents will gain from obtaining political freedom.

Furthermore, the model does not capture any other inequalities than economic ones. It will not be able to capture societies which are divided between other factors and between more than two classes, such as ethnicity or cultural belonging. If this is the case, then uprisings may result in one dictatorship being replaced by another as the different classes try to dominate one another.

However, this does not mean that the economic structure does not play an important role. Since the model described in this paper corresponds well with a sound part of the data within the field, it is rather likely that economics are important, but that there are other factors at play as well. In terms of policymaking this is beneficial since it implies that there are several possible approaches in how to reach more democratic societies. In the next section, the policy implications related to my model will be discussed.

5.3 Policy implications

First, and foremost, my results indicate that there actually are policy implications; policy choices will be able to steer a society onto more or less prosperous roads. However, policies designed to promote democracy are without doubt complex in nature, and the conclusion derived from the results of this model will not provide any quick fixes either. Nevertheless, it does give us some indications of the nature of democratic consolidation which I deem important for policymakers. Unlike the strand of literature claiming that historical institutions decide what economic and political path an economy will take, this model implies that there can be several effective policies fostering democracy and growth. Policy and the economy interact and can together create sustainable synergies.

Furthermore, the model rejects the classic empirical approaches arguing that democracy can be obtained through creating policies focusing solely on politics or solely economics. A strategy which only promotes democracy will not be successful if the economy does not progress from an agrarian society and a policy only promoting growth risks being stuck in dictatorship if democracy does not become beneficial enough for the ruling elites. Hence, there is a clear need for both tools to be utilized in policymaking.

Moreover, income as such does not seem to be enough to move out of dictatorship since the development needs to be entwined with a technological shift. However, technological development and growth are closely related. This can be seen from Figure 17 which shows the relationship between percentage of income from agriculture 2014 and overall income, as measured in GDP per capita for 2014. The measures of agricultural income and GDP per capita are taken from the World Bank, International Comparison Program database, World Bank national accounts data, and OECD National Accounts data files. Hence, arguing whether it is economic structure or income as such that determines a shift from dictatorship to democracy should not be given too much space. More important is finding successful ways to actually promote growth, which is a whole sector of economics on its own.

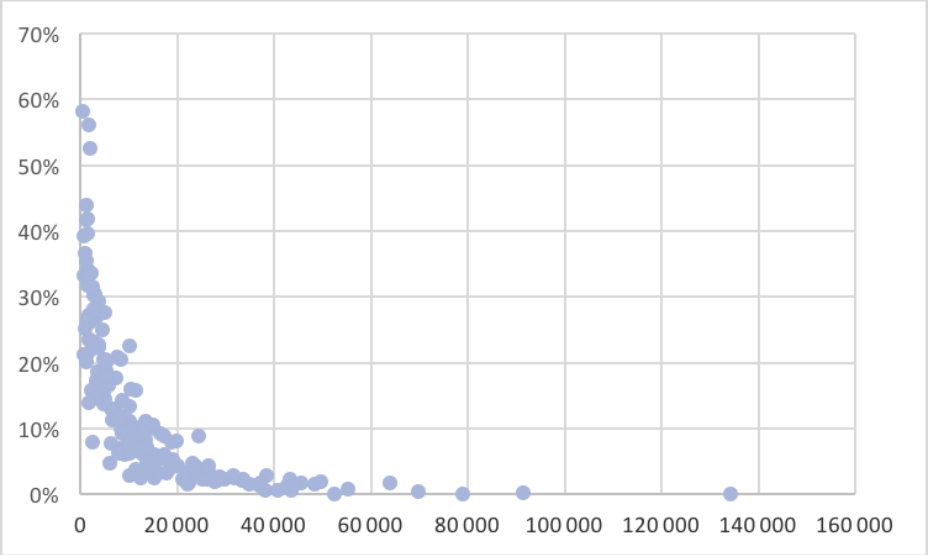


Figure 17 **GDP per capita, PPP (constant 2011 international $) on Agriculture, value added (% of GDP) for 2014. Data from the World Bank, International Comparison Program database, World Bank national accounts data, and OECD National Accounts data files.**

Additionally, even though my model looks at an economy where the democratization occurs in the form of a revolution it also emphasizes the cost-benefits of consolidating an economy. Democratization will not occur unless it is beneficial for both the elites and the peasants to do so. Reforms should therefore be directed toward both groups. It is necessary for the elites of a society to see the benefits of a democracy or else the likelihood of coups will increase. This could be argued to lie close to the literature emphasizing the importance of equality in democratic consolidation (Acemoglu and Robinson, pp. 32-38; Gradstein, 2008) since this scenario implies that the preferred policies of the elite class will be closer to those preferred by the peasant class On the other hand, equality is not a necessary precondition for democracy in my model, as long as the economic benefits of democratization are high enough for the elites.

6 Conclusion

This thesis has aimed to improve the dynamic political-economic models which try to explain the relationship between political and economic development. By introducing the possibility for citizens to commit to a revolution or coup to the model constructed by Seim and Parente (2013), my model has been able to incorporate some important empirics. More specifically, it has shown that democratization occurs at mostly low levels of economic development, while consolidation of the same is dependent on economic development. Foremost, my model predicts that it is the economic structure of a society which will determine if the consolidation will take place or not, meaning that the shift from a Malthusian to a Solow technology is important. However, economic development is not enough for a consolidation of democracy. If the elites deem that the benefits of an autocracy are high enough, they will prefer transferring back to this state whenever possible. In turn, if the costs of being ruled by a dictator are low enough for the peasants, they will eventually stop committing to revolutions and settle for a dictatorship instead.

In terms of policy, the results imply that the road to democracy is a difficult one where many synergies have to be created. Nonetheless, the results also indicate that there are things which can be done. With the right policies and leadership, economic development can be created. With the right interven-

tions, a society will eventually deem it more profitable to be democratic. In short, the paper does not support any specific interventions, but points out that interventions indeed may have a positive impact.

There are many questions which remain unanswered. Would it be able to predict specific cases of democratic consolidation in the past by calibrating the model to different economies? Would it be possible to change the model in such a way that political freedom becomes an important aspect? Alternatively, it would also be interesting to see models where the society is divided by other factors than economic ones. The thesis also encourages good policymaking, but is too vague to go into specific policies. Hence, my thesis also opens up for further studies on which policies can be deemed effective in promoting both growth and democracy.

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A Appendix

A.1 Different TFP losses of a failed revolution

In this section the TFP loss of failing to commit to a revolution varies. There are five different scenarios, one with a TFP of 0.95 times the original TFP in that period, and subsequently 0.96, 0.97, 0.98, 0.99 and 1 times the original TFP.

Elite autocrat
When the citizens can choose between an elite autocrat or a democracy, the different variables will react as follows in the figures below. Figure A.1 shows that the transfer to democracy will occur att different points in time depending on how large the TFP loss of a failed revolution is. The larger the TFP loss, the sooner there will be a stable state and vice versa. However, as shown by Figure A.2, there will be no large impacts on the GDP in the terminal period by varying the TFP loss of an unsuccessful revolution. Together this implicates that if one wishes to parameterize the model to a specific economic setting, then the size of the TFP loss of an unsuccessful revolution will have an impact on the results. However, it does not affect the general trends of the model.

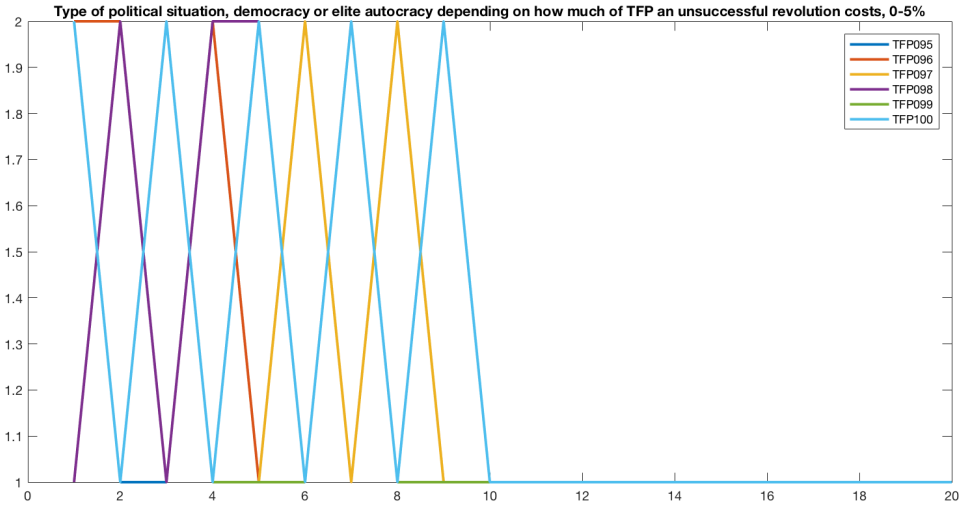


Figure A.1 **Differences in type of ruler, democracy = 2 and autocracy = 1, depending on the loss in TFP following an unsuccessful revolution.**

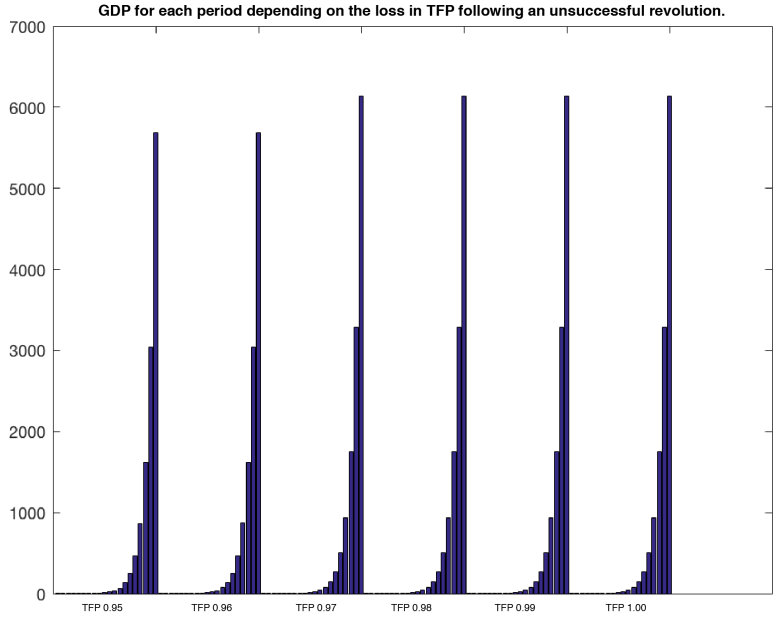


Figure A.2 **Differences in GDP depending on the loss in TFP following an unsuccessful revolution.**

Bad autocrat

When the citizens can choose between a bad autocrat or a democracy, the different variables will react similarly to what has been described above. If the TFP loss of an unsuccessful revolution is larger, as shown in Figure A.3, the transition to a stable autocracy will occur at an earlier stage in time. However, there are no large effects on income in the periods following the transition to the stable political state as shown in Figure A.4.

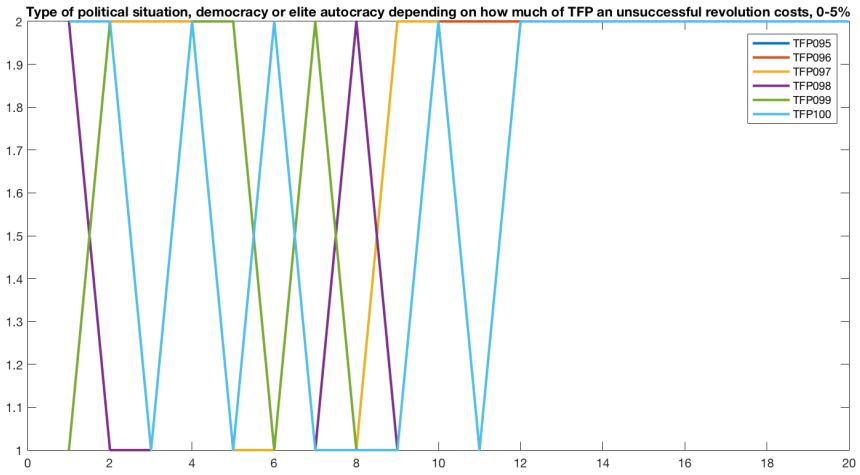


Figure A.3 **Differences in type of ruler, democracy $= 2$ and autocracy $= 1$, depending on the loss in TFP following an unsuccessful revolution.**

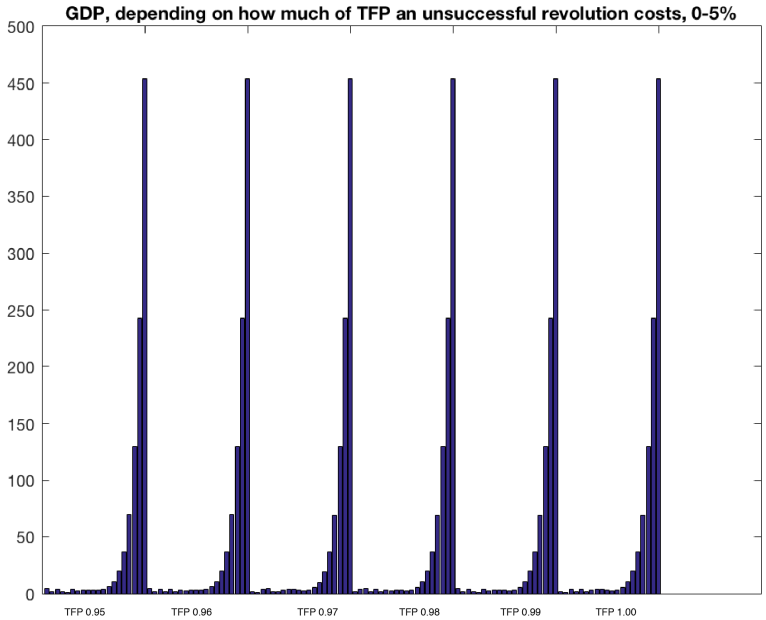


Figure A.4 **Differences in GDP depending on the loss in TFP following an unsuccessful revolution.**

A.2 Different likelihoods of a successful revolution and coup

When introducing different likelihoods of revolutionary success, the general trends of the model does not change. However, transitions to stable political states varies depending on the different likelihoods and will hence have an impact on the results if the purpose would have been to calibrate the model to a specific setting. The different likelihoods studied are 25% chance of success, 49% chance of success (as in the model setup), 75% of success and 100% of success.

Elite
When the citizens can choose between an elite autocrat or a democracy, the transition to autocracy will vary as described below. As can be seen, this is a simple mechanical procedure. The equilibrium occurs at around year 1900, but depending on the likelihood of a successful revolution, the transition might occur later seeing that there will be more unsuccessful revolutions and coups.

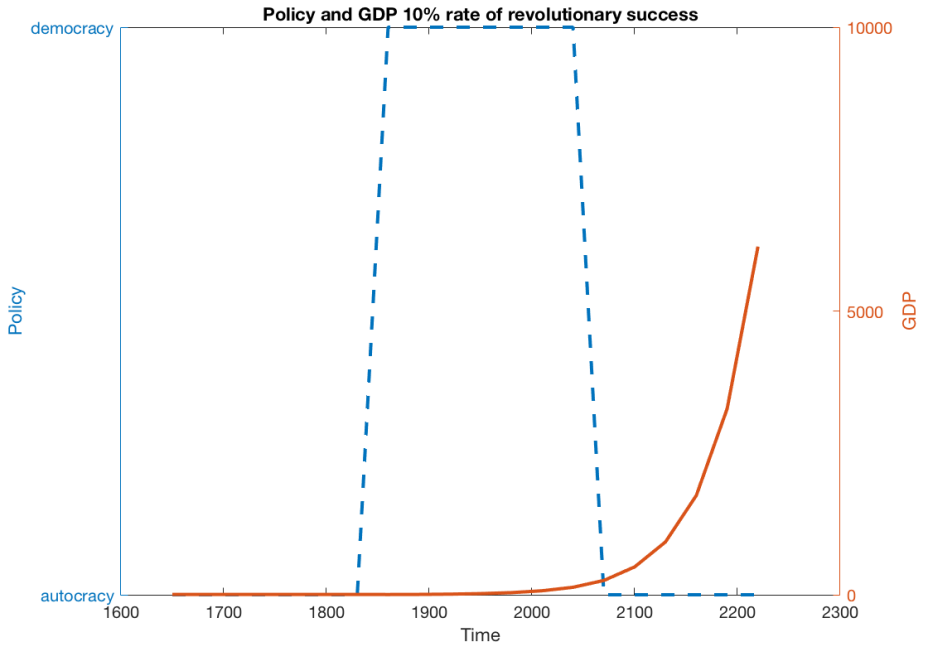


Figure A.5 **The probability of succeeding with a revolution or coup is 10%**

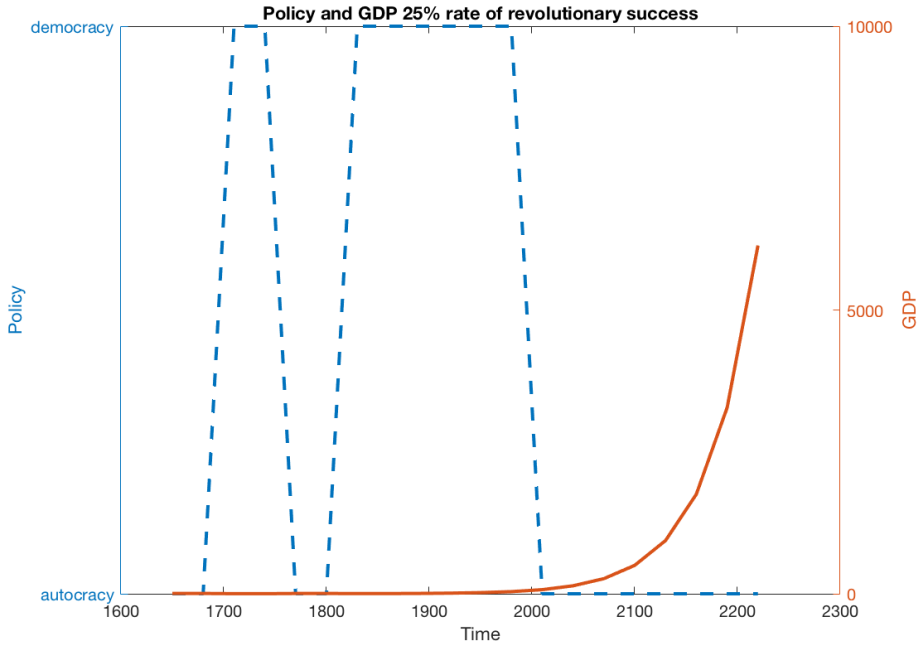


Figure A.6 **The probability of succeeding with a revolution or coup is 25%**

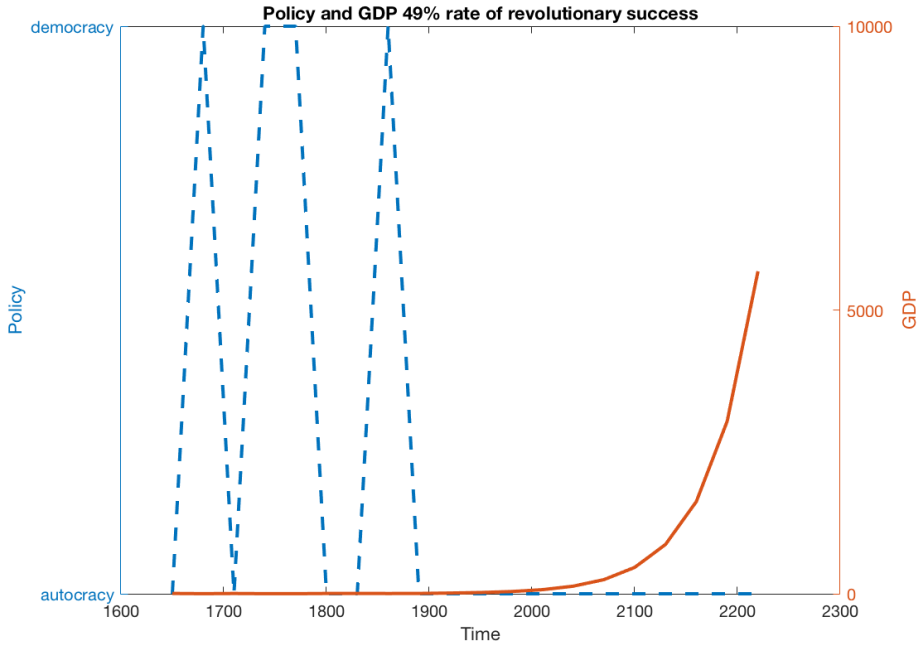


Figure A.7 **The probability of succeeding with a revolution or coup is 49%**

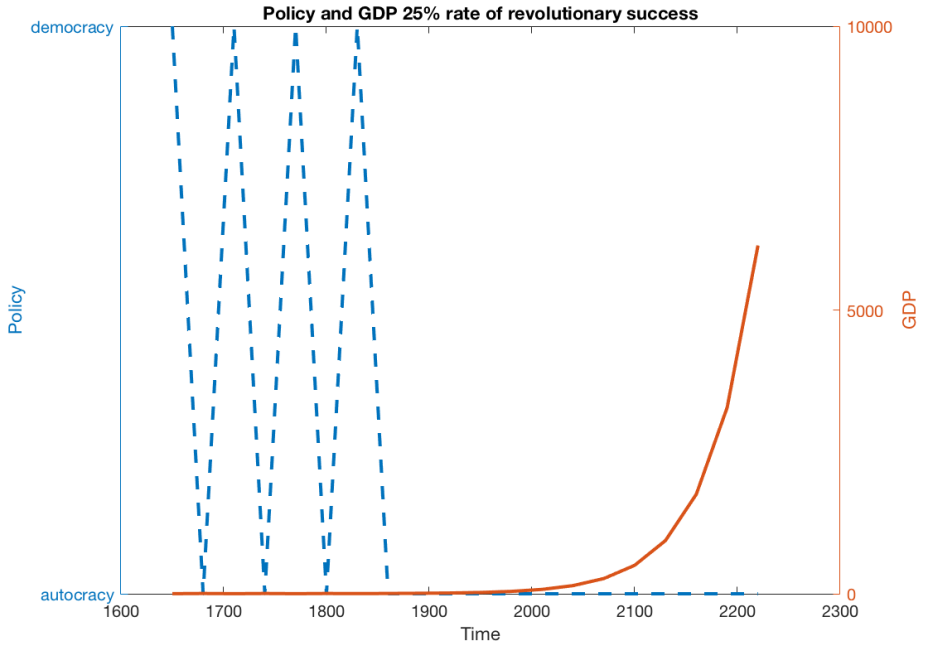


Figure A.8 **The probability of succeeding with a revolution or coup is 75%**

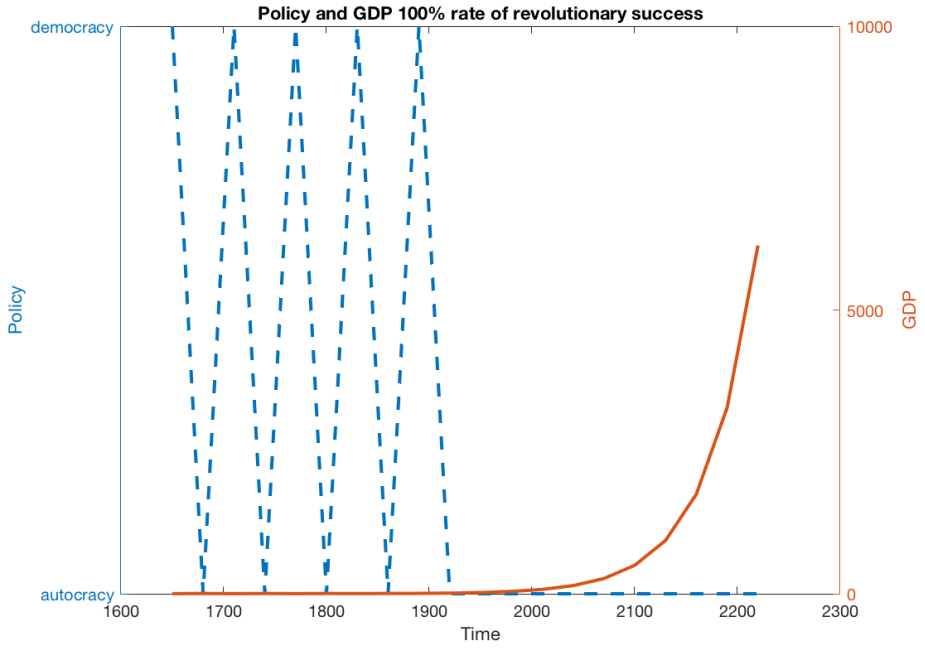


Figure A.9 **The probability of succeeding with a revolution or coup is 100%**

Bad autocrat

When the citizens can choose between a bad autocrat or a democracy, the different variables will react as follows below. Once again, the procedure is mechanical, and the transition to democracy occurs at around year 1900, but will occur later if there are several unsuccessful revolutions.

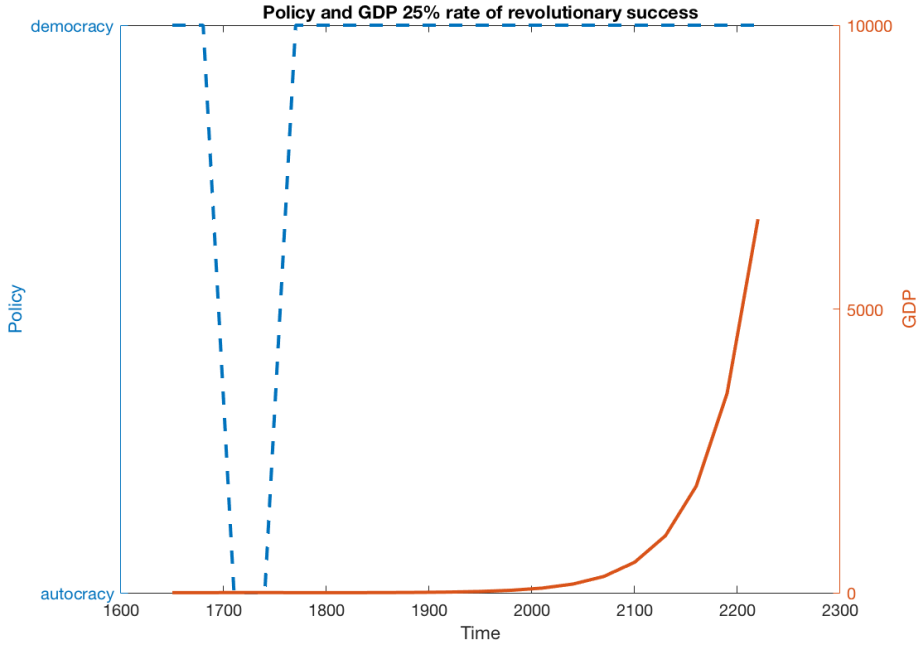


Figure A.10 **The probability of succeeding with a revolution or coup is 25%**

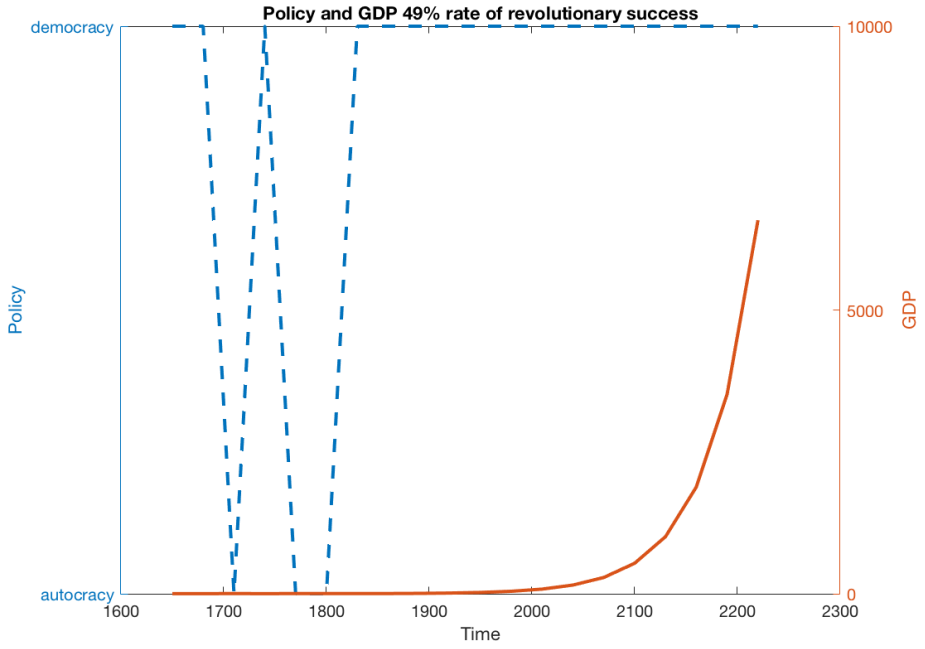


Figure A.11 **The probability of succeeding with a revolution or coup is 49%**

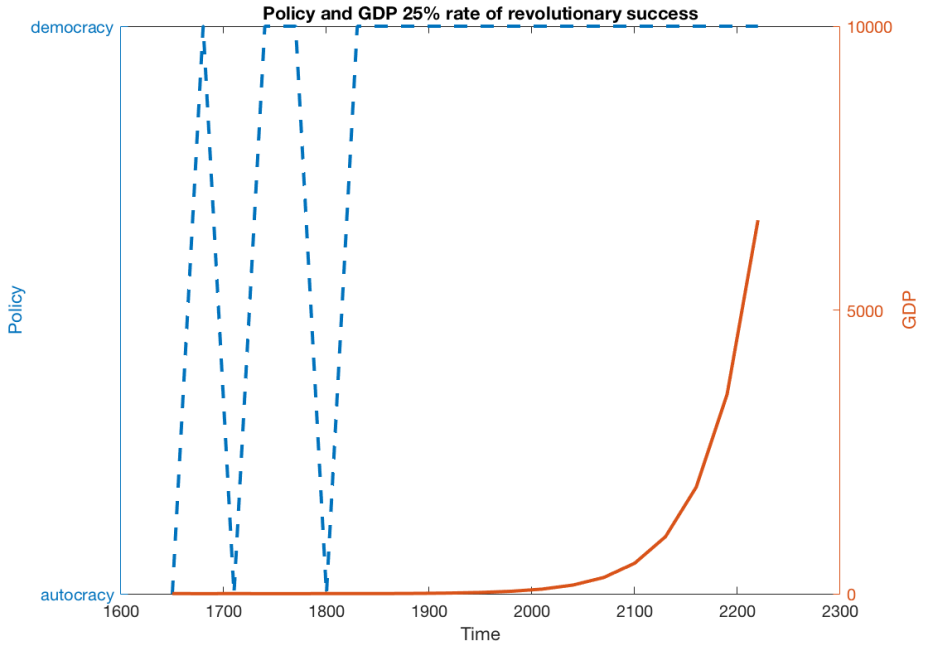


Figure A.12 **The probability of succeeding with a revolution or coup is 75%**

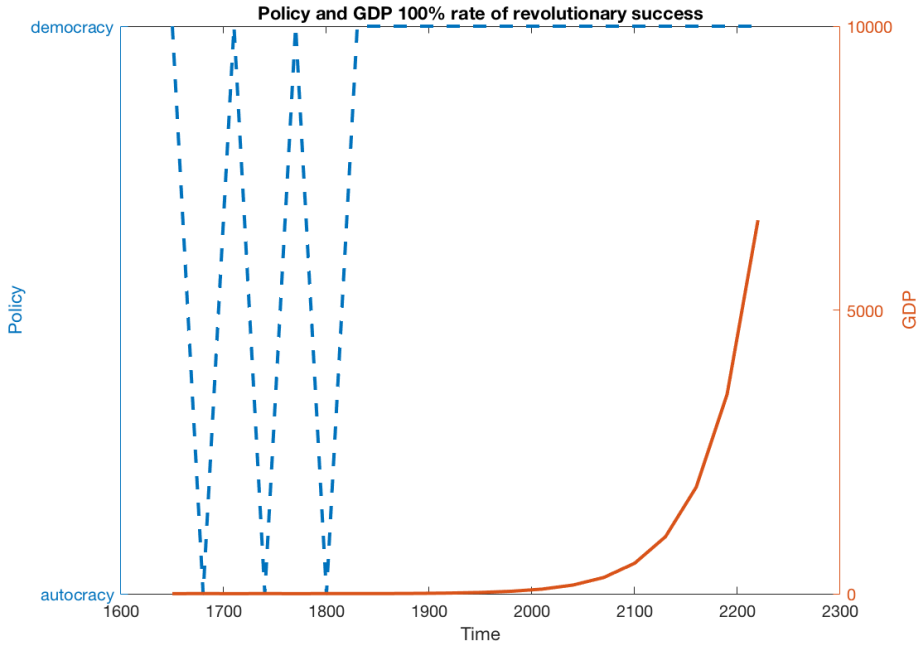


Figure A.13 **The probability of succeeding with a revolution or coup is 100%**