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Poverty, Competition, Democracy and Ownership: a General Equilibrium Model with Vertical Preferences*

Amani Kahloul[†] Rim Lahmandi-Ayed[‡] Hejer Lasram[§]

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*If a free society cannot help the many who are poor,
it cannot save the few who are rich.*

John F. Kennedy - *Inaugural Address, January 20, 1961*

Abstract

We consider a general equilibrium model where individuals are at the same time workers, consumers and shareholders, with two possible ownership structures: *egalitarian* where all individuals share equally the firm's (firms') capital and *concentrated* where the owners of the firm(s) are negligible w.r.t the total population; and two possible market structures: Monopoly and Duopoly. The questions are, whether more competition generates more or less poverty for a given ownership structure; and whether a democratic choice between Monopoly and Duopoly leads to the alternative with less poverty. We consider four poverty indicators based respectively on Per Capita Income (PCI), Income Floor, Poorest and Income-Poor Population Size. When the ownership is concentrated, we show that Duopoly generates less poverty than Monopoly and that democratic choice between the two alternatives alleviates poverty according to all indicators apart from PCI. When the ownership is egalitarian, Duopoly may generate more or less poverty than Monopoly and democratic choice alleviates poverty regarding at least one poverty indicator and worsens poverty regarding at least another one, the four poverty indicators never converging. An empirical study on the effect of competition on poverty supports to some extent our theoretical findings.

Keywords: Vertical differentiation, general equilibrium, poverty, democracy, competition, ownership structure.

JEL Classification: I32, J4, L13.

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1 Introduction

In his 1978 lecture at Stanford University, Friedman said “There have never, in history, been a more effective machine for eliminating poverty than the free enterprise system and the free market”. On the other hand, Georges Soros (2004, BuzzFlash Journal) said “Most of the poverty and misery in the world is due to bad government, lack of democracy, weak states, internal strife, and so on”. In short, poverty is commonly expected to be alleviated by the “free enterprise and free market”, thus by more competition, and by democracy. Surprisingly, such apparently wise statements have received little attention in the existing empirical as well as theoretical works.

Most of the literature on poverty, mainly empirical, focuses on poverty measurement and on the efficiency of anti-poverty policies. Some papers link these policies to the ruling political force voted into power via a democratic process. The fact is that these papers deal only with the effect of indirect democracy on poverty, where people elect representatives to make laws and choose policies on their behalf. But they say nothing about the role of direct democracy in alleviating poverty, neither do they predict the impact on poverty of factors such as the market structure or the ownership pattern within an economy.

In this paper, the question is whether more competition (Duopoly versus Monopoly) on the product market generates more or less poverty, for a given ownership structure, regarding four existing poverty indicators; and whether the direct democratic choice between Monopoly and Duopoly leads to the alternative with the lowest levels of poverty.

Finding stylized facts sticking completely to our purpose is an impossible task. But we think that the transition of ex-communist countries, China, East European countries and ex-USSR, to market economy and for the major part to more or less democratical regimes, may provide a good example¹. Indeed this transition has meant more competition relative to the public monopolies which were dominating almost all sectors. Observing the headcount ratio at the 1.9 USD poverty line (Figures 12, 13 and 14 in Appendix C), we notice the absence of data before the collapse of communism but globally from that moment a decreasing trend of poverty in these countries. However the observed effects cannot be attributed in totality to more competition and/or democracy. Indeed the transition to free markets was also accompanied by a series of other events such as the collapse of public monopolies with all their well-known inefficiencies, the openness to the world and the important amounts of aids for some countries like East European countries. A theoretical model would be very helpful precisely to disentangle the effect of competition/democracy from the other ones, thus to determine the effect of competition/democracy on poverty all other things being equal.

We consider a general equilibrium model with three goods, one or two firms producing vertically differentiated products using labour as the unique input and a population

¹<https://datacatalog.worldbank.org/dataset/world-development-indicators>

of workers/consumers/shareholders. Individuals are supposed to be continuously distributed with respect to two characteristics: their sensitivity to effort and their intensity of preference for the product quality. We consider two extreme ownership structures: egalitarian where all individuals share equally the firms' capital and concentrated where the owners of the firm(s) are negligible in the total population. We consider the four indicators already existing in the literature: the indicators derived respectively from Per Capita Income, Income Floor (the lowest income), the Poorest (population having the lowest income) and the Income-Poor Population Size relative to some given poverty line.

First we compare poverty under Monopoly and under Duopoly for each ownership structure. Equilibrium outcomes being independent of the ownership pattern and profits having to be considered in the global wealth in both cases, the effect of competition on PCI is the same under both ownership structures. We prove that PCI is improved by Duopoly under some conditions on the model's parameters. PCI being composed of profits which are lower and wages which are higher under Duopoly, it is improved by Duopoly only if the wage effect outweighs the profit one.

As for the three other indicators, results depend on the ownership pattern. In the concentrated case, Duopoly improves wages thus the individual income for all non-owners, hence improves poverty regarding the indicators based on individual income: Income Floor, Poorest and IPPS. However, in the egalitarian ownership case, Duopoly worsens the Income Floor but reduces the Poorest population. Indeed the Poorest choose not to work thus have a lower income stemming only from profits. But Duopoly offers more labor options and raises wages, thus reduces unemployment and the Poorest population. As for IPPS, the effect depends on the model's parameters and on the level of the poverty line.

Regarding the effect of democracy, in the concentrated ownership case, democracy leads to the alternative alleviating poverty regarding Income Floor, Poorest and IPPS. Indeed, in this case, individuals have converging interests as workers and as consumers, since the alternative giving them higher wages also ensures lower prices. Hence higher incomes are perfectly consistent with higher indirect utilities. Only PCI may lead to divergence between incomes and indirect utilities, as profits which must be integrated in the PCI, are earned only by a negligible part of the population which does not weigh on vote.

In the egalitarian ownership case, for each poverty indicator, there are conditions on the model's parameters under which democracy leads to the best option and conditions under which it leads to the worst. For fixed parameters, there is always at least one poverty indicator improved and at least one poverty indicator worsened by democracy, the four poverty indicators never converging. That democracy does not lead to the best option in terms of poverty may be explained at the individual and collective levels. Individuals are not interested by higher incomes *per se* but by higher indirect utilities which depend on the sensitivity to effort, the intensity of preference for quality and the prices. Even the poor or the Poorest may prefer the option giving them the lowest income because it gives them a higher utility resulting from a lower effort, a higher quality or lower prices. At the collective level, there is no reason why the majority should choose the option with the lowest levels of poverty. This is so either because of the inconsistency of individual choices with low levels of poverty, or because those who

care about poverty do not weigh enough on vote.

We introduce two utility-based indicators: the Utility Floor and the Unhappiest indicator which may account for extreme unhappiness. We prove that under concentrated ownership, competition alleviates extreme unhappiness. Under egalitarian ownership, no conclusion may be drawn as, the more competition the less numerous are the unhappiest but the more unhappy they are. Regarding the effect of democracy, it alleviates extreme unhappiness under concentrated ownership. Under egalitarian ownership, when democracy improves the utility floor it enlarges the size of the unhappiest population. Hence no conclusion may be drawn on the effect of democracy on extreme unhappiness in this case.

Finally, we test empirically our theoretical findings concerning the effect of competition on poverty using the headcount ratio at the 1.9 USD poverty line as proxy for poverty. Our estimates support to some extent our theoretical findings.

Related literature.

In the poverty literature, different measures are used in order to estimate the poverty level, and poverty measurement tools remain an open debate. Several classifications of poverty are proposed in the literature, among which the most popular in modern economics is the income-related poverty.

One of the most straightforward income-based indicators of poverty corresponding to the first indicator used in this paper is Per Capita Income (PCI). It is calculated as the total product of the country or the GDP to the population size and is particularly used for country comparisons. Since it is an indicator directly related to demographic characteristics, it allows to understand the relation between demographics such as population growth or age structure and the evolution of typical incomes and thus of poverty (Hajamini, 2015). It is used very often as an indicator of the efficiency of anti-poverty policies such as family planning programs (Yunker, 2003) and official development aids to poor countries (Nowak-Lehmann et al., 2012; Anwar and Cooray, 2015).

However, PCI remains a limited indicator of poverty, because too aggregated. According to Shaffer (2013) the major challenge facing researchers is to identify the poor, therefore to address the following issues. First, one has to specify the dimensions of poverty: standard dimensions such as income-based or consumption-based poverty versus “locally meaningful” definitions of poverty. Second, one has to set relative weights if multiple dimensions are identified. Finally, one has to determine an appropriate cut-off (or threshold) level in order to disentangle poor from non-poor.

Literature on poverty gives special attention to assessing the poorest population, in terms of number as well as in terms of income level (how poor are the poorest), because, of all the poor, this stratum remains the most vulnerable and the most exposed to health and social risks (Costello; Osrin and Manandhar; 2004), and also to the increasing climate change-related disasters (Evans; 2010). But identification of the poorest is not straightforward. An important body of the literature going back to Rowntree (1901) is dedicated to the identification of the poorest. Simanowitz et al. (2000) outline the difficulty of disentangling the poorest from the poor. Ravallion (2015) addresses the question of the poorest by emphasizing the necessity and the difficulty of identifying the lowest observable level of living or what he calls the “floor”

or the “consumption floor”². It is “the typical level of living of the poorest stratum”. Ravallion (2015) asserts that the level of the floor in an economy is an important information *per se* and that anti-poverty policies success must be assessed in part through the ability to raise the floor. In this paper, we use two indicators inspired by Ravallion: the Income Floor and the Poorest indicator.

But the most popular poverty measure is by far the poor population estimated as the number of individuals whose income lies below a certain threshold called poverty line. According to Morelli et al. (2014), in over 100 countries, official poverty statistics rely on the poverty line approach. Poor census according to this method dates back to Booth (1889) and Rowntree (1901). The poverty line was an instrument aimed at evaluating the proportion of the population objectively unable to provide for basic physiological needs. In his “primary poverty line”, Rowntree deliberately eliminates all social needs such as distractions and culture, and limits the poor to those who cannot provide for their primary irreducible needs, i.e. food and housing. Then he converts those basic needs in monetary terms to set the poverty line. The following definition of Morelli et al. (2014) corresponds to the recent definition of an absolute poverty standard “a level of purchasing power that is sufficient to buy a fixed bundle of basic necessities at a specific point in time”. In our paper, we use the absolute poverty line approach to construct our fourth poverty indicator: the Income Poor Population Size indicator.

To the best of our knowledge, only Rodriguez-Castelan (2015) tries to determine theoretically the effects of more competition on poverty. He considers a partial equilibrium model and a general equilibrium one closer to our model. Unlike our model, agents are supposed to have the same tastes for the goods and the same level of productivity as workers. Firms are supposed to produce homogenous products, while we consider a differentiated sector. Under these hypotheses, he proves that more competition decreases poverty rates³ The next closest are papers on liberalism or capitalism which are reflection works falling more under the scope of social sciences and philosophy than under economics, and debating on whether capitalism and liberal practices lead to more or less poverty, a question related but only at the level of ideas to our paper: Harris-White (2006), Freeman (1998), Lomasky and Swan (2009), Kuo (1997).

As for the effect of democracy on poverty, a part of the literature that tries to understand the relation between poverty and democracy such as Brady (2006, 2008, 2009, 2010), just describes determinants of poverty patterns in rich western democracies and show that it is the welfare state that contributes to alleviate poverty. In a more targeted work, Saha and Zhang (2017) argue that for developed countries, enhancing the human development is related more to democracy than to economic growth. But

²The same notion of consumption floor is employed in a different context (life cycle modelling) where the consumption floor refers to the irreducible consumption of an individual with no income. See Hubbard, Skinner and Zeldes (1994) and De Nardi, French and Jones (2010).

³Brummund (2011) is an empirical study in Indonesia on the effect of firms’ market power on the poverty of the hired workers. It corresponds rather to a partial equilibrium approach (labor) not interested in the more complex global effects of competition (labor, consumption and revenues) as we are in our theoretical and empirical study.

for developing countries, economic growth plays a more important role. Ha and Cain (2017) take into account the government ideology in democratic countries and find that only when democracies are associated with the access of lefties to power that democracy contributes to alleviate poverty. Minkler and Prakash (2017) focus on the effect on poverty of constitutions as one of the democracy aspects and find that only when economic and social rights are framed as “enforceable law” that they lead to the reduction of poverty. The two last papers suggest that it is rather the centralized policies against poverty that may alleviate poverty and not democracy *per se*. But even if the access of lefties to power and the choice of anti-poverty policies are allowed by democracy, the direct effect of democracy on poverty is not addressed.

Unlike this stream of literature which suggests some correlation between democracy and poverty, Acemoglu et al. (2008) prove that when controlling for factors that simultaneously affect per capita income (as a poverty indicator) and democracy, the correlation between these two variables is no longer observed.

The general equilibrium model used in this paper has been first introduced by Kahloul, Lahmandi-Ayed, Lasram and Laussel ⁴ (2017). They determine the majority vote issue between Monopoly and Duopoly, for each ownership structure, depending on the model’s parameters. They were not preoccupied by poverty or human development issues. We rely on their results concerning equilibria under Monopoly and Duopoly, and on the majority vote outcome between the two alternatives.

The remaining of the paper is organized as follows. Section 2 provides the basic model and defines formally the poverty indicators which will be used. We analyze the effect of competition on poverty in Section 3. Section 4 is dedicated to studying whether a democratic vote between Monopoly and Duopoly leads to the alternative with less poverty. Section 5 introduces new poverty indicators based on utility and determines the effect of competition and democracy on poverty in terms of these new indicators. Section 6 provides an empirical study on the effect of competition on poverty. We conclude in Section 7. All proofs are provided in Appendix A and all figures of the theoretical part in Appendix B. Appendix C is dedicated to stylized facts and empirical estimates.

2 The model and the poverty indicators

In this section, we describe the model then we define formally the four poverty income-based indicators which will be used.

2.1 The model

Consider an economy with 3 goods: labour and a numeraire as inputs and an indivisible “differentiated” good as the unique output (“differentiated” in the sense that it may possibly be of different qualities perceived differently by consumers).

⁴To be further referred to as KLLL (2017).

One or two firm(s) produce(s) differentiated product(s). One unit of the differentiated good requires one unit of labour.

There is a population of workers/consumers/shareholders. Each individual is endowed with an indivisible unit of labour and a given quantity e of the numeraire and is doubly characterized by:

- a “working parameter” $\alpha \in [0, \bar{\alpha}]$ which captures the worker’s sensitivity to effort,
- a “consumption parameter” $\theta \in [0, \bar{\theta}]$, which measures the intensity of the consumer’s preference for the product’s quality.

Denote by $\lambda \geq 0$ the share in the firm’s profit of each agent.

Individuals are assumed to be uniformly distributed over $[0, \bar{\alpha}] \times [0, \bar{\theta}]$ with a density normalized to 1. Each worker/consumer (α, θ) chooses sequentially:

- first to remain idle (\bar{W}) or to work in the differentiated sector and if so in which firm.
- second to compose his/her consumption bundle, in particular not to consume (\bar{C}) of the differentiated product or to consume one unit and if so from which firm.

Individuals derive their utility from the consumption of the numeraire and the differentiated good as follows.

$$V(x, t) = \theta qx + t$$

where

- x is the quantity of the differentiated product of quality q and may take the values 0 or 1,
- t is the quantity of the numeraire.
- Thus $(x, t) \in \{0, 1\} \times \mathbb{R}$.

Denote by $I(\alpha, \theta)$ the income of individual (α, θ) . Individuals derive incomes out of their work, initial endowment in numeraire and potentially from their dividends from the firm(s). If the individual chooses to work, he/she receives a salary ω and must receive a training implying a cost αq . His/her net income from working is equal to $\omega - \alpha q$. If he/she chooses not to work, he/she receives no salary (and does not have to be trained), his/her revenue being limited to the initial endowment in the numeraire and to his/her share in the firm’s profit. We consider two extreme ownership structures: first, the concentrated ownership case corresponding to $\lambda = 0$ for almost everybody; second, the egalitarian ownership case corresponding to $\lambda = \frac{1}{\theta \bar{\alpha}}$.

We note that as our model involves a numeraire, all the values (prices, revenues, profits) calculated are expressed in terms of this numeraire. Denote by $\delta = \frac{\bar{\theta}}{\bar{\alpha}}$, the same notation adopted by KLLL (2017).

2.2 Poverty indicators

In this paper, we consider four poverty indicators: the Per Capita Income, the Income Floor, the Poorest indicator and Income Poor Population Size indicator, all formally provided below.

- **Per Capita Income.** PCI is the income generated per capita, i.e. the sum of all individual incomes over the population size $(\bar{\alpha}\bar{\theta})$. That is:

$$PCI = \frac{1}{\bar{\alpha}\bar{\theta}} \int_0^{\bar{\alpha}} \int_0^{\bar{\theta}} I(\alpha, \theta) d\alpha d\theta.$$

PCI measures the global/average wealth of the population. The larger PCI , the wealthier is the population globally or equivalently in average.

- **Income Floor.** The Income Floor is the lowest level of income achieved over the population. Formally,

$$IF = \min_{\alpha \in [0, \bar{\alpha}], \theta \in [0, \bar{\theta}]} I(\alpha, \theta).$$

The larger the IF , the richer are the Poorest.

- **The Poorest indicator.** The population concerned with the Income Floor is what we call the Poorest. Formally,

$$\text{Poorest} = \underset{\alpha \in [0, \bar{\alpha}], \theta \in [0, \bar{\theta}]}{\text{argmin}} I(\alpha, \theta),$$

hence, the size of the Poorest population is defined as:

$$\text{Poorest Size} = \int \int_{\text{Poorest}} d\alpha d\theta.$$

The Poorest indicator is defined to be

$$I_{\text{Poorest}} = \frac{1}{\text{Poorest Size}}.$$

The larger I_{Poorest} the smaller the Poorest population. Together with IF , the Poorest indicator accounts for extreme poverty.

- **Income Poor Population Size indicator.** In accordance with the literature, we define an absolute poverty line as follows. We consider the numeraire in our model as a benchmark good and we assume some exogenous quantity γ of the numeraire to be the bundle of basic necessities. The absolute poverty line is then the exogenous level of income sufficient to buy γ of this benchmark good. Since the numeraire's price is equal to one, the absolute poverty line is precisely equal to γ .

All the individuals having an income below the poverty line are considered to be poor. The Income-Poor Population referred to in the literature is thus defined as follows:

$$IPP = \{(\alpha, \theta) \in [0, \bar{\alpha}] \times [0, \bar{\theta}] / I(\alpha, \theta) \leq \gamma\}.$$

The Income Poor Population Size (IPPS) measures the area of the Income-Poor Population (IPP), that is:

$$IPPS = \int \int_{IPP} d\alpha d\theta.$$

The IPPS indicator is defined to be:

$$I_{IPPS} = \frac{1}{IPPS}.$$

I_{IPPS} measures poverty in its rather conventional definition. The larger I_{IPPS} the smaller the population concerned with poverty relative to the poverty line.

All along the paper, we use index M for Monopoly, index D for Duopoly, index C for concentrated ownership and index E for egalitarian ownership.

3 The effect of competition on poverty

In this section, we compare the poverty level under Monopoly and under Duopoly for each considered ownership structure. We first start by comparing individual incomes in the concentrated and the egalitarian ownership cases under Monopoly and Duopoly in Result 1. Then we deal with the effect of competition on poverty in terms of the four considered indicators defined previously.

Result 1 (Comparison of individual incomes) *Comparing the individual incomes, we have:*

- *In the concentrated ownership case, individual income is higher under Duopoly than under Monopoly for almost all individuals (apart from the owners of the firms). Formally,*

$$I_D(\alpha, \theta) \geq I_M(\alpha, \theta), \text{ for almost every } (\alpha, \theta) \in [0, \bar{\alpha}] \times [0, \bar{\theta}].$$

- *In the egalitarian ownership case, two cases emerge:*

$$- \text{ If } \bar{\theta} < 3\bar{\alpha}, \exists \hat{\alpha}(\bar{\alpha}, \bar{\theta}) \in [0, \bar{\alpha}] / \begin{cases} I_M^E(\alpha, \theta) < I_D^E(\alpha, \theta) & \text{if } \alpha < \hat{\alpha}(\bar{\alpha}, \bar{\theta}), \\ I_M^E(\alpha, \theta) > I_D^E(\alpha, \theta) & \text{if } \alpha > \hat{\alpha}(\bar{\alpha}, \bar{\theta}); \end{cases}$$

$$\text{with } \hat{\alpha}(\bar{\alpha}, \bar{\theta}) = \begin{cases} \frac{7\bar{\theta}(6\bar{\alpha}-\bar{\theta})}{48(\bar{\alpha}+\bar{\theta})} & \text{if } \bar{\theta} < 2\bar{\alpha}, \\ \frac{\bar{\theta}(9\bar{\alpha}-\bar{\theta})}{12(\bar{\alpha}+\bar{\theta})} & \text{if } 2\bar{\alpha} < \bar{\theta} < 3\bar{\alpha}. \end{cases}$$

- If $\bar{\theta} > 3\bar{\alpha}$, individual income is higher under Monopoly than under Duopoly for all individuals. Formally,

$$I_M(\alpha, \theta) \geq I_D(\alpha, \theta), \forall (\alpha, \theta) \in [0, \bar{\alpha}] \times [0, \bar{\theta}].$$

The individual income curves are depicted in Figures 3 and 4 (Appendix B).

In the concentrated ownership case, the comparison is done for individuals who are not owners in the firms. Hence, this comparison holds for almost everybody, as the owners have a null measure in the concentrated case. Individual income under Monopoly lies below individual income under Duopoly (see Figure 3) for non-owners. This is expected, since in the concentrated ownership case, almost all individuals are only workers. Then incomes stem only from work (and the initial endowment assumed to be the same over the whole population). Since wages are lower under Monopoly, it is natural that Monopoly leads to lower income.

In the egalitarian ownership case, the incomes stem from wages and dividends. Profits are higher but wages are lower under Monopoly relative to Duopoly, which explains roughly why the individual income may be higher or lower under each market structure.

When $\bar{\theta}$ is sufficiently high, the shareholder (or the profit) effect on income is stronger than the worker effect. Indeed for a fixed $\bar{\alpha}$, an increase of $\bar{\theta}$ pushes up Monopoly profit more than joint Duopoly profit ($\frac{\partial \pi_m^*}{\partial \bar{\theta}} > \frac{(\partial \pi_1^* + \pi_2^*)}{\partial \bar{\theta}}$) and pushes up wages under Duopoly mildly more than under Monopoly as $\frac{\partial \omega_m^*}{\partial \bar{\theta}} = \frac{\partial \omega_1^*}{\partial \bar{\theta}} < \frac{\partial \omega_2^*}{\partial \bar{\theta}}$.

When $\bar{\theta}$ is low, the ranking of these two effects depends on the individual's type, more precisely on his/her sensitivity to effort α . For high enough α , the individual under Monopoly does not work. Under Duopoly, he/she either does not work, which eliminates the worker effect, or works but bears a high training cost because of his/her high sensitivity to effort, his/her income under Duopoly still remaining below his/her income under Monopoly.

Now, in order to analyze the effect of competition on poverty, we need to define three zones A, B and C in the $(\bar{\alpha}, \bar{\theta})$ -space as follows:

$$\begin{aligned} A &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\theta} < \bar{\alpha}\}, \\ B &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\alpha} < \bar{\theta} < 3\bar{\alpha}\}, \\ C &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\theta} > 3\bar{\alpha}\}. \end{aligned}$$

The zones are depicted in Figure 1.

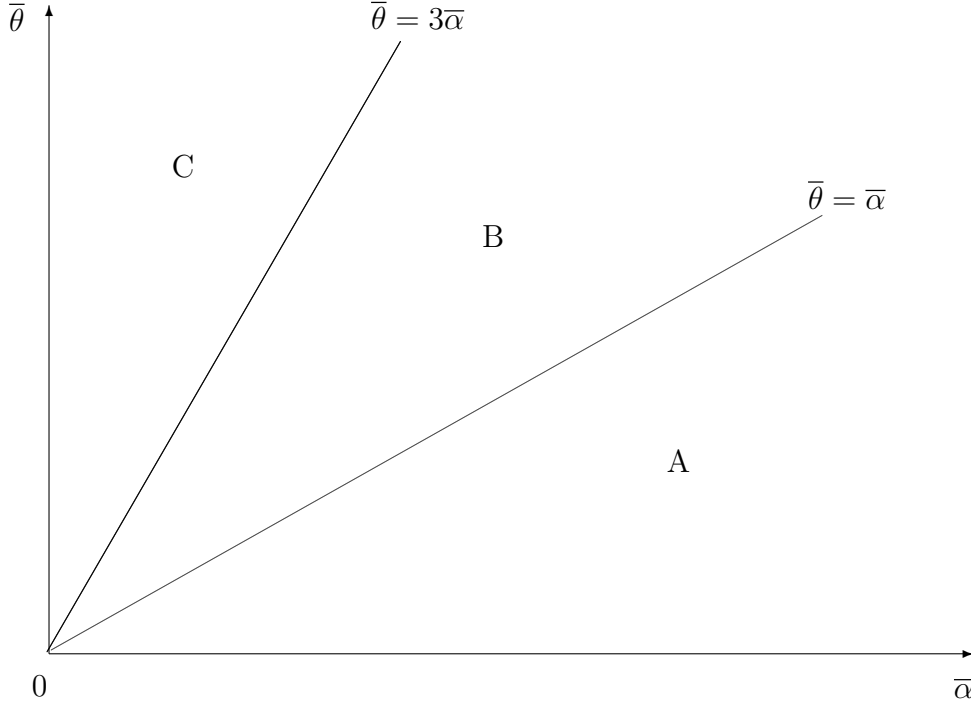


Figure 1: Zones in the $(\bar{\alpha}, \bar{\theta})$ -space of interest for the effect of competition on poverty.

Proposition 1 (Effect of competition on poverty) *Tables 1 and 2 give respectively in the concentrated and egalitarian ownership cases, for each zone of Figure 1, according to each poverty indicator, the conditions under which competition worsens (−) or alleviates (+) poverty.*

Indicator \ Zone	A	B	C
<i>PCI</i>	+	−	−
<i>IF</i> , <i>I_{Poorest}</i> , <i>I_{IPPS}</i>	+	+	+

Table 1: Effect of competition on poverty in the concentrated ownership case.

Indicator \ Zone	A	B	C
<i>PCI</i>	+	−	−
<i>IF</i>	−	−	−
<i>I_{Poorest}</i>	+	+	+
<i>I_{IPPS}</i>	+ for $\gamma > \tilde{\gamma}$	+ for $\gamma > \tilde{\gamma}$	−

Table 2: Effect of competition on poverty in the egalitarian ownership case.

with $\tilde{\gamma} = e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha} + \bar{\theta})}$.

The first straight conclusion is that either in the concentrated or the egalitarian ownership cases, competition does not necessarily alleviate poverty. Regarding one or more poverty indicators, things may go worse because of more competition.

Equilibrium outcomes being independent of the ownership pattern and profits having to be considered in the global wealth under the two ownership structures as the whole population is composed by owners and non-owners, the effect of competition on *PCI* is exactly the same in the concentrated and egalitarian ownership cases. Competition alleviates global poverty, i.e. in terms of *PCI*, only in zone A (i.e for $\bar{\theta} < \bar{\alpha}$). In zone $B \cup C$ (i.e for $\bar{\theta} > \bar{\alpha}$) competition worsens poverty in terms of *PCI*. Indeed the aggregated income is composed of wages and profits. Profits are higher under Monopoly and wages are higher under Duopoly. As it has been explained earlier at the individual level (Result 1) for high enough $\bar{\theta}$, the effect of profit outweighs the effect of wages on the aggregated income.

Concerning the three other poverty indicators, the results depend on the ownership structure. In the concentrated ownership case, Duopoly ensuring higher individual incomes to almost everybody according to Result 1, more competition naturally alleviates poverty in terms of the three indicators based on individual incomes: *IF*, $I_{Poorest}$ and I_{IPPS} .

In the egalitarian ownership case, competition can lead to more or less poverty, depending on the poverty indicator and to the model's parameters. Competition yields a lower Income Floor. Indeed individuals with the lowest income do not work, thus do not receive wages and derive their incomes only from dividends which are higher under Monopoly. In this case, competition worsens the income level of the Poorest people. This does not prevent the size of the Poorest population from being reduced by more competition. Indeed relative to Monopoly, Duopoly offers more labor options and raises wages, thus reducing unemployment and the size of the Poorest population. Considering the two indicators of extreme poverty together (*IF* and $I_{Poorest}$), in the case of egalitarian ownership, no conclusion may be drawn on the effect of competition on extreme poverty, as more competition lowers the Income Floor but reduces the size of the Poorest population. Regarding I_{IPPS} , for high values of $\bar{\theta}$ (zone C, i.e. $\bar{\theta} > 3\bar{\alpha}$), according to Result 1, income under Monopoly is higher than income under Duopoly, and Duopoly always generates more poor. For low values of $\bar{\theta}$ (zones A and B, i.e. $\bar{\theta} < 3\bar{\alpha}$), whether Monopoly or Duopoly generates more or less poverty depends on the level of the poverty line γ . This is due to the comparison between the income curves under Monopoly and Duopoly (Result 1 and Figure 4). Indeed as the Income Floor is lower under Duopoly, for low values of γ , the poor population under Duopoly is composed of the individuals who do not work (the Poorest under Duopoly) and some workers who bear too high training costs because of too high sensitivity to effort; and there are no poor under Monopoly thanks to high dividends. As γ exceeds some threshold value, the poor population under Monopoly is composed of the individuals who do not work (the Poorest under Monopoly) and some workers who bear too high training costs. Under Duopoly the workers who are poor are less numerous as better wages ensured by Duopoly outweigh the training costs.

Finally, note that for I_{IPPS} , when there is improvement or deterioration, it must be generally understood in a broad sense. Duopoly improves strictly IPPS indicator only for not too high γ . Indeed for too high values of γ everybody is poor under Monopoly as well as Duopoly and the Income Poor Population is thus the same under

both market structures. In the same way, Duopoly deteriorates strictly poverty in terms of IPPS indicator, only for not too low values of γ . Indeed for too low values of γ , there are poor neither under Monopoly nor under Duopoly. Even the Poorest under each of the two market structures are not poor regarding the poverty line γ . In this case also, the Income Poor Population is the same under both market structures. The effect of competition regarding this indicator is meaningful only for intermediate values of poverty line. This is explained in the proof of Lemma 4 in Appendix A.

4 Democratic vote and poverty

In this section, we investigate whether the majority vote is in accordance or not with less poverty regarding the four considered indicators. We can already tell that at the individual level, agents are not interested in higher incomes *per se* but in higher utilities resulting from consumption (linked to the intensity of preference for quality), prices and effort. Hence, the improvement of the global wealth does not necessarily result from a democratic choice, which amounts to say that the majority does not necessarily choose the option leading to alleviate poverty in terms of PCI. Even the Poorest population and the Income Poor Population (relative to some exogenous poverty line) may not choose the option giving them a better income (which is the Income Floor for the Poorest), let alone the individuals outside those populations. Finally, we easily understand that there is no reason to suppose that democracy should reduce the size of those populations ($I_{Poorest}$ and I_{IPPS}).

Democratic choice between Monopoly and Duopoly for the two considered ownership structures has been determined by KLLL (2017), comparing first each individual's utility under Monopoly and Duopoly, then comparing the number of individuals preferring each option. KLLL's Results 3 and 4 (in Appendix A) recall the results of KLLL (2017) on the vote outcome respectively in the concentrated and egalitarian ownership cases. We analyze in Propositions 2 and 3 if this majority vote between Monopoly and Duopoly leads to the option with more or less poverty according to the considered poverty indicators, respectively in the concentrated and egalitarian ownership cases.

Proposition 2 (Democracy and poverty/Concentrated ownership) *In the concentrated ownership case, the democratic choice between Monopoly and Duopoly alleviates poverty according to IF , $I_{Poorest}$ and I_{IPPS} . As for PCI , democracy alleviates poverty only when $\bar{\theta} < \bar{\alpha}$.*

In the concentrated ownership case, individual preferences (for almost everybody) are in accordance with higher income. Indeed the alternative giving the best wages (Duopoly) thus the best incomes, also ensures the best prices. The individual has converging interests as a worker and a consumer. Aggregating similar preferences, majority vote leads to less poverty regarding the three poverty indicators based on individual incomes: IF , $I_{Poorest}$ and I_{IPPS} . The only poverty indicator which may give diverging results is PCI . Indeed, from Lemma 2 in Appendix A, the global income is higher under Monopoly relative to Duopoly only for $\bar{\theta} > \bar{\alpha}$, as the profits which must be re-injected into the global income, are earned by a negligible part of the population who does not weigh

on vote.

In the egalitarian ownership case, the relationship between poverty and democracy is less simple than in the concentrated ownership case because the income encompasses an additional component which is the dividend. When we take into account the vote outcome from KLLL's Result 4, the former Figure 1 must be divided into four areas, which leads to Figure 2, in which M and D refer respectively to one of the two voting issues (Monopoly and Duopoly) and $\hat{\delta}$ the value of δ provided in KLLL's Result 4. Hence, in area AM, the majority votes Monopoly and in areas AD, BD and CD the majority votes for Duopoly. Formally we define these zones as follows:

$$\begin{aligned} AM &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\theta} < \hat{\delta}\bar{\alpha}\}, \\ AD &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \hat{\delta}\bar{\alpha} < \bar{\theta} < \bar{\alpha}\}, \\ BD &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\alpha} < \bar{\theta} < 3\bar{\alpha}\}, \\ CD &= \{(\bar{\alpha}, \bar{\theta}) \in [0, +\infty[\times [0, +\infty[\mid \bar{\theta} > 3\bar{\alpha}\}. \end{aligned}$$

The zones are depicted in Figure 2 in the $(\bar{\alpha}, \bar{\theta})$ -space.

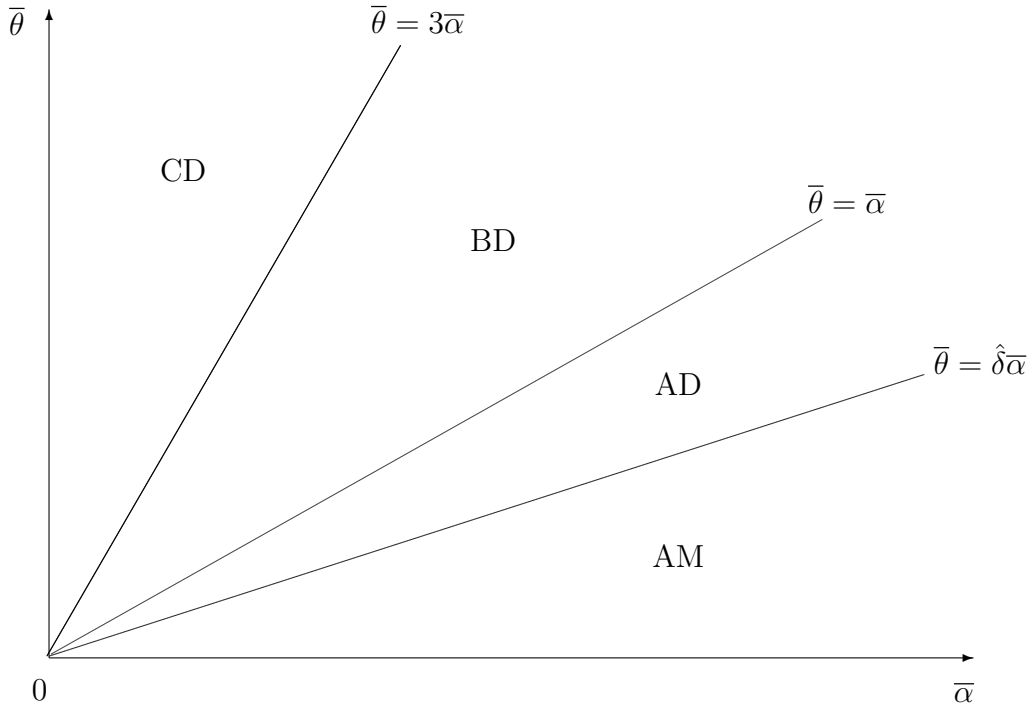


Figure 2: Zones in the $(\bar{\alpha}, \bar{\theta})$ -space of interest for the vote outcome and poverty in the egalitarian ownership case.

Proposition 3 (Democracy and poverty/Egalitarian ownership) *In the egalitarian ownership case, Table 3 gives for each zone of Figure 2, according to each poverty indicator, conditions under which democratic choice between Monopoly and Duopoly worsens (–) or alleviates (+) poverty.*

Indicator \ Zone	AM	AD	BD	CD
<i>PCI</i>	-	+	-	-
<i>IF</i>	+	-	-	-
<i>I_{Poorest}</i>	-	+	+	+
<i>I_{IPPS}</i>	+ for $\gamma < \tilde{\gamma}$	+ for $\gamma > \tilde{\gamma}$	+ for $\gamma > \tilde{\gamma}$	-

Table 3: Democratic choice and poverty in the egalitarian ownership case.

$$\text{with } \tilde{\gamma} = e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha} + \bar{\theta})}.$$

The results are at first glance more complicated than those obtained in the concentrated ownership case. If we look at the table in terms of lines i.e. indicator by indicator, in each line, there are minuses and pluses. This means that, for each poverty indicator, there are conditions on the model's parameters under which democracy leads to the best option in terms of this indicator and conditions under which democracy leads to the worst. Now if we look at the table in terms of columns, i.e. zone by zone, in each column, there are also minuses and pluses, meaning that for fixed parameters, there is at least one poverty indicator improved by democracy and at least another poverty indicator worsened by democracy. The four poverty indicators are thus never converging and what is good for one indicator is bad for at least another one.

That democracy does not lead necessarily to the best option for poverty may be explained at the individual and collective levels.

The individual choice, stemming from the indirect utility, is not necessarily consistent with higher individual income. Indeed the indirect utility results from his/her effort and from the consumption bundle permitted by the income at his/her disposal, which depend in turn on the salaries offered and on the goods' prices. This can be illustrated by Figures 5 to 11 (Appendix B) in which individual choices between Monopoly and Duopoly are superimposed with the individual income comparison between these two options.

Generically there are two types of individuals: those who vote consistently with a better individual income and those whose choice is inconsistent with a better income. In Figures 5 to 11, the hatched areas represent the individuals whose choices are inconsistent with better income. In the latter category, those who vote for Monopoly do so because under Duopoly they would work in the low quality firm and incur a training cost, whereas under Monopoly they would remain idle but receive a dividend. As they have a high sensitivity to effort, they prefer Monopoly to Duopoly, although their income under Monopoly is lower than under Duopoly. Those who vote for Duopoly do so because they have a high preference for quality. They prefer Duopoly under which they consume a higher quality at a better price.⁵

As a direct consequence, the majority does not necessarily vote for a situation with a higher global wealth. In other words the democratic choice does not always lead to the option with the highest PCI.

⁵In Figure 11, individual income is higher under Monopoly than under Duopoly for everybody but Duopoly is voted by the majority. This is so because those who vote for Duopoly, even though it provides lower income, are interested with acquiring the highest quality at the Duopoly price.

For instance, for low $\bar{\theta}$ (Figure 5), Monopoly is chosen by the majority, which leads to a lower PCI than what would have prevailed under Duopoly. The electorate of Monopoly chooses this option as it allows them a high dividend without working. The whole wealth is created only by individuals belonging to $[0, \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})}]$ who are a minority preferring Duopoly. In other words, the electorate of Monopoly which is the majority is not interested in a better global income.⁶

As for extreme poverty, the Income Floor being the lowest income, even the individuals concerned by it may prefer the option with the lowest Income Floor, as a higher individual income is not a goal in itself even for the Poorest category. Besides democracy may lead to the option with the smallest Poorest population as in the case $\bar{\theta} > \hat{\delta}\bar{\alpha}$ (Figures 7 to 11), or to the option with the largest Poorest population as in Figures 5 and 6 for $\bar{\theta} < \hat{\delta}\bar{\alpha}$. Moreover, in these latter cases the whole electorate of Monopoly is among the Poorest population. Among $Poorest_M$, a large part of those who vote for Monopoly have a better income under Monopoly than under Duopoly. As they do not work, this income comes here (in the egalitarian ownership case) exclusively from dividends, which are higher under Monopoly. The Poorest under Monopoly who vote for Duopoly are those whose incomes are higher under Duopoly or those who have a high intensity of preference for quality, thus preferring Duopoly which allows them to consume a higher quality at a lower price. The remaining few who vote for Monopoly despite a lower income (hatched area) make this choice because they prefer their conditions under Monopoly (where they do not consume the differentiated good, do not work thus do not incur training costs and perceive a high dividend) to their conditions under Duopoly (where they consume the low quality good, work in the low quality firm, incurring a training cost and perceive a low dividend).

As for the Income Poor Population and for the same type of reasons, the democratic choice may be consistent with a worsening (Figures 6, 7, 9 and 11) or an alleviation (Figures 5, 8 and 10) of poverty in terms of I_{IPPS} , depending on $\bar{\theta}$, $\bar{\alpha}$ and the poverty line γ .

5 Poverty or Unhappiness? Two new utility-based indicators.

The inconsistency between incomes and utilities, together with the complexity of the results on the effects of competition and democracy on poverty, especially in the egalitarian ownership case, urge us to propose other ways to account for poverty through utility rather than through income. The idea behind is to try to know whether that complexity is linked or not to the way poverty is measured, thus to try to disentangle the effect of competition and democracy on poverty from the effects of the inconsistency between utility and income.

⁶For high $\bar{\theta}$, (Figures 7 to 11), Duopoly is voted although it gives a lower global income. The electorate of Duopoly chooses this option because some gain a better income (stemming from a better wage) and some consume a higher quality at a lower price.

In this section we introduce two utility-based poverty indicators: Utility Floor and Unhappiest indicator. We then analyze the effect of competition and democracy on these new indicators.

Utility Floor

The Utility Floor is the lowest level of utility in the population. Formally,

$$UF = \min_{\alpha \in [0, \bar{\alpha}], \theta \in [0, \bar{\theta}]} U(\alpha, \theta).$$

The larger UF, the happier are the unhappiest.

The Unhappiest indicator

The population concerned with the Utility Floor is what we call the Unhappiest. Formally,

$$\text{Unhappiest} = \underset{\alpha \in [0, \bar{\alpha}], \theta \in [0, \bar{\theta}]}{\text{argmin}} U(\alpha, \theta).$$

The Unhappiest Population Size (UPS) is the area of Unhappiest.

$$UPS = \int \int_{\text{Unhappiest}} d\alpha d\theta.$$

The Unhappiest indicator is defined to be

$$I_{\text{Unhappiest}} = \frac{1}{UPS}.$$

The larger the Unhappiest indicator the smaller the size of the unhappiest population, i.e. the less numerous are the unhappiest.

Together with UF , the Unhappiest indicator account for extreme dissatisfaction or unhappiness.

Comparison of the Income-based and Utility-based indicators. Both UF and IF are equal to the initial endowment e in the concentrated ownership case, increased by the individual share in the total profit in the egalitarian ownership case, but as provided in Remark 1 the Poorest are more numerous than the Unhappiest.

Remark 1 (Comparison of the Poorest and the Unhappiest indicators) *For each ownership structure, under Monopoly as well as under Duopoly the Unhappiest are a subset of the Poorest.*

The Poorest are individuals who choose not to work, whether they consume or not. But the Unhappiest are those among the Poorest who choose not to consume either. Indeed, some among the Poorest have a sufficiently high preference for the product's quality, hence choose to consume the differentiated good, which increases their utility

relative to those having a low preference for the product's quality, who decide not to consume the differentiated good, achieving the lowest level of utility.

The effect of Competition on Unhappiness. The introduction of competition on the product market allows a part of the individuals who would rather choose not to work under Monopoly to work in the lowest quality firm under Duopoly, since it requires less effort than working in the Monopoly Firm. It also allows a part of the individuals who would rather choose not to consume under Monopoly to consume the lower quality under Duopoly, since the lower quality is more accessible than the Monopoly's one. Hence those individuals can lift their utilities from the Utility Floor under Monopoly to an upper utility under Duopoly. Thus, as proved in Proposition 4 below, the introduction of competition reduces the unhappiest population (as well as the Poorest population as we already proved) regardless of the ownership structure.

Proposition 4 (Effect of competition on the Unhappiest indicator) *For a given ownership structure, the Unhappiest population is always larger under Monopoly than under Duopoly. Formally,*

$$Unhappiest_D \subset Unhappiest_M \quad \text{thus} \quad I_{Unhappiest}^M < I_{Unhappiest}^D.$$

Hence competition reduces the size of the unhappiest population. But are the unhappiest made happier by more competition? To answer this question we have to consider UF . Proposition 5 provides a formal comparison of Utility Floor under Monopoly and under Duopoly.

Proposition 5 (Effect of competition on the Utility Floor) *Concerning the effect of competition on UF ,*

- *in the concentrated ownership case, the Utility Floor is the same under Monopoly and Duopoly:*

$$UF_M = UF_D.$$

- *in the egalitarian ownership case, Monopoly generates higher Utility Floor, that is:*

$$UF_M > UF_D.$$

The unhappiest are always more numerous under Monopoly than under Duopoly regardless of the ownership structure. However, UF depends on the ownership structure. In the concentrated ownership case, more competition has no effect on the Utility Floor. Considering both indicators, in the concentrated case, competition alleviates extreme unhappiness. In the egalitarian ownership case, Monopoly generates higher Utility Floor; and considering both indicators, no conclusion may be drawn as the more competition the less numerous are the unhappiest but the more unhappy they are.

The effect of Democracy on unhappiness. Proposition 6 analyzes the effect of democracy on Utility-based indicators under each ownership structure.

Proposition 6 (Effect of democracy on unhappiness) *Concerning the effect of democracy on unhappiness,*

- *in the concentrated ownership case, the democratic choice between Monopoly and Duopoly alleviates unhappiness according to UF and $I_{Unhappiest}$.*
- *in the egalitarian ownership case, Table 4 gives, according to each unhappiness indicator and according to the value of δ , conditions under which democratic choice between Monopoly and Duopoly worsens $(-)$ or alleviates $(+)$ unhappiness.*

Indicator \ value of δ	$\delta < \hat{\delta}$	$\delta > \hat{\delta}$
UF	+	-
$I_{Unhappiest}$	-	+

Table 4: Democratic choice and unhappiness in the egalitarian ownership case.

When democracy improves the utility of the unhappiest (Utility Floor), it systematically enlarges the size of the unhappiest population ($I_{Unhappiest}$). Both indicators never converging, this prevents from reaching a conclusion on the effect of democracy on extreme unhappiness.

To conclude this section, in the concentrated ownership case, competition alleviates extreme unhappiness (as it alleviates extreme poverty), and democracy leads to the best option in terms of both utility-based indicators. In the egalitarian ownership case, competition reduces the number of unhappy people but makes them more unhappy, and democracy never alleviates poverty in terms of both utility-based indicators at the same time.

6 An empirical study on the effect of competition on poverty

In this paragraph, we study empirically the effect of competition on poverty⁷. The degree of competition will be measured by what is commonly called Market concentration⁸. The larger the market concentration the less competitive the market is. We use the Hirschman Herfindahl Index (HH Index) as proxy for Market concentration, and the headcount ratio at the 1.9 USD poverty line as proxy for poverty. The adopted proxy for poverty corresponds to $IPPS$ of our theoretical model with a particular value of $\gamma = 1.9$ USD.

Rewilak (2017) studies the determinants of poverty using the poverty headcount ratio at the national poverty line as proxy of poverty. He finds that economic growth, GDP per capita and financial depth reduce poverty. He reports non significant effects

⁷We recall that, to our knowledge, no empirical study exists on this issue.

⁸Not to be confused with ownership concentration.

of government spending and trade openness. Ames et al. (2001) report that inflation increases poverty while economic growth reduces it.

Thus in addition to HH Index, our model includes economic growth, inflation rate, government expenses, trade openness and GDP. We choose not to consider financial resources to the private sector, as the correlation matrix (Table 9 from Appendix C) shows that it is highly correlated to GDP. Table 8 from Appendix C provides the definitions of the variables and the expected sign of the effects of the covariates according to Rewilak (2017) and Ames et al (2001).

We estimate the impact of the HH Index on poverty for an unbalanced panel of 178 countries, for the period ranging from 1991 to 2016. The data are collected from the WITS database (World Integrated Trade Solution) for the HH Index, and from the World Bank Indicators for all the other variables. The 178 countries studied are the ones from the World Bank Indicators database that have an HH Index in the WITS database.

We estimate the following model:

$$POV_{it} = \alpha + \beta HH_{it} + \gamma X_{it} + \varepsilon_{it},$$

Where POV_{it} is the poverty Proxy, α is the constant term of the model, HH_{it} is the Hirschman Herfindahl Index, X_{it} is the vector of control variables or covariates and ε_{it} is the error term.

Wooldridge test for autocorrelation in panel data and Modified Wald test for groupwise heteroskedasticity show that the data suffer from autocorrelation and heteroskedasticity. Hence the appropriate estimation method is FGLS (Feasible Generalized Least Squares) for panel data. The results of the estimation are provided in Table 10 of Appendix C, considering the model with economic growth among the covariates (Columns 1, 2 and 3) and without economic growth (Columns 4, 5 and 6).

The coefficients of control variables have the same signs obtained by Rewilak (2017) and Ames et al (2001) and are highly significant. As for the HH Index, its effect on poverty is not significant considering the whole sample (Columns 1 and 4). However, this estimation is made without considering the ownership structure which plays an important role in our theoretical model.

To account for the ownership structure, we use the market capitalization (MKAL) of an economy. Indeed when the financial market is developed, ownership tends to be more dispersed, as the shares of firms are freely traded on stock markets, which may approximate the egalitarian ownership case. However, when financial markets are less developed, firms remain generally family-owned, therefore ownership is concentrated.

To control for this ownership effect, we divide our sample into 2 categories of countries: those with high market capitalization (above the median) and those with low

market capitalization (below the median). Then we run our estimates on each sub-sample separately. Interestingly, we find that when the ownership is concentrated (Columns 2 and 5 in Table 10), the HH Index has a significant effect in worsening poverty. However when the ownership is dispersed (Columns 3 and 6 in Table 10), the market concentration has no significant effect on poverty.

The obtained estimates support to some extent our theoretical findings. Indeed, they first support the fact that the effect of competition (or equivalently HH Index) on poverty generally depends on ownership. Second, the estimates under concentrated ownership (sub-sample of countries with less developed financial markets) are completely in line with our theoretical findings (Table 1 from Proposition 1) stating that more competition alleviates poverty in terms of *IPPS* under concentrated ownership. Third, under egalitarian ownership, theoretically (Table 2 of Proposition 1), the effect may be positive or negative, depending on the value of the poverty line γ and the other model's parameters ($\bar{\alpha}$ and $\bar{\theta}$), which may explain why we find no significant effect of HH Index on poverty in the sub-sample of countries with developed financial markets. Indeed, the model's parameters ($\bar{\alpha}$ and $\bar{\theta}$) which are characteristics of labor and consumption of the differentiated good are not controlled for in our estimation. The sample may include countries with different values of these parameters belonging to different areas of Figure 1, which may lead, when the countries are aggregated, to the absence of significance of the effect.

Back to stylized facts, the apparent decrease of poverty in ex-communist countries after the collapse of communism are not in contradiction with our theoretical results and the above empirical study. Indeed, all those countries except Montenegro and China may be ranked among the countries with high concentration of ownership for which more competition is expected to decrease poverty. Thus for the major part of the considered countries, the observations are perfectly in line with the expected outcome. As for Montenegro, there are too many missing values to permit a relevant conclusion. As for China which is ranked among countries with a developed financial market, theoretically more competition may decrease poverty under some conditions. Hence, the observed decrease is a possible outcome of the raise of competition, even if we ignore the other effects due to the collapse of communism which may enhance the expected effect of competition, such as among others the decrease of inefficiencies due to public monopolies.

7 Conclusion

Considering a general equilibrium model with vertical preferences and two extreme ownership structures, we first investigated the effect of more competition on poverty regarding four well-known income-based poverty indicators. Second, we investigated whether the direct vote by all individuals between Monopoly and Duopoly leads or not to the best option in terms of each poverty indicator.

The answer to these two questions is not simple, especially in the egalitarian ownership case. The reason is that more competition is synonymous of higher wages and

lower prices but lower dividends too. More competition may raise or not individual income, thus may reduce poverty or not depending on the wage and price effect relative to the profit one.

As for the effect of direct democracy, the individual is not necessarily interested in a higher income *per se* but by higher utility and those interested by higher incomes may not be numerous enough to influence majority vote.

Introducing two new theoretical poverty indicators measuring extreme unhappiness based on utility rather than income, the inconsistency between income and utility is eliminated. But no general conclusion may be drawn on the effect of competition and democracy on extreme unhappiness.

Finally our theoretical findings concerning the effect of competition on poverty have been tested empirically. The empirical estimates support to some extent our theoretical findings. This is so even if the hypotheses we made in the theoretical model are constraining and should reduce drastically the testability of our results. Indeed our theoretical model considers a differentiated good produced from labor as the unique input, determines the effect of competition through the comparison between monopoly and duopoly and not the effect of an increase in the number of firms, and considers only two extreme ownership structures. This shows that our results are highly robust. This also shows that competition and the ownership structure are very important determinants of poverty but not in a simple way.

The model and the findings are a novelty relative to the existing literature, the theoretical and empirical one. To our knowledge, no previous paper considered poverty under this light and from both theoretical and empirical viewpoints. However the work may be continued in several directions. First, the poverty line bundle may be redefined so as to include the differentiated good which has a price depending on the market structure. This means that the same poverty line bundle has a different value under Monopoly and under Duopoly. Thus the poverty line under Monopoly is different from the poverty line under Duopoly. Second, we may take into account the effect of poverty on productivity. We may indeed consider a dynamic game with two periods. At the second period, the poor population has an altered productivity. At the first period, there is a possibility to tax the rich and redistribute the tax to the poor in order to reduce the effect on the second period. Then, we would calculate the “right” taxation rate and the optional proportion of poor to “save”. Finally, we may try to improve the empirical testability of our results. In this respect, we may rewrite all our results introducing a rate between 0 and 1 representing the proportion of individuals who are owners among the whole population. This rate will be a more accurate measure of the concentration of ownership and will be more convenient for empirical testing.

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Appendix A

To calculate the individual incomes, we need the equilibrium outcomes under Monopoly (KLLL's Result 1) and Duopoly (KLLL's Result 2). These equilibria do not depend on the ownership structure. We recall them for completeness.

KLLL's Result 1 (The Monopoly equilibrium) [KLLL, 2017] *At equilibrium, the Monopoly chooses quality $q_m^* = \bar{q}$, price $p_m^* = \frac{\bar{\theta}\bar{q}(\bar{\theta}+2\bar{\alpha})}{2(\bar{\theta}+\bar{\alpha})}$ and salary $\omega_m^* = \frac{\bar{\alpha}\bar{q}\bar{\theta}}{2(\bar{\theta}+\bar{\alpha})}$, making the profit $\pi_m^* = \frac{\bar{\alpha}\bar{q}\bar{\theta}^3}{4(\bar{\theta}+\bar{\alpha})}$.*

KLLL's Result 2 (Duopoly equilibrium) *At the Duopoly equilibrium Firms 1 and 2 sell respectively qualities $q_1^* = \frac{4}{7}\bar{q}$ and $q_2^* = \bar{q}$ at prices $p_1^* = \frac{\bar{\theta}\bar{q}(\bar{\theta}+8\bar{\alpha})}{14(\bar{\theta}+\bar{\alpha})}$ and $p_2^* = \frac{\bar{\theta}\bar{q}(\bar{\theta}+4\bar{\alpha})}{4(\bar{\theta}+\bar{\alpha})}$ with salaries $\omega_1^* = \frac{\bar{\alpha}\bar{\theta}\bar{q}}{2(\bar{\theta}+\bar{\alpha})}$ and $\omega_2^* = \frac{3\bar{\alpha}\bar{\theta}\bar{q}}{4(\bar{\theta}+\bar{\alpha})}$, and make profits $\pi_1^* = \frac{\bar{\alpha}\bar{q}\bar{\theta}^3}{48(\bar{\theta}+\bar{\alpha})}$ and $\pi_2^* = \frac{7\bar{\alpha}\bar{q}\bar{\theta}^3}{48(\bar{\theta}+\bar{\alpha})}$.*

We need Lemma 1 for the Proof of Result 1.

Lemma 1 (Individual income) *The individual income under Monopoly in the Concentrated (C) and Egalitarian (E) ownership cases are respectively given by:*

$$I_{MC}(\alpha, \theta) = \begin{cases} e + \bar{q} \left(-\alpha + \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})} \right) & \text{if } 0 < \alpha < \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})}, \\ e & \text{if } \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})} < \alpha < \bar{\alpha}. \end{cases}$$

$$I_{ME}(\alpha, \theta) = \begin{cases} e + \bar{q} \left(-\alpha + \frac{\bar{\theta}(\bar{\theta}+2\bar{\alpha})}{4(\bar{\alpha}+\bar{\theta})} \right) & \text{if } 0 < \alpha < \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})}, \\ e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha}+\bar{\theta})} & \text{if } \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})} < \alpha < \bar{\alpha}. \end{cases}$$

The individual income under Duopoly in the Concentrated (C) and Egalitarian (E) ownership cases are respectively given by:

$$I_{DC}(\alpha, \theta) = \begin{cases} e + \bar{q} \left(-\alpha + \frac{3\bar{\alpha}\bar{\theta}}{4(\bar{\alpha}+\bar{\theta})} \right) & \text{if } 0 < \alpha < \frac{7\bar{\alpha}\bar{\theta}}{12(\bar{\alpha}+\bar{\theta})}, \\ e + \bar{q} \left(-\frac{4\alpha}{7} + \frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha}+\bar{\theta})} \right) & \text{if } \frac{7\bar{\alpha}\bar{\theta}}{12(\bar{\alpha}+\bar{\theta})} < \alpha < \frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\alpha}+\bar{\theta})}, \\ e & \text{if } \frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\alpha}+\bar{\theta})} < \alpha < \bar{\alpha}. \end{cases}$$

$$I_{DE}(\alpha, \theta) = \begin{cases} e + \bar{q} \left(-\alpha + \frac{\bar{\theta}(9\bar{\alpha}+2\bar{\theta})}{12(\bar{\alpha}+\bar{\theta})} \right) & \text{if } 0 < \alpha < \frac{7\bar{\alpha}\bar{\theta}}{12(\bar{\alpha}+\bar{\theta})}, \\ e + \bar{q} \left(-\frac{4\alpha}{7} + \frac{\bar{\theta}(3\bar{\alpha}+\bar{\theta})}{6(\bar{\alpha}+\bar{\theta})} \right) & \text{if } \frac{7\bar{\alpha}\bar{\theta}}{12(\bar{\alpha}+\bar{\theta})} < \alpha < \frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\alpha}+\bar{\theta})}, \\ e + \frac{\bar{q}\bar{\theta}^2}{6(\bar{\alpha}+\bar{\theta})} & \text{if } \frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\alpha}+\bar{\theta})} < \alpha < \bar{\alpha}. \end{cases}$$

Proof of Lemma 1. For Monopoly then Duopoly, we respectively replace the equilibrium values provided in KLLL's Results 1 and 2 in the individual incomes given respectively in Tables 5 and 6.

Working decision \ θ	$\bar{\theta}$	
	0	Egalitarian ownership
W	$I(W) = \omega_m - \alpha q_m + e$	$I(W) = \omega_m - \alpha q_m + \frac{\Pi_m}{\alpha \bar{\theta}} + e$
\bar{W}	$I(\bar{W}) = e$	$I(\bar{W}) = \frac{\Pi_m}{\alpha \bar{\theta}} + e$
$\bar{\alpha}$		

Table 5: Individual income under Monopoly

Working decision \ θ	$\bar{\theta}$	
	0	Egalitarian ownership
W_2	$I(W_2) = \omega_2 - \alpha q_2 + e$	$I(W_2) = \omega_2 - \alpha q_2 + \frac{\Pi_1 + \Pi_2}{\alpha \bar{\theta}} + e$
W_1	$I(W_1) = \omega_1 - \alpha q_1 + e$	$I(W_1) = \omega_1 - \alpha q_1 + \frac{\Pi_1 + \Pi_2}{\alpha \bar{\theta}} + e$
\bar{W}	$I(\bar{W}) = e$	$I(\bar{W}) = \frac{\Pi_1 + \Pi_2}{\alpha \bar{\theta}} + e$
$\bar{\alpha}$		

Table 6: Individual income under Duopoly

Note that, in both cases, the income is independent of θ . ■

Proof of Result 1. The comparison of I_D and I_M is easily derived by superimposing the income curves for Duopoly and Monopoly in each ownership structure (Figures 3 and 4, Appendix B) drawn from Lemma 1. ■

We need Lemmas 2, 3 and 4 in the Proof of Proposition 1.

Lemma 2 (Per Capita Income) *In terms of PCI, in the concentrated as well as in the egalitarian ownership case, we have*

$$PCI^D > PCI^M \quad \text{if and only if} \quad \bar{\theta} < \bar{\alpha}.$$

Proof of Lemma 2.

The equilibrium values being independent of the ownership structure and profits having to be considered in the global wealth either under concentrated or egalitarian ownership, one way to calculate the global income GI is to add the profits to the sum of the individual incomes under the concentrated case (Lemma 1) and the sum of initial endowments. Dividing GI by the population size $\bar{\alpha}\bar{\theta}$ gives PCI .

Calculations yield under both market structures, for Monopoly:

$$PCI_M = e + \frac{\bar{q}\bar{\theta}^2 (3\bar{\alpha} + 2\bar{\theta})}{8(\bar{\alpha} + \bar{\theta})^2},$$

and for Duopoly:

$$PCI_D = e + \frac{\bar{\theta}^2 \bar{q} (11\bar{\alpha} + 4\bar{\theta})}{24(\bar{\alpha} + \bar{\theta})^2}.$$

The difference

$$PCI_D - PCI_M = \frac{\bar{\theta}^2 \bar{q} (\bar{\alpha} - \bar{\theta})}{12(\bar{\alpha} + \bar{\theta})^2},$$

which is of the same sign as $(\bar{\alpha} - \bar{\theta})$.

■

Lemma 3 (Income Floor and Poorest indicator) *In terms of IF and Poorest indicator,*

- *in the concentrated ownership case, IF is the same for Monopoly and Duopoly:*

$$IF^M = IF^D.$$

- *in the egalitarian ownership case, Monopoly generates higher IF, that is:*

$$IF^M > IF^D.$$

- *in the concentrated ownership as well as in the egalitarian ownership cases, the Poorest population is larger under Monopoly. Formally, $I_{Poorest}^M < I_{Poorest}^D$.*

Proof of Lemma 3 . From Lemma 1 and Figures 3 and 4, we derive the Income Floor and the Poorest population under Monopoly and Duopoly, for each ownership structure. The outcome is provided in Table 7:

Poverty Indicator	Monopoly		Duopoly	
	Concentrated	Egalitarian	Concentrated	Egalitarian
IF	e	$e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha} + \bar{\theta})}$	e	$e + \frac{\bar{q}\bar{\theta}^2}{6(\bar{\alpha} + \bar{\theta})}$
Poorest population	$[\frac{\bar{\alpha}\bar{\theta}}{2(\bar{\alpha} + \bar{\theta})}, \bar{\alpha}] \times [0, \bar{\theta}]$		$[\frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\alpha} + \bar{\theta})}, \bar{\alpha}] \times [0, \bar{\theta}]$	

Table 7: Income Floor and Poorest population under Monopoly and Duopoly.

Comparisons of Income Floor and Poorest indicator values under Monopoly and Duopoly are straightforward from Table 7. ■

We now consider the Income Poor Population Size, i.e. individuals having an income below the poverty line γ . We denote by $IPPS_M$ and $IPPS_D$ respectively the Income Poor Population Size under Monopoly and under Duopoly. Lemma 4 provides the comparison between $IPPS_M$ and $IPPS_D$ for each ownership structure.

Lemma 4 (Income Poor Population Size) *Concerning the effect of competition on IPPS,*

- *in the concentrated ownership case, $IPPS_M \geq IPPS_D, \forall \gamma > 0$ and $IPPS_M > IPPS_D$, if and only if $e \leq \gamma < e + \frac{3\bar{q}\bar{\theta}\bar{\alpha}}{4(\bar{\theta}+\bar{\alpha})}$.*
- *in the egalitarian ownership case,*
 - *for $\bar{\theta} < 3\bar{\alpha}$, $IPPS_D \geq IPPS_M$ and $IPPS_D > IPPS_M$ if and only if $e + \frac{\bar{q}\bar{\theta}^2}{6(\bar{\alpha}+\bar{\theta})} \leq \gamma < \tilde{\gamma} = e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha}+\bar{\theta})}$.*
 - *for $\bar{\theta} > 3\bar{\alpha}$, the comparison between $IPPS_D$ and $IPPS_M$ depends on the value of γ as follows.*
 - * *If $\gamma \geq e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha}+\bar{\theta})}$, then $IPPS_D \leq IPPS_M$;*
 - * *If $\gamma \leq e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha}+\bar{\theta})}$, then $IPPS_D \geq IPPS_M$.*
 - * *$IPPS_D < IPPS_M$ if and only if $e + \frac{\bar{q}\bar{\theta}^2}{4(\bar{\alpha}+\bar{\theta})} \leq \gamma < e + \frac{\bar{q}(2\bar{\theta}^2+9\bar{\alpha}\bar{\theta})}{12(\bar{\alpha}+\bar{\theta})}$.*

Proof of Lemma 4. To compare $IPPS_M$ and $IPPS_D$ for the same poverty line γ , graphically, on the Duopoly and Monopoly superimposed income curves (Figures 3 and 4), we draw a horizontal line representing the level of the poverty line γ . The Income Poor Population corresponds to individuals whose income lies below this line.

- In the concentrated ownership case, from Figure 3, it is clear that any γ generates more poor under Monopoly than under Duopoly. Thus, $IPPS_M \geq IPPS_D \quad \forall \gamma > 0$. But when $\gamma \geq e + \frac{3\bar{q}\bar{\theta}\bar{\alpha}}{4(\bar{\theta}+\bar{\alpha})}$, everybody is poor under both market structures. When $\gamma < e$, there are poor neither under Monopoly nor under Duopoly.
- In the egalitarian ownership case, we distinguish four cases depending on the values of $\bar{\theta}$ and $\bar{\alpha}$, the same cases distinguished to draw the individual income curves (Figure 4). Using the same expressions of a , b , c , d and f explicited in Figure 4, we have the following.
 - The case $\bar{\theta} < 2\bar{\alpha}$ corresponds to the upper left quadrant of Figure 4.
 - * For $\gamma < a$, there are poor neither under Monopoly nor under Duopoly: $IPPS_M = IPPS_D$.

- * For $a \leq \gamma < b$, then γ is below the lowest income under Monopoly. Thus there are no poor under Monopoly but there are poor under Duopoly. Hence $IPPS_D > IPPS_M$.
 - * For $b < \gamma < d$, the γ -line intersects both curves and intersects the Monopoly curve at a lower value of α . Thus $IPPS_M > IPPS_D$.
 - * For $d < \gamma < f$, the γ -line intersects only the Duopoly line at some positive value of α . Everybody is poor under Monopoly but not under Duopoly. Thus $IPPS_M > IPPS_D$.
 - * For $\gamma \geq f$, everybody is poor under Monopoly and Duopoly. $IPPS_M = IPPS_D$.
- The case $2\bar{\alpha} < \bar{\theta} < 3\bar{\alpha}$ corresponding to the upper right quadrant of Figure 4 and qualitatively looking like the preceding case, is dealt with similarly.
 - The cases $3\bar{\alpha} < \bar{\theta} < 9\bar{\alpha}$ and $\bar{\theta} > 9\bar{\alpha}$ correspond respectively to the bottom left quadrant and the bottom right quadrant of Figure 4. In both cases, individual income under Duopoly lies below individual income under Monopoly. Any horizontal poverty line γ satisfying $a \leq \gamma < d$ generates strictly more poor under Duopoly than under Monopoly. For $\gamma < a$, there are no poor under both market structures and for $\gamma > d$ everybody is poor under both market structures.

■

Proof of Proposition 1. We easily derive the effect of competition on poverty for each ownership structure from Lemmas 2, 3 and 4. ■

KLLL's Result 3 on the vote outcome in the concentrated ownership case is needed to prove Proposition 2.

KLLL's Result 3 (Vote outcome/Concentrated ownership) *In the concentrated ownership case, almost all individuals prefer Duopoly to Monopoly or are indifferent between both, irrespective of $\bar{\alpha}$ and $\bar{\theta}$. Hence Duopoly is chosen by the majority.*

Proof of Proposition 2. From KLLL's Result 3 and Proposition 1 we can easily derive for the concentrated ownership case conditions on $\bar{\alpha}$ and $\bar{\theta}$ for which the majority vote alleviates poverty regarding each considered poverty indicator and those for which it deteriorates it. ■

KLLL's Result 4 on the vote outcome in the egalitarian ownership case is needed to prove Proposition 3.

KLLL's Result 4 (Vote outcome/Egalitarian ownership case) *In the egalitarian ownership case, recalling that $\delta = \frac{\bar{\theta}}{\bar{\alpha}}$, the majority votes for Duopoly if and only if: $\delta > \hat{\delta}; \hat{\delta} \simeq 0.629445$.*

Proof of Proposition 3. From KLLL's Result 4 and our findings in Proposition 1, we can easily derive for the egalitarian ownership case conditions on $\bar{\alpha}$ and $\bar{\theta}$ for which the majority vote alleviates poverty regarding each considered poverty indicator and those for which it deteriorates it. ■

Proof of Remark 1. Regardless of the ownership structure, the Unhappiest are individuals who choose not to consume and not to work (Tables 1, 2, 3 and 4 of Online Appendix from KLLL, 2017). Proof of Lemma 3 provides the Poorest population under Monopoly and Duopoly.

- Under Monopoly,

$$\text{Poorest}_M = [\frac{\bar{\alpha}\bar{\theta}}{2(\bar{\theta} + \bar{\alpha})}, \bar{\alpha}] \times [0, \bar{\theta}].$$

$$\text{Unhappiest}_M = [\frac{\bar{\alpha}\bar{\theta}}{2(\bar{\theta} + \bar{\alpha})}, \bar{\alpha}] \times [0, \frac{\bar{\theta}(\bar{\theta} + 2\bar{\alpha})}{2(\bar{\theta} + \bar{\alpha})}].$$

Hence, Unhappiest_M is a subset of Poorest_M .

- Under Duopoly,

$$\text{Poorest}_D = [\frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\theta} + \bar{\alpha})}, \bar{\alpha}] \times [0, \bar{\theta}].$$

$$\text{Unhappiest}_D = [\frac{7\bar{\alpha}\bar{\theta}}{8(\bar{\theta} + \bar{\alpha})}, \bar{\alpha}] \times [0, \frac{\bar{\theta}(\bar{\theta} + 8\bar{\alpha})}{8(\bar{\theta} + \bar{\alpha})}].$$

Hence, Unhappiest_D is a subset of Poorest_D .

■

Proof of Proposition 4. The comparison is obvious from the expressions of Unhappiest_M and Unhappiest_D found in the proof of Remark 1. ■

Proof of Proposition 5. For the concentrated ownership case, according to Tables 1 and 2 from Online Appendix in KLLL (2017), the lowest level of utility is e under Duopoly and Monopoly.

As for the egalitarian ownership case, according to Tables 3 and 4 from Online Appendix in KLLL (2017), the lowest level of utility is $e + \lambda\pi$ which is greater under Monopoly than Under Duopoly since the Monopoly profit is greater than the Duopoly joint profit. ■

Proof of Proposition 6 . From KLLL's Results 3 and 4 on the majority vote respectively in the concentrated and the egalitarian cases and our findings in Propositions 4 and 5, we can easily derive conditions under which the majority vote leads to more or less unhappiness according to the two considered indicators. ■

Appendix B

Appendix B provides some figures and tables used in the paper.

Figures 3 and 4 represent superimposed income curves under Monopoly and Duopoly, respectively, in the concentrated and in the egalitarian ownership cases.

Each figure from 5 to 11 represents a map of the population in the egalitarian ownership case for the different relevant cases in terms of $\bar{\alpha}$, $\bar{\theta}$ and the poverty line γ , as it appears in Proposition 3. On each of these figures are depicted:

- The individual choice between Monopoly (M) and Duopoly (D) as they appear in KLLL (2017).
- The majority vote, which appears in the caption of each figure. For instance, if a figure is relative to area AM of Figure 2, M stands for Monopoly as the majority vote.
- The comparison between the individual income under Monopoly and the individual income under Duopoly stemming from Result 1.
- Hatched areas corresponding to parts of the population who vote inconsistently with better income.
- The Poorest Population under Monopoly and under Duopoly, Poorest_M and Poorest_D , stemming from Lemma 3.
- The Income Poor Population under Monopoly and under Duopoly, relative to the poverty line γ , stemming from Lemma 4.

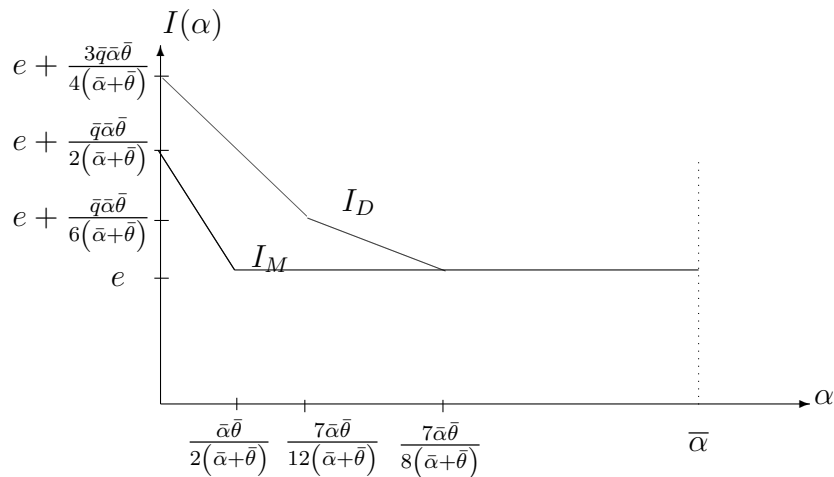


Figure 3: Superimposed individual income curves under Monopoly and Duopoly in the concentrated ownership case.

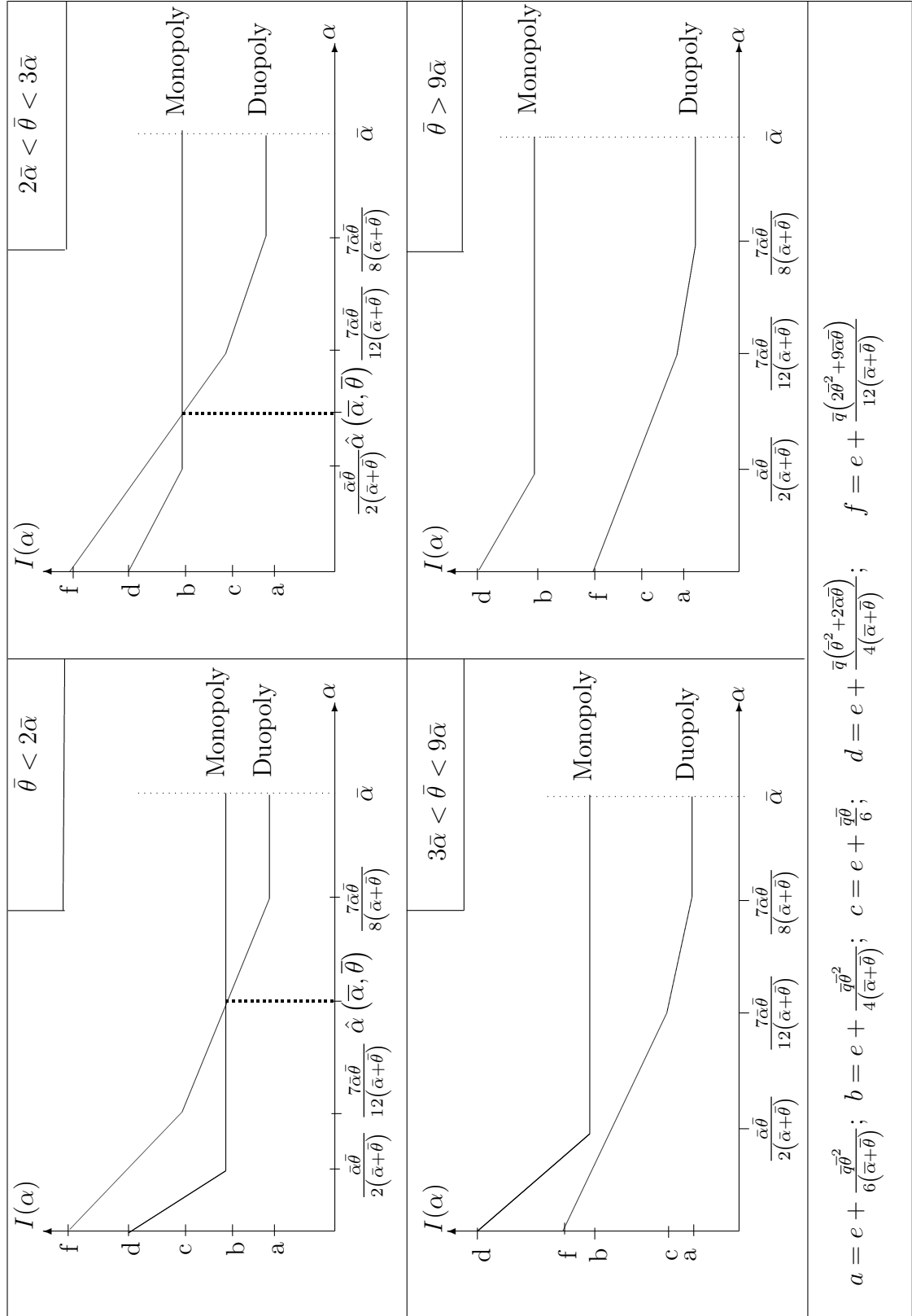


Figure 4: Superimposed individual income curves under Monopoly and Duopoly in the egalitarian ownership case.

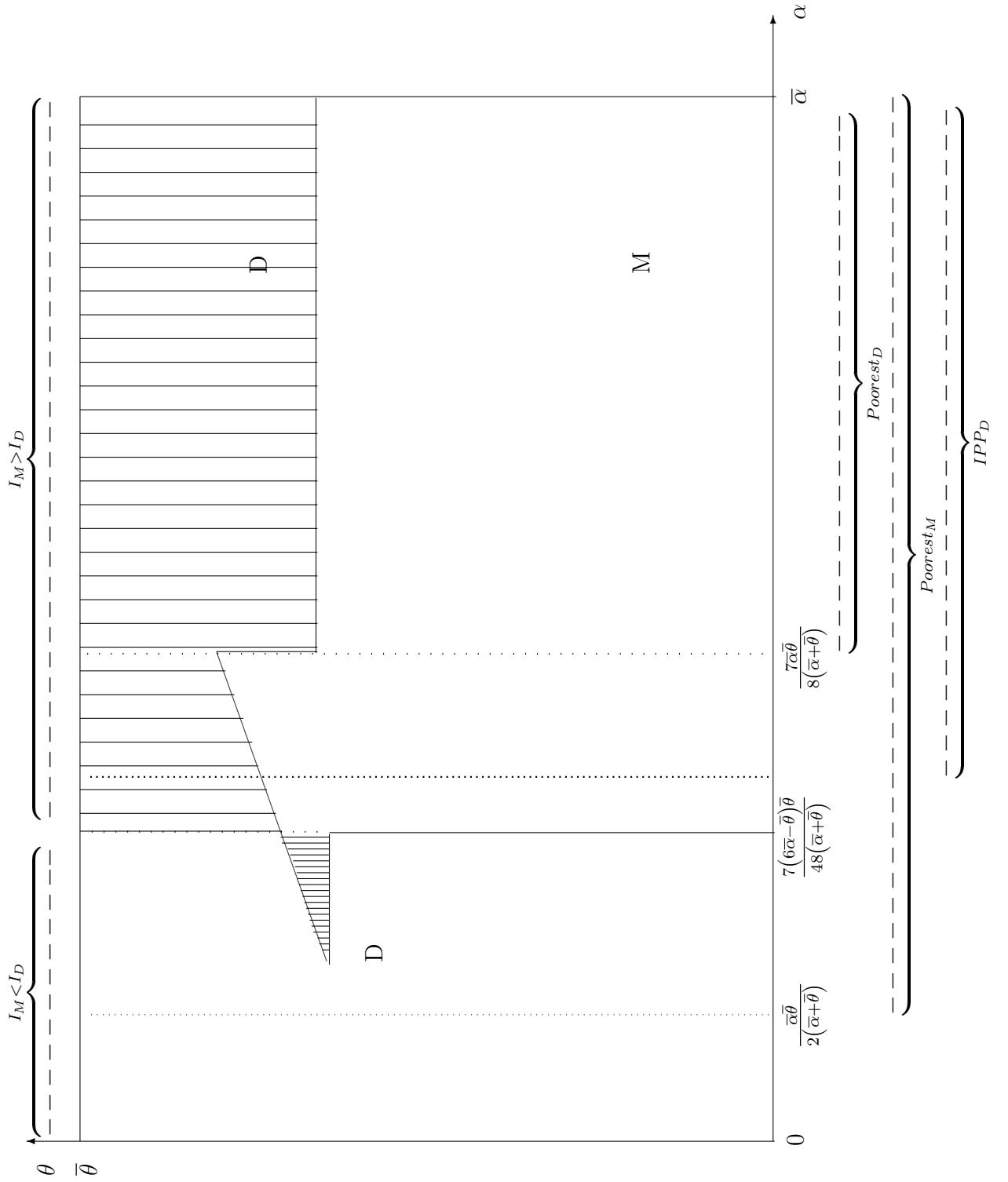


Figure 5: The case $\bar{\theta} < \hat{\delta}\bar{\alpha}$ (zone AM in Figure 2) for $\gamma < \tilde{\gamma}$.

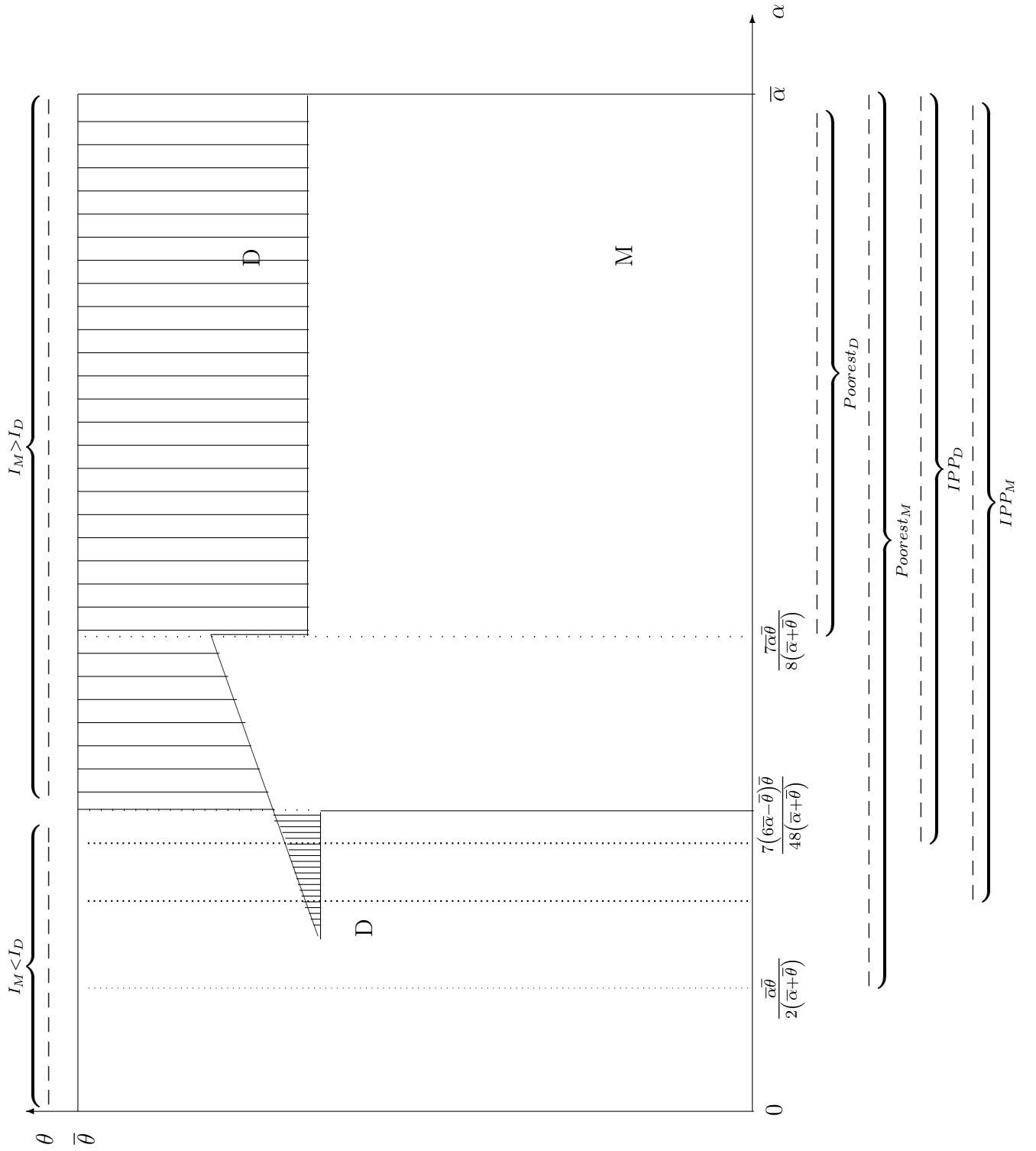


Figure 6: The case $\bar{\theta} < \hat{\delta}\bar{\alpha}$ (zone AM in Figure 2) for $\gamma > \tilde{\gamma}$.

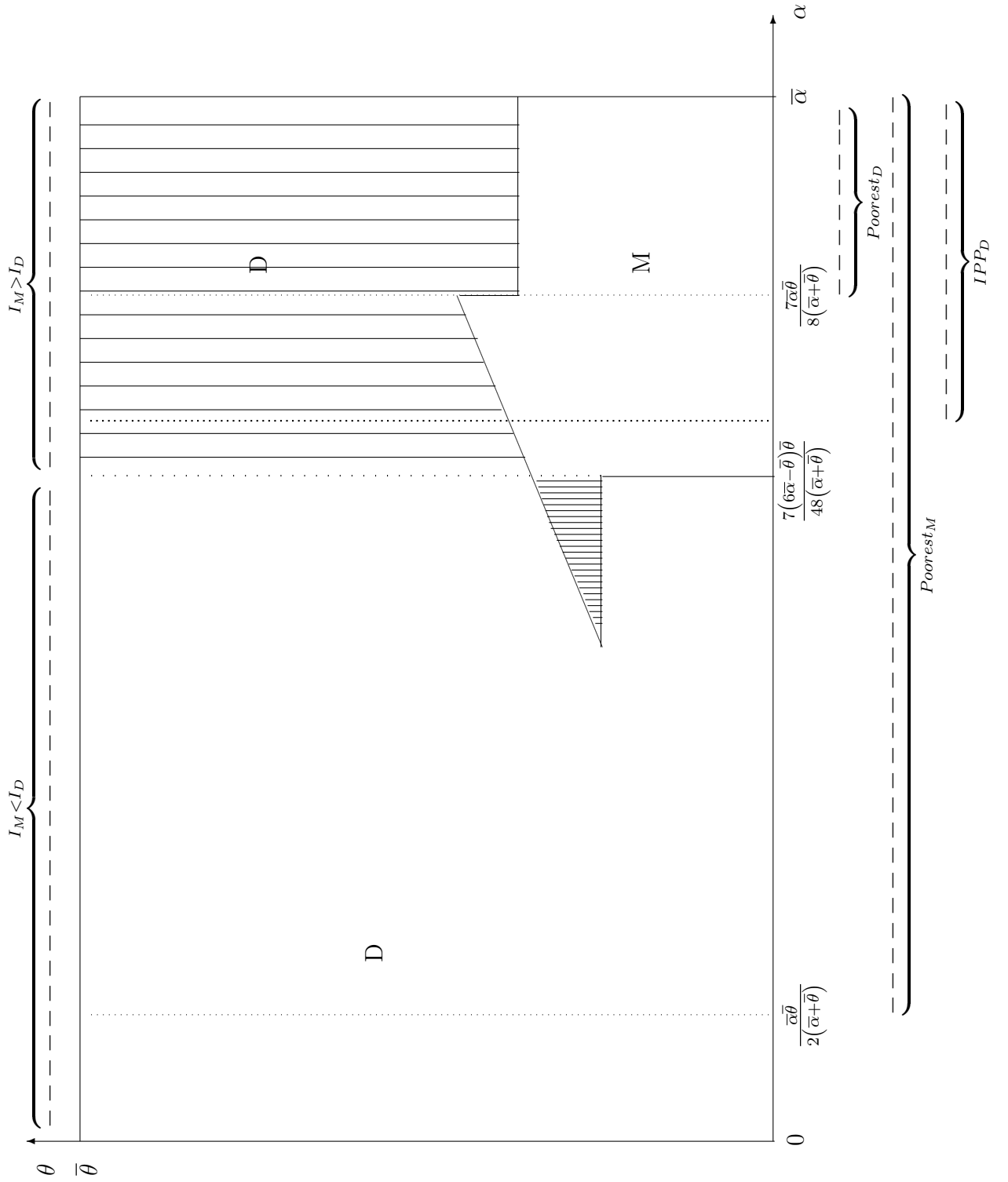


Figure 7: The case $\hat{\delta}\bar{\alpha} < \bar{\theta} < 2\bar{\alpha}$ (zone AD and part of zone BD in Figure 2) for $\gamma < \tilde{\gamma}$.

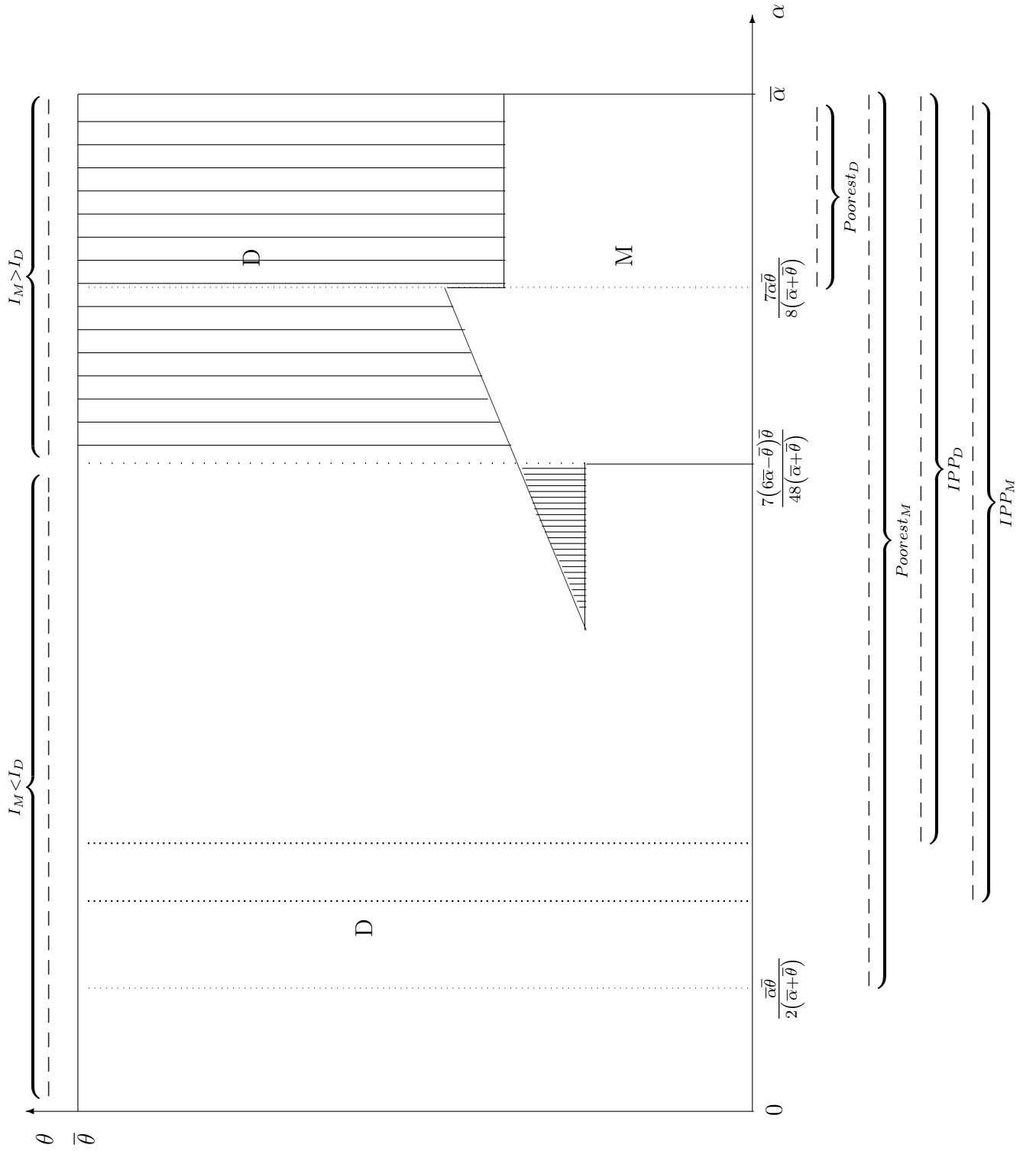


Figure 8: The case $\hat{\delta}\bar{\alpha} < \bar{\theta} < 2\bar{\alpha}$ (zone AD and part of zone BD in Figure 2) for $\gamma > \tilde{\gamma}$.

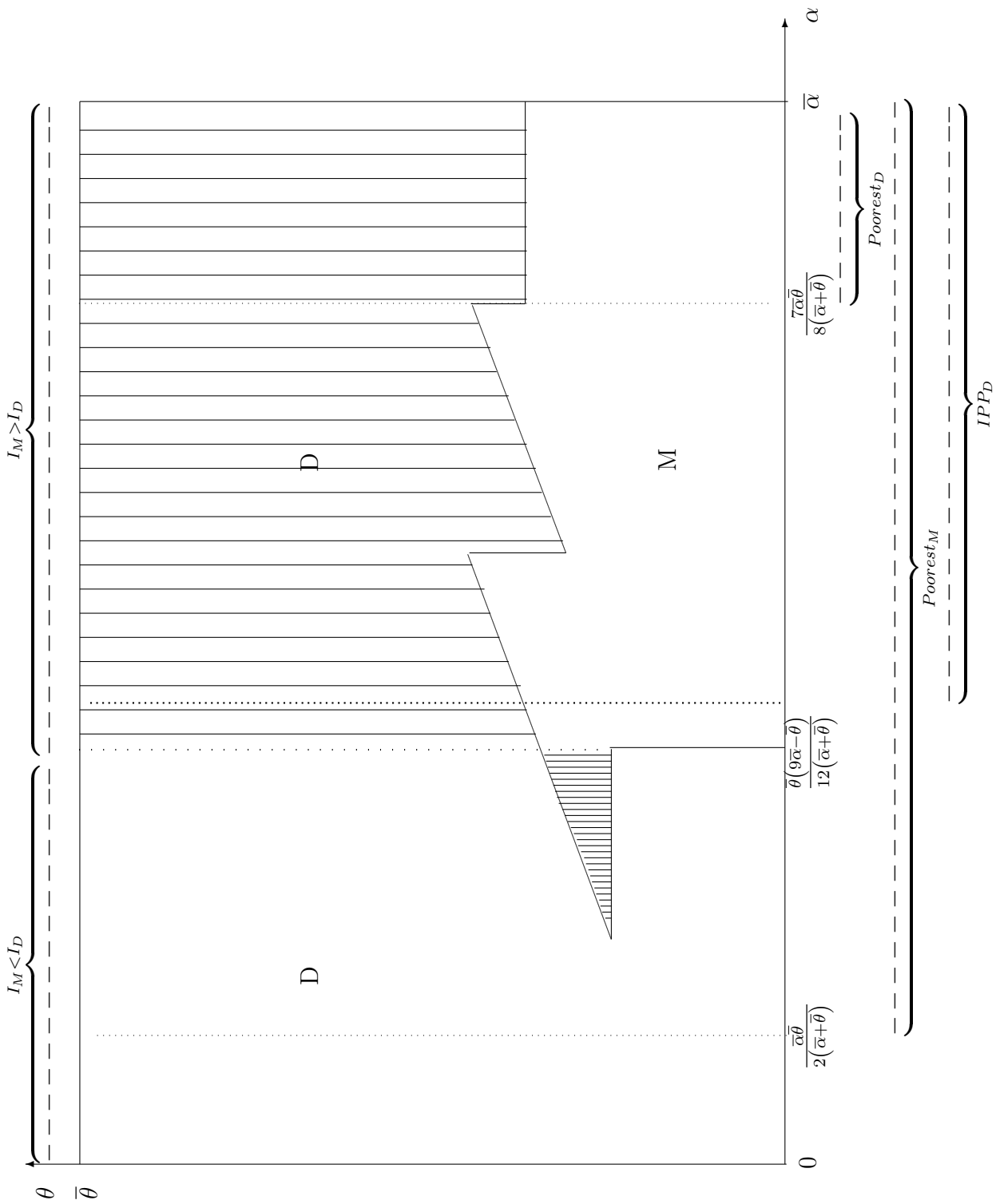


Figure 9: The case $2\bar{\alpha} < \bar{\theta} < 3\bar{\alpha}$ (part of zone BD in Figure 2) for $\gamma < \tilde{\gamma}$.

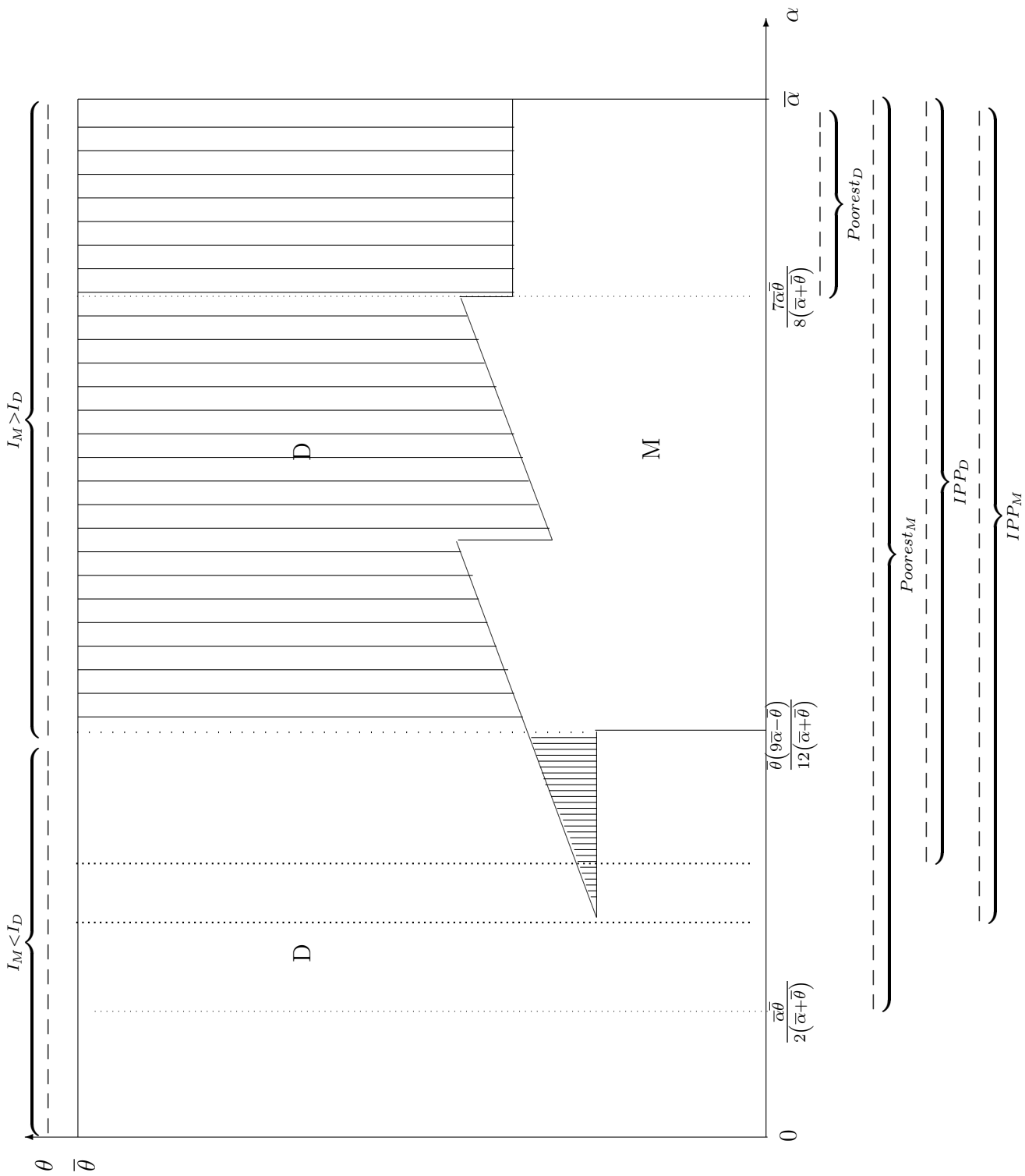


Figure 10: The case $2\bar{\alpha} < \bar{\theta} < 3\bar{\alpha}$ (part of zone BD in Figure 2) for $\gamma > \tilde{\gamma}$.

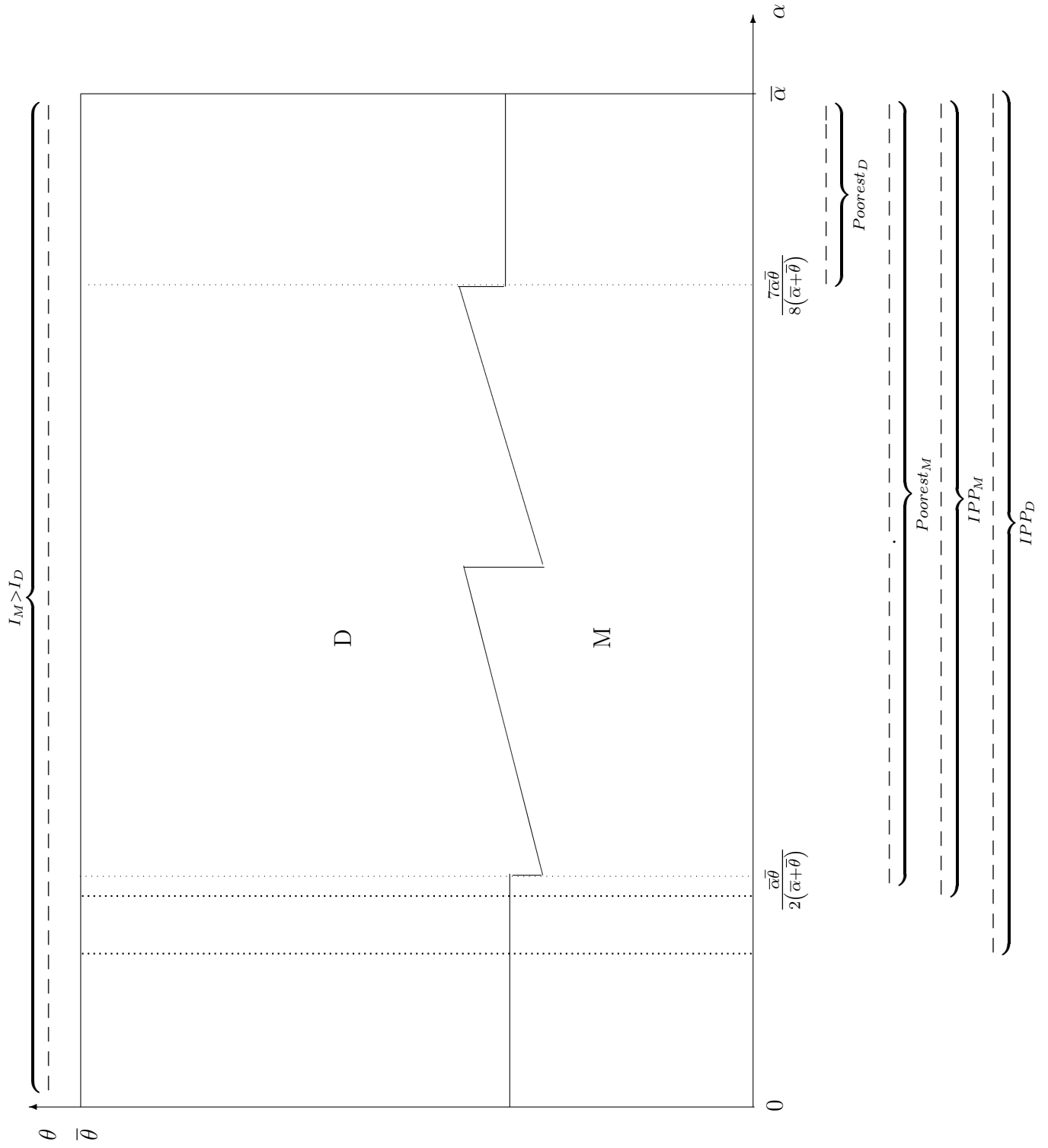


Figure 11: The case $\bar{\theta} > 3\bar{\alpha}$ (zone CD in Figure 2).

Appendix C

Stylized facts

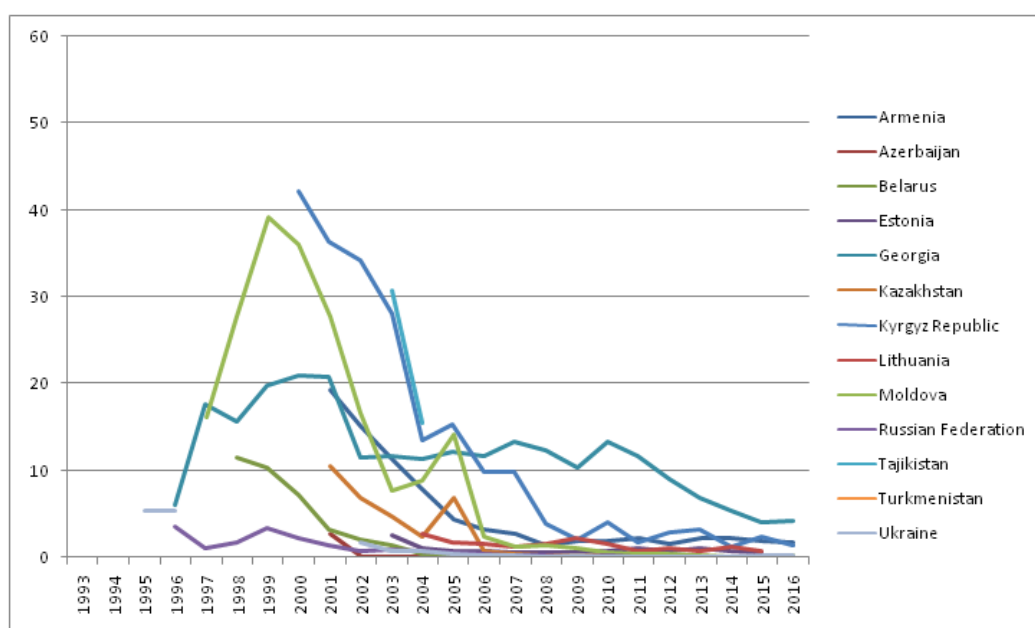


Figure 12: Poverty at the 1.9 USD poverty line for ex-USSR countries after the collapse of communism

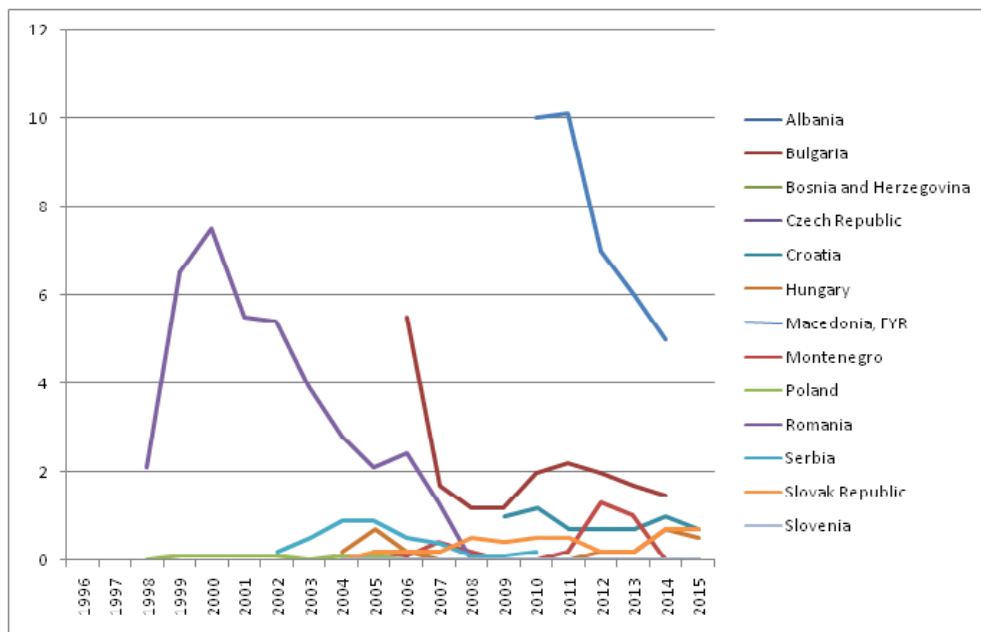


Figure 13: Poverty at the 1.9 USD poverty line for ex-communist East-European countries after the collapse of communism

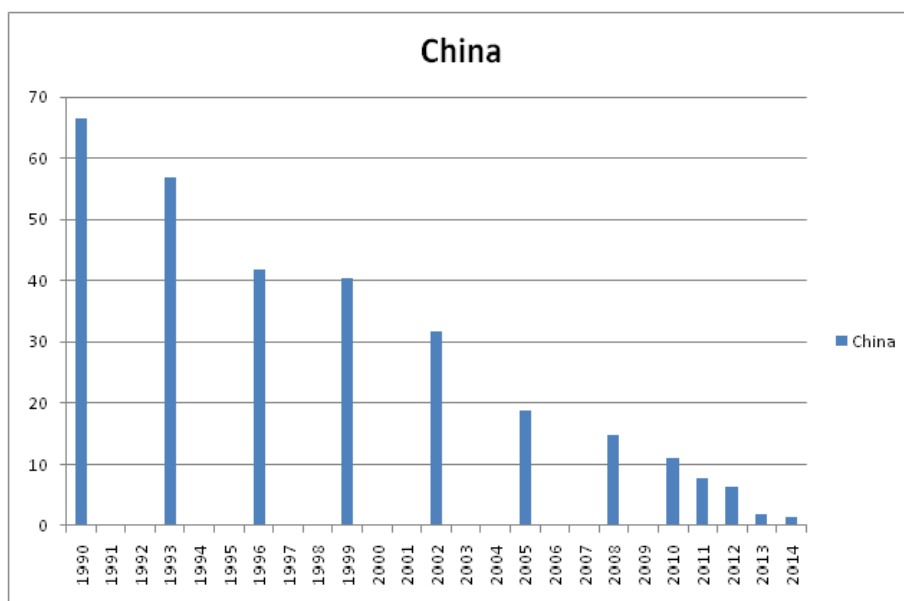


Figure 14: Poverty at the 1.9 USD poverty line for China after the collapse of communism

Empirical study

Table 8: Definition of variables and the expected signs of covariates.

Variable	Abbreviation	Definition	POV
Poverty headcount ratio	POV	The percentage of the population living on less than 1.90 USD a day at 2011 international prices.	
Hirschman Herfindahl Index	HH	HH Market concentration index. It ranges between 0 and 1. 0 indicates perfect competition and 1 indicates a monopolistic situation.	?
GDP per capita	GDP	Gross Domestic Product per capita converted to international dollars using purchasing power parity rates	(-)
Economic growth	GRW	Annual percentage growth rate of GDP at market prices based on constant local currency.	(-)
Inflation rate	INFL	Inflation as measured by the annual growth rate of the GDP implicit deflator	(+)
Government expenses	G	Expense is cash payments for operating activities of the government in providing goods and services (% of GDP)	(-)
Trade openness	TRADE	Trade is the sum of exports and imports of goods and services measured (% of GDP)	(-)
Financing of private sector	FP	Domestic credit to private sector (% of GDP)	(-)
Stock market capitalization to GDP	MKAL	Value of listed shares to GDP	

All variables are reported as natural logarithms with the exception of economic growth. As in Rewilak (2017), the inflation rate is logged after applying a transform $(1 + \text{inflation rate})$.

Table 9: Correlation matrix.

	POV	GDP	TRADE	MKAL	HH	FP	INFL	G	GRW
POV	1.00								
GDP	-0.82	1.00							
TRADE	-0.23	0.23	1.00						
MKAL	-0.34	0.53	0.05	1.00					
HH	0.29	-0.23	0.09	-0.15	1.00				
FP	-0.59	0.70	0.24	0.62	-0.25	1.00			
INFL	0.23	-0.30	-0.07	-0.35	0.08	-0.41	1.00		
G	-0.55	0.44	0.20	0.07	-0.19	0.30	-0.15	1.00	
GRW	0.15	-0.12	0.03	-0.05	-0.02	-0.16	0.04	-0.26	1.00

Table 10: The effect of market concentration on poverty headcount ratio.

Variables	(1) All	(2) Concentrated	(3) Egalitarian	(4) All	(5) Concentrated	(6) Egalitarian
GDP	-1.439*** (0.0545)	-1.393*** (0.0903)	-1.665*** (0.0783)	-1.413*** (0.0555)	-1.380*** (0.0919)	-1.643*** (0.0784)
HH	0.0688 (0.0559)	0.230*** (0.0844)	-0.0241 (0.0730)	0.0931 (0.0567)	0.264*** (0.0849)	-0.0223 (0.0732)
G	-0.729*** (0.117)	-0.987*** (0.158)	-0.193 (0.167)	-0.624*** (0.114)	-0.903*** (0.155)	-0.102 (0.154)
TRADE	-0.00661*** (0.00107)	-0.00186 (0.00170)	-0.0114*** (0.00133)	-0.00725*** (0.00108)	-0.00231 (0.00171)	-0.0117*** (0.00131)
INFL	-0.121*** (0.0441)	-0.246*** (0.0661)	0.115* (0.0667)	-0.146*** (0.0441)	-0.268*** (0.0668)	0.117* (0.0647)
GRW	-0.0457*** (0.0113)	-0.0414*** (0.0149)	-0.0305* (0.0175)			
Constant	17.54*** (0.495)	18.03*** (0.818)	17.88*** (0.737)	16.94*** (0.484)	17.61*** (0.818)	17.31*** (0.676)
Observations	635	317	270	639	320	271
Number of countries	104	46	37	104	46	37

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1