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Economic Development As Opportunity Equalization

John E. Roemer

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Abstract

Economic development should be conceived of as the degree to which an economy has implemented an efficient and just distribution of economic resources. The ubiquitous measure of GDP per capita reflects a utilitarian conception of justice, where individual utility is defined as personal income, and social welfare is the average of utilities in a population. A more attractive conception of justice is opportunity-equalization. Here, a two-dimensional measure of economic development is proposed, based upon viewing individuals' incomes as a consequence of circumstances, effort, and policy. The first dimension is the average income level of those in the society with the most disadvantaged circumstances, and the second dimension is the degree to which total income inequality is due to differential effort, as opposed to differential circumstances. This pair of numbers is computed for a set of 22 European countries. No country dominates all others on both dimensions. The two-dimensional measure induces a partial ordering of countries with respect to development.

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The author may be contacted at john.roemer@yale.edu.

"Economic development as opportunity equalization"

by

John E. Roemer[*]

Yale University

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[*] John Roemer is a professor of political science and economics at Yale University; his e-mail address is john.roemer@yale.edu I am grateful to referees of this journal for suggestions leading to important revisions, and to the many scholars with whom I have discussed these ideas. This article is based upon a lecture given at the ABCDE meeting in Paris, 2011.

1. Introduction[1]

Suppose we are concerned with the inequalities that exist in a society with respect to the distribution of some desirable good or advantage – wealth, life expectancy, literacy, or wage-earning capacity. The causes of inequality in that distribution can be partitioned into two categories: those for which individuals should not be held responsible, and those for which they should be. We need not here be concerned with the problem of free will, and the possibility that people are not responsible for anything if they lack free will, because every society has a conception of responsibility, and we may take that as the politically salient conception. Thus, in many societies, it is thought wrong that an individual's income be strongly correlated with her parent's education or social position, for, assuming that that correlation reflects causality, these family characteristics seem to be ones from which children should not differentially benefit or suffer. On the other hand, most societies believe that adults should be held responsible for various choices that they make, assuming that they possess adequate information about the alternatives. Let us call the social and biological aspects of a person's environment for which society believes he should not be responsible his *circumstances*, those choices and actions for which he should be held responsible, his *effort*, and the desirable good whose distribution we are concerned with the *objective.*

When we have a data set that permits us to measure the inequality in the distribution of the objective, and its correlation with circumstances and effort, it is usually necessary (because data sets are finite) to choose a fairly small number of

[1] This section reviews previous work of the author on the conceptualization of equality of opportunity (see Roemer (1993, 1998, 2002)).

circumstances, each of which can take on a fairly small number of values. Thus, one circumstance might be parental education, which one could partition into three values; another might be race, partitioned into three categories, and so on. Call a vector of circumstances a *type.* Thus, one may partition the population of the data set into a finite number of types, where a type is the set of individuals with (approximately) the same vector of circumstances. Denote the types by $t = 1,,...,T$. Denote the level of the objective with which we are concerned (income, wage-earning capacity, or life expectancy) by *u*, which is a function of circumstances, policy, and effort. Thus, $u^t(e,\varphi)$ is the average level of the objective for individuals of type *t* whose effort choices are summarized by the vector *e* if the policy is φ. Denote the policy space by Φ. In this formulation, any characteristic of the individual is either a component of circumstance, or of effort.

Effort here is measured so that increasing effort produces an increasing value of the objective. In this way, effort's role in the functions u^t differs from its relationship to utility in economic theory. For example, if the objective is health status, then *refraining* from smoking constitutes positive effort, although that abstinence may lower 'utility' in the usual sense, where the utility function is a representation of subjective preferences.

If the population faces a policy $\varphi \in \Phi$, there will ensue a distribution of effort in each type; denote the distribution functions of these probability distributions by $G^t_\varphi(\cdot)$. These distribution functions will, of course, have characteristics that reflect type – that is, circumstances. For instance, we will find different distributions of smoking behavior in different socio-economic types. Because the goal of equal-opportunity policy is to compensate persons for their circumstances, we should compensate them as well for the

effect of their circumstances on their effort. How can we decide when two persons, of different types, have expended *comparable degrees* of effort? I propose to measure the *degree* of a person's effort by his rank in the distribution G_{φ}^{t}. Rank sterilizes out of the distribution aspects of it that reflect circumstances. Thus, for example, if we view 'years of education chosen' as effort, and persons in two different types both rank at the 80th centile of the distributions of years of education in their respective types, we will declare them to have expended equal *degrees* of effort (although their actual years of education may be quite different).

We may thus define the function

$$v^{t}(\pi,\varphi) = u^{t}((G_{\varphi}^{t})^{-1}(\pi),\varphi), \qquad (1)$$

which is the (average) value of the objective, when the policy is φ, of the individuals at the π^{th} quantile of the distribution of effort of their type. If effort is uni-dimensional, the function v^{t} is well-defined. If *e* is multi-dimensional, then in general it is not, and we should then replace vectors of effort with, for example, the linear combination of its components that best explains the value of the objective. For practical purposes, however, in many applications, one need never measure effort: one can simply define the values $v^{t}(\pi,\varphi)$ directly as the level of the objective in type *t* at the π^{th} quantile of the distribution of the objective in that type. Implicitly, this approach assumes that effort is declared to be that constellation of choices that enhance the value of the objective, conditional upon type.

In figure 1, we see the distribution function of post-fisc income of three types of men in Austria, in 2005, where the unique circumstance defining type is the level of education of the individual's more educated parent. The yellow curve is the distribution

function of those men whose parent had at least some tertiary education; the red curve, of those men whose parent had 12 years of education, and the blue curve, of those men whose parent had less than 12 years of education.

Taking the objective to be post-fisc income, the inverses of the functions in the graph are the functions $v^t(\pi)$. So to see the graphs of the three functions v^t, simply reflect figure 1 over the vertical axis and then rotate it 90 degrees clockwise.

Holding persons responsible for their effort means that if two individuals in the same type (who are exposed to identical policy treatments by hypothesis) sustain different values of the objective, there is no inequity, because by hypothesis, these different values are due to differential effort, something for which they are responsible. However, differences between the *functions* v^t are ethically undesirable – a reflection of unequal opportunities—because individuals are not responsible for their type/circumstances. Therefore, the goal of policy should be so render the functions $\{v^t(\cdot,\varphi)\}$ as similar as possible. Since we identify individuals at the same rank of their distributions as having expended equal degrees of effort, the goal is to choose the policy φ to render the distribution functions (in Figure 1) as close together as they can be (that is, to minimize the horizontal distance between the functions).

But we do not want equality of distribution functions at a low level: we therefore desire some kind of maxi-minimization. Suppose we fixed a particular value of π; inequality in the *T* numbers $\{v^t(\pi,\varphi) \mid t \in T\}$ is due not to differential effort, by hypothesis, but to differential circumstances. Thus, we should choose the policy to

$$\max_{\varphi \in \Phi} \min_{t \in T} v^t(\pi,\varphi). \qquad (2)$$

However, we are concerned with *every* level of effort: a reasonable way of addressing all effort levels is to take the average of the numbers being maximized in (2), that is, to choose policy to

$$\max_{\varphi \in \Phi} \int_0^1 \min_t v^t(\pi, \varphi) d\pi. \qquad (3)$$

I call the solution to (3) the *equal opportunity policy*. It must be emphasized that this policy is conditional upon the definition of circumstances, and the choice of policy space[2].

Define $W^{EO}(\varphi) = \int_0^1 \min_t v^t(\pi, \varphi) d\pi$. $W^{EO}(\cdot)$ defines an ordering on Φ; that is to say that:

$$\varphi \succeq_{EOp} \varphi' \Leftrightarrow W^{EO}(\varphi) \geq W^{EO}(\varphi'),$$

In words, $W^{EO}(\varphi)$ is the average value of the lower envelope of the objective functions, across types.

There is a special case of interest. Typically, there are constraints that we impose upon policies, so that the policy space for the problem, Φ, is fairly small – for example, we may limit ourselves to affine income tax policies, a uni-dimensional (small) set in the large set of income-tax policies. In this case, it may well be that there is one type – denote it type 1 -- that for all policies $\varphi \in \Phi$ is unambiguously the most disadvantaged one, in the sense that its distribution function is dominated (first-order stochastically) by the others at every policy. This is virtually the case in figure 1, where the distribution functions are stacked almost unambiguously – it is obvious that the most disadvantaged

[2] A generalization of program (3) is provided in Roemer (2012), where a large family of possible equality-of-opportunity measures is proposed.

type is the one of men whose more educated parent had fewer than twelve years of education, as its income distribution function is virtually FOSD by the distributions of the other two types[3]. In this case, the left-hand envelope of the distribution functions is simply the distribution function of a single type, and equation (3) reduces to:

$$W^{EO}(\varphi) = \int_0^1 v^1(\pi,\varphi)d\pi \equiv \bar{v}^1(\varphi) \qquad (4)$$

where $\bar{v}^1(\varphi)$ is the average value of the objective[4] in the most disadvantaged type under policy φ. In this case, the equal-opportunity ethic directs us to *choose the policy to maximize the average value of the objective in the most disadvantaged type* – assuming that this type is unambiguously the most disadvantaged, for any feasible policy[5].

It is worthwhile contrasting the equal-opportunity ethic with one of its main competitors, the utilitarian ethic. Denote by f^t the fraction of the population in type *t*. The utilitarian policy maximizes the ordering given by:

$$W^U(\varphi) = \sum_{t=1}^{T} f^t \int_0^1 v^t(\pi,\varphi)d\pi \qquad (5)$$

i.e., the average value of the objective in the population.

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[3] First-order stochastic dominance does not hold for very low incomes in figure 1; almost surely, this is the case because the children of highly educated parents are going to university, and earning very low incomes early in their careers, less than those who have entered the working-class after secondary school.

[4] Recall that the area above a distribution function and bounded by the line at ordinate value one is the mean of the distribution.

[5] Indeed, an alternative proposal, due to van de Gaer (1993), is to implement equality of opportunity by maximizing the function $W^*(\varphi) = \max_{\varphi} \min_{t} \int v^t(\pi,\varphi)d\pi$. In $W^*(\cdot)$, the 'min' and 'integral' operators are commuted, with respect to $W^{EO}(\cdot)$. Fleurbaey and Peragine (2012) call W^{EO} an 'ex post' approach, and W^* an 'ex ante' approach to measuring equality of opportunity. In Roemer (2012), I offer reasons for my preference for the measure W^{EO}. However, what the text has just pointed out is that, in special cases, the two measures coincide.

A third ordering, associated with John Rawls, is the ordering which maximizes the minimum value of the objective in the population; I will write:

$$W^R(\varphi) = \min_{\pi,t} v^t(\pi, \varphi). \qquad (6)$$

We see that the equal-opportunity ethic lies 'between' utilitarianism and the Rawlsian difference principle; it is less extreme than the Rawlsian formulation, in that it maximizes an *average* of minima across effort levels. Actually, my naming of (6) as the Rawlsian view is not quite fair, for Rawls wrote that the difference principle should apply to 'social groups,' not individuals. If we take the different types to be the relevant social groups, then, at least in the special case where (4) holds, the equal-opportunity ethic maximizes the minimum objective value over social groups, and hence possesses a Rawlsian ancestry.

In the general case, however, if the distribution functions cross, the solution of (3) does not entail maximizing the average value of the most disadvantaged type, but rather, maximizing the area above the left-hand envelope of the distribution functions of the types, and bounded by the horizontal line of height one.

To summarize, we have provided an ordering of policies with respect to the equal-opportunity ethic. That ordering takes as data a particular social view of personal responsibility, summarized in a set of circumstances and an implied typology – a partition of the population – and a policy space. The objective for which opportunities are to be equalized is typically some measurable and interpersonally comparable kind of advantage, the kind of thing a ministry in a government might be concerned with, such as income, health, life expectancy, or educational achievement.

2. Economic development

Economic development should be measured by the extent to which a society has achieved a desirable distribution of advantage. Desirability should include considerations of both efficiency and justice or fairness. Indeed, the most common measure of economic development, GDP per capita, is based upon the utilitarian ethic, which computes the level of social welfare as the average of the utilities in the population, where utility is taken to be proportional to income.

The human development index (HDI) is not utilitarian, because it is not an average of a value of some kind of advantage over a population. But it is a convex combination of the average of three kinds of advantage over a population: the individual's income (or consumption), his degree of literacy (which could be coded as 0 or 1), and his life expectancy[6]. The human development index is an average of the averages of these three dimensions over the whole society. So the HDI does not essentially depart from utilitarian practice in that it looks only at population averages, although it looks at three averages instead of only one. To be precise, this description is valid for the HDI as defined up to the 2009 Human Development Report of the UNDP. But in 2010, the Human Development Report introduced the 'inequality adjusted human development index,'which, although still consequentialist, is not utilitarian.

Neither of these measures of development is sensitive to the distinction between circumstances and effort. They are *consequentialist* measures of how well an economic system is doing, in that the data required to assess the system's desirability are the values

[6] An individual's life expectancy can be defined as the average age of death of a cohort of persons with the individual's characteristics. I am assuming that the life expectancy in a country is the average of life expectancies of individuals, so defined.

of various outcomes for members of the population. The equal-opportunity view, however, focuses upon the distinction between circumstances and effort. Thus, to assess the desirability of a system, it requires not only the data just mentioned, but also knowledge of the *type* of each individual. It is a non-consequentialist measure, for it will assess differently the same outcome for two individuals, if they have different circumstances. Utilitarianism condemns inequalities if their elimination would increase average or total welfare (however it is measured); opportunity egalitarianism condemns them to the extent they are due to circumstances beyond the control of the individuals concerned. The views are quite different.

Opportunity egalitarianism is not only a superior ethic to utilitarianism, it is the one implicitly endorsed by members of many societies. Suppose one asks the proverbial man on the street, "Do you think that the inequality between the rich Mr. *A* and poor Ms. *B* is unjustified?" it is unlikely that he will answer, "Only if a redistribution from *A* to *B* would increase their total welfare." But he might well answer, "It depends upon how hard they each worked." In other words, the popular views of justice are not consequentialist, they are based upon notions of *desert,* and desert is based upon measurements of effort. Our man on the street must know more than the aggregate distribution of the objective to assess whether that distribution is fair – he must know the (disaggregated) distributions of the objective by type. The source of the inequality matters, ethically speaking, but these sources are ignored by looking only at outcomes[7].

[7] There is substantial survey and experimental work which examines the views that people in various societies have concerning distributive justice. An extensive discussion of this literature is found in Gaertner and Schokkaert (2012).

We cannot maintain that the most common measures of economic development are value free: they are derived from a utilitarian ethic. To this claim one might object that the measure of GDP per capita has nothing to do with utilitarianism, it is simply a proxy for technological development. But this cannot be right, because economists are not interested in technological prowess per se: we are interested in human welfare. We would not consider a society highly developed which possessed a fine technology run by slaves, whose product all went, but for the slaves' subsistence, to the prince. So an attempt to justify the GDP per capita measure of development as a value-free measure of technological accomplishment has the undesirable consequence of obliterating the distinction between economics and engineering – namely, that economics must always focus upon human welfare[8].

Therefore, we should use the best conception of justice or social welfare to derive a measure of economic development. Perhaps the extent to which opportunities have been equalized is not the best such conception, but it dominates, so I believe, utilitarian measures. It is better to measure the level of economic development by some statistic that reflects equality of opportunity rather than by a utilitarian measure.

But what version of equality of opportunity should we use to evaluate economic development in a panel of countries? What should be the circumstances and the objective? To be most similar to GDP per capita, the objective should be income – let us say, post-fisc income including the per capita value of public goods. Begin with circumstances that include the educational level and occupations of the parents of the

[8] I do not wish to denigrate the goals of engineers. However, there is a sense in which engineers are interested in technological efficiency as a goal, while economists are interested in it only insofar as technological efficiency is necessary for Pareto efficiency (in which the goal is human welfare).

individuals, and the ethnicity and gender of the individual[9]. Then calculate the number $\hat{W}^{EO} = W^{EO}(\varphi^*)$, where φ^* is the status quo policy. This is the first component of the two-dimensional measure of economic development that I propose. The value $\hat{W}^{EO}$ is the average income of those in society who are most disadvantaged by circumstances. Choosing it as a measure of economic development is inspired by the view, attributed to Mohandes Ghandi, among many others, that "a nation's greatness is measured by how it treats its weakest members.[10]" This proposal is not new. Indeed Bourguignon, Ferrera and Walton (2007) propose a dynamic and closely related version of $\hat{W}^{EO}$: namely they say that the present discounted value of the average income of the most disadvantaged type should be maximized for development policy to be equitable.

3. The degree of opportunity equality

I have proposed to measure the *level of development* of a society as the value of the equal-opportunity social welfare function. Of course, we are highly restricted in our ability to measure economic development when we must use a single number to capture it. In particular, applying the measure defined in (4) to income does not allow us to distinguish the *wealth* of the society from the *degree* to which the society has succeeded in eliminating injustice – that being the influence of circumstances upon inequality. To do this, I propose a second measure, which I call the *degree of opportunity equality*[11].

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[9] How one treats gender depends upon whether one uses households or the individual as the unit.

[10] The quotation is ubiquitously attributed to Ghandi, over the original statement of it is obscure.

[11] Again, this proposal is not new. It is a special case of the 'inequality of opportunity ratio (IOR)' defined in Ferreira and Gignoux (2011). Ferreira and Gignoux's preferred measure of inequality is not CV^2 but the 'mean logarithmic deviation.' The same idea for measuring the degree of inequality due to circumstances is proposed in Checchi and Peragine (2010) as well.

A society will have achieved equality of opportunity to the extent that the contribution of differential circumstances to total inequality in the distribution of the objective is small. Let the distribution function of the objective in a given society be *H*, and the distribution functions of the objectives in the types be H^t; then

$$H = \sum f^t H^t. \qquad (7)$$

Suppose we measure inequality in a distribution by the coefficient of variation squared (CV^2), that is:

$$C(H) = \frac{\operatorname{var} H}{\mu^2}. \qquad (8)$$

where the mean of *H* is μ. Denote the mean of H^t by μ^t. Without loss of generality, suppose that we have enumerated types so that $\{\mu_t\}$ is a monotone increasing sequence. Define the distribution:

$$\Phi^T(x) = \begin{cases} 0, \text{ if } 0 \le x \le \mu_1 \\ \sum_{t=1}^{k} f_t, \text{ if } \mu_k < x \le \mu_{k+1} \text{ for } k < n \\ 1, \text{ if } x > \mu_n \end{cases}, \qquad (9)$$

Clearly the mean of Φ^T is μ. If Φ^T were the actual distribution of the objective in society, then everybody in a given type would have exactly the same value of the objective, equal to the mean of the objective in that type. Were this the case, then the contribution of effort to inequality would be nil, as no variation of accomplishment would exist within any type. Now it is well-known that we can decompose $C(H)$ as follows:

$$C(H) = C(\Phi^T) + \sum f^t (\rho^t)^2 C(H^t), \qquad (10)$$

where $\rho^t = \frac{\mu^t}{\mu}$. Since both contributions in this decomposition are positive, it is natural to interpret $C(\Phi^T)$ as the amount of inequality due to circumstances, and $\sum f^t(\rho^t)^2 C(H^t)$ the amount of inequality due to effort. I therefore propose, as a measure of the *degree* of opportunity equalization, the index:

$$\eta = 1 - \frac{C(\Phi^T)}{C(H)}. \qquad (11)$$

We may want to think of η as an upper bound on the fraction of inequality due to effort because surely some circumstances have not been taken into account, whose effect is measured, residually, as 'effort.'

My suggestion is that we measure economic development by the ordered pair $d = (\hat{W}^{EO}, \eta)$. Note that neither component of *d* is a consequentialist measure. One cannot recover either $\hat{W}^{EO}$ or η from knowledge of the distribution of income (more generally, the objective) alone. One must know, as well, the circumstances of individuals, which capture the concept of responsibility salient for the society in question.

4. Country calculations of the level and degree of development

In this section, I calculate the value of *d* for a set of OECD countries. The data upon which these calculations are based are taken from EU-SILC 2005. The sample consists of male workers, who are partitioned into three types, based upon the maximum of the worker's parents' educational levels:

Type 1: the worker's more educated parent had at most lower secondary education

Type 2: the worker's more educated parent had at least upper secondary education but not tertiary education

Type 3: the worker's more educated parent had at least some tertiary education.

The net income for each respondent is recorded, which includes earnings, self-employment income, after taxes and transfers. The *single characteristic* of type in these calculations is parental education which takes on three values.[12]

The fact that income does not include the value of public goods is a weakness of the measure. If a country has a high rate of taxation, and a substantial fraction of tax revenues finance public goods (as opposed to transfer payments), this will not be reflected in the income data. Transfer payments are included in the definition of income.

Figure 1 presents the income-distribution functions for Austria, by type, which is in many ways typical. Since the left-hand envelope of the three CDFs is, for all practical purposes, the CDF of type 1, the level of development is simply the mean of type 1's income. For Austria, the level and degree of development, as defined in the previous section, are:

$$(\hat{W}^{EO}, \eta) = (20975, 0.970).$$

(Incomes are measured in Euros.) It may surprise the reader that only about 3% of income inequality is attributed to circumstances, but this is quite typical for advanced European countries, given that only one circumstance is specified. For Latin American

[12] I am grateful to Daniele Checchi and Francesco Scervini for providing me with the data set. For an exact description of the data set, see Checchi, Peragine, and Serlenga (2010). The computation of the degrees of development and the type-distributions of income were performed by the author using *Mathematica*; I will supply the code upon request.

countries, this number will be considerably larger. Indeed, Ferreira and Gignoux (2011), in their table 8, present their comparable measure to η, using the mean logartithmic deviation of income as the inequality measure, for a set of six Latin American countries. Their set of circumstances is denser than mine. For some countries (Guatamala), the degree of inequality attributable to circumstances is over 50%.

Figure 2 presents the income CDFs of the three types for one of the least developed countries in sample, Hungary, and for one of the most developed, Denmark.

We see that the inter-type dispersion is considerably more dramatic in Hungary than in Austria, while the CDFs in Denmark are very close together. The graphs of the three CDFs for the other countries in the sample are presented in an online appendix.

Figure 3 plots the ordered pairs $(\hat{W}_j^{EO}, \eta)$ for all 22 countries in the sample[13]. Some comments:

1. The eastern European countries are the worst off with respect to the index $\hat{W}^{EO}$: these comprise Lithuania (LT), Estonia (EE), the Czech Republic(CZ), Poland (PL), Latvia (LV), and Hungary (HU). (Slovenia (SI) does somewhat better.) But Spain (ES) is also very low on this measure. With respect to the degree of development, η, the eastern European countries span a range from about 92% to 99.5% .

2. Greece appears to do very well on the degree of development: I question whether the data are reliable.

[13] EU-SILC also contains data for Cyprus, but there are so few observations that I do not consider the CDFs to be meaningful. I excluded as well Ireland from the sample, because I believe the data have been miscoded: according to the data, the middle type in Ireland is worse off than the most disadvantaged type.

3. We may define a partial order with respect to development; a country *j dominates* a country *k* if

$$(W_j^{EO}, \eta_j) > (W_k^{EO}, \eta_k).$$

With regard to this partial order, no country in the sample dominates all others. Thus, we can say there exists no most developed European country. Conversely, however, there are five countries that are undominated by any other: Denmark (DK) , Iceland (IS), Germany (DE), the UK, and the Netherlands (NL). These data are from 2005, and doubtless Iceland, post-crash, no longer enjoys this status.

Table 1 presents the same data as figure 1.

As noted, Ferreira and Gignoux (2011) calculate a similar statistic to η for six Latin American countries. Their calculation differs from the one presented here using the SILC data in two ways: they have a different set of circumstances, and they use a different measure of inequality. I have calculated an index (W^{EO}, η) for Brazil, using a data set which reports income of workers for a typology whose circumstances are race, gender of the head of household in which the worker was raised, and urban-rural[14]. There are four races: white, mixed, black, and 'other' – thus 16 types. I limited my analysis to nine types, which comprise 94.5% of the sample, not including the four types of 'other' race, or the three rural types with female head-of-household parent. For this population, we compute $\eta = 0.984$, which is surprisingly high – only 1.6% of income inequality is attributed to these circumstances. This contrasts with the IOR computation of Ferreira and Gignoux (2011), in which, in Brazil, about 32% of inequality is due to

[14] I thank Sean Higgens for providing me with the Brazilian data, which were collected as part of the Commitment to Equity project. See Higgens and Pereira (in press) for details.

(their) circumstances, which are {ethnicity, father in agriculture, father's education, mother's education, birth region}. Surely the inclusion of parental education in the Ferreira-Gignoux data set increases the role of circumstances in generating inequality.

Figure 4a presents the distribution functions of disposable income for the Brazilian types (white, male household head, urban), (white, female household head, urban), (white, male household head, rural) in order of stochastic dominance (using the Higgens-Pereira data set). Thus, it appears that one has better opportunities if one is raised by a woman in the city than by a man in the countryside. Figure 4b presents the analogous three distribution functions for the mixed race. The order of stochastic dominance is the same as in figure 4a. Figure 4c places these two plots together: we see that even the *most disadvantaged* white type first-order-stochastic-dominates the *most advantaged* mixed type.

It turns out that the three black types also have distribution functions ordered in the same way. Figure 5 presents the distribution functions of the black types (in violet) superimposed upon figure 4c. We observe that the first two black types ((male household head, urban) and (female household head, urban)) have distribution functions that are virtually coincident with the analogous mixed types, and the distribution function of (black, male household head, rural) appears to FOSD the comparable 'mixed' type. Indeed, the distribution function of the (black, male household head, urban) type is virtually invisible in figure 5, as it coincides so closely with that of the (mixed, male household head, urban) type. The conclusion appears to be that there is racial discrimination in Brazil which favors whites over non-whites, but there is no special

discrimination against black workers, who appear, if anything, to have somewhat better opportunities than 'mixed' workers.

Finally, Björklund, Jäntti and Roemer (2012) study income in Sweden, using a large data set that permits the partition of the population into over 1100 types, based on six circumstances, each partitioned into several levels. Using methods different from the ones discussed here, they conclude that at least 25% of income inequality is due to circumstances[15]. Contrast this to the 1.5% figure for Sweden from table 1.

5. Equity 'versus' development[16]

It is often said that equity and efficiency are competing goals -- that equity is purchased at the expense of efficiency. There are two senses in which this phrase may be uttered. The first is that redistributive taxation may be purchased only at the cost of Pareto inefficiency, due to workers' and firms' facing different effective wages. The second sense is that redistribution may lower total output. These two claims are in principle independent. There may be policies which re-allocate income in a more equitable manner, lower total output, but are not Pareto inefficient. (Think, for example, of re-allocating educational funds from tertiary education to secondary education in a poor country. This might have a purely redistributive effect, without significant consequences for Pareto efficiency.)

I wish to criticize the second usage of the phrase. Saying that there may be a trade-off between equity and efficiency *where efficiency is measured as total output* is equivalent to saying there is a trade-off between equity and the utilitarian measure of

[15] Perhaps, most critically, IQ in adolescence is taken as a circumstance.
[16] The point in this section is discussed more extensively in Roemer (2006).

development, which (in its simplest form) is given by output per person. In fact, both the measures of equity that I have proposed in the ordered pair *d*, and output per capita, are measures of equity according to different normative criteria, as discussed in section 2. Indeed, because utilitarianism was the reigning conception of distributive justice until at least the 1970s, it is unsurprising that GDP per capita was the corollary measure of development in economics.

There is an increasing number of economists who argue that 'improving equity improves efficiency.' (The World Development Report (2006) presses this point, but the argument goes back many years.) My objection is not to the substantive claim, that equalizing opportunities often increases productivity and national income, but only to the tradition of assigning utilitarianism *primus inter pares* as the normative view which *defines* efficiency.

If the view of economic development I here advocate is adopted, there may be a significant change in policy evaluation. One would not have to justify investment in very disadvantaged social groups by showing that such investment increased total output. In the long run, such a conflict might not exist: but often, policy makers must evaluate the consequences of their policy choices in the short run. If a country is evaluated on the basis of its ordered-pair statistic $(\hat{W}^{EO}, \eta)$ rather than on GDP per capita, policies could be quite different.

6. A World-Bank proposal for measuring equal opportunity

The World Bank has been an important innovator in bringing considerations of equal opportunity into economic development. Its two important publications, to date,

have been the 2006 World Development Report, *Equity and Development*, and a monograph, *Measuring inequality of opportunities in Latin America and the Caribbean* (Paes de Barros et al., 2009). The more recent publication contains a wealth of information on the effects of social circumstances on various measures of achievement and output.

Paes de Barros et al. (2009) propose a measure of equality of opportunity. Consider a particular kind of opportunity, such as 'attaining the sixth grade in elementary school.' Let the total sixth-grade attendance in a country be *H*, and the total number of children of sixth-grade age be *N*, and define $\bar{p} = \frac{H}{N}$ to be the *access* on average of children to the opportunity of a sixth-grade education. $\bar{p}$ measures the level of this opportunity in the country, but not the extent to which access is unequal to different children, based upon their social circumstances. Now using a logit model, estimate the probability that each child, *j*, in the country has of attending the sixth grade, where that probability is a function of a vector of circumstances; denote this estimated probability by $\hat{p}_j$. Define $D = \frac{1}{2\bar{p}N}\sum|\hat{p}_j - \bar{p}|$. *D* measures the variation in access to the opportunity in question across children in the country. The normalization guarantees that $0 \le D \le 1$. Now define the *human opportunity index* as

$$O = \bar{p}(1 - D);$$

note that $0 \le O \le \bar{p}$.

The human opportunity index is a non-consequentialist measure of development, because the probabilities $\hat{p}_j$ can only be computed knowing the circumstances of the children. The measure combines a concern with the level of provision of opportunities

and the inequality of the distribution of them. This is to be contrasted with my ordered pair $(\hat{W}^{EO}, \eta)$, which separates these two concerns into two measures. Obviously, some information is lost in using a single measure rather than two measures.

The concern of the 2009 report is in large part with children. In my view, where children are concerned, all inequality should be counted as due to circumstances, and none to effort, and so the fact that the human opportunity index does not explicitly make the distinction between effort and circumstances is unobjectionable[17]. However, if the measure is used for addressing inequality of opportunity for adults, this may be a defect.

To study this, let us take an opportunity for adults – earning an income above *M*, measured in PPP exchange rates. Suppose there are three types of worker, according to the level of education of their more educated parent. Denote the distribution of income in type *t* as F^t; let the fraction of type *t* be f^t and let *F* be the distribution of income in the society as a whole. Then $\bar{p} = 1 - F(M)$ is the average access to the opportunity in question in the country. Now for all members *j* of a given type, *t*, compute that $\hat{p}_j = 1 - F^t(M)$: this is because the probabilities $\hat{p}_j$ are computed by taking the independent variables in the logit regression as the circumstances. Hence, the human opportunity measure is:

$$O = \bar{p}\left(1 - \frac{1}{2\bar{p}}\sum f^t \left|1 - F^t(M) - (1 - F(M))\right|\right) = (1 - F(M)) - \frac{1}{2}\sum f^t \left|F(M) - F^t(M)\right| \quad (12)$$

[17] Children should only become responsible for their actions after an 'age of consent' is reached, which may vary across societies. Both nature and nurture fall within the ambit of circumstances for the child.

Despite the fact that effort is not explicitly mentioned in defining the index, effort is reflected in measure, because the distributions F^t appear in the calculation. Indeed, the first term $1-F(M)$ measures the level of opportunity in the country, while the second term is a penalty for the degree to which this opportunity is mal-distributed with respect to circumstances (e.g., if there were no inequality of opportunity, then $F^t(M)=F(M)$ for all *t*, and the penalty is zero).

In expression (12), the first term on the right-hand side, $1-F(M)$, plays the role that $\hat{W}^{EO}$ plays in my measure: it measures the level of development. But while $\hat{W}^{EO}$ focuses upon how well off the most disadvantaged type is doing, $1-F(M)$ is a level for the society at large. The second component of my measure, η, is explicitly derived to show the degree to which inequality is due to circumstances, while the second term on the right-hand side of (12) is a form of a variance. Certainly these two measures are getting at the same phenomenon. I have a slight preference for my proposal, as it is more carefully justified as measuring what we are concerned with. But these are minor criticisms; certainly, the measure *O* is in the spirit of thinking of economic development as opportunity equalization.

7. Conclusion

Inequality has become an important focus in development economics in recent years, and this is a step forward from the days when only GDP per capita was considered to be salient. But an important weakness in the entry of inequality into the field has been treating all inequality as having the same ethical status. This is seen in the very large literature on the measurement of inequality, where the concern has been upon whether the

statistical properties of various inequality measures conform to our intuitions concerning when equality is *large or small*. These discussions ignore the issue of whether inequality is *innocuous or undesirable* – that is, the ethical status of the inequality. The equal-opportunity literature introduced the latter distinction into economic theory, and it built on the introduction of the issue of responsibility into egalitarian political philosophy, through the writings of R. Dworkin (1981a,b), G.A. Cohen (1989) and R. Arneson (1989). For discussions of this literature, from economists' viewpoints, see Roemer (1996, 2009) and the treatment of Fleurbaey (2008).

It is useful to further compare the equal-opportunity approach to inequality to the approach represented by the human development index, based upon the work of Amartya Sen on functionings and capability. As is well known, Sen's (1980) major point was that there are objective measures of human functioning that are important for any conception of welfare, and the set of vectors of functionings, available to a person, which Sen defined as her *capability,* is a measure of the opportunities that she has. Sen's intervention was post-Rawls and pre-Dworkin: his main foil was Rawls's choice of primary goods as the equalisandum, which he proposed replacing with capabilities; and his conception of responsibility was implicit in the idea that, if capabilities, so defined, were 'equal' (whatever that should mean) across persons, then if individuals chose different vectors of functioning from these sets, the result was of no ethical consequence. The treatment of responsibility, in Dworkin (1981,1982), was significantly more explicit, and led to the equal-opportunity literature.

The proposal I have stated here, and the human development index (HDI), are complementary. The HDI broadens the objective of concern from income (GDP) to a

set of functionings, but continues to average over the population as a whole, and ignores the source of inequality[18]. The equal-opportunity approach – as I have advocated applying it to a set countries – retains income as the objective, but disaggregates the population into types based upon circumstances that are beyond the control of individuals. The HDI approach says that human accomplishment along dimensions other than income is important, and the equal-opportunity approach says that inequality is bad only if it is of a certain kind.

Of course, it is possible to unite the two approaches. Instead of using income as the measure in my proposal, one could measure human development *disaggregated by types*, where type continues to be defined according to a set of circumstances, and then the two-dimensional index *d* would allow us to assess levels and degrees of development with regard to the various Sen-inspired functionings. It would be ideal to have data sets that permitted us to do this. The reason I have here proposed using only income is that I think, at this point, we do not have the data to compute the distribution of levels of human development by type for a large set of countries. However, the recent publication of the results of the Global Burden of Disease project (see the entire issue of *The Lancet*, December 13, 2012) indicates that this lacuna may be filled, as we may soon have available distributions of longevity by country and by type[19].

Note that the issue of the ethical status of inequality is quite different from another way that inequality can be good or bad, and that is, with regard to its effect on

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[18] In the 2011 Human Development Report, the human development index is calculated by taking a geometric mean of national income, literacy, and longevity, rather than a convex combination of them.

[19] In this issue of *Lancet*, longevity and morbidity figures are given for almost all countries in the world. Information on these measures of welfare by type is not, however, reported.

incentives. Bad inequality in this sense – inequality that is bad for incentives – will be condemned by the utilitarian measure of GDP per capita, because its elimination will increase social output. This is to be distinguished from inequality that is bad because it reflects disadvantage due to circumstances: as I have emphasized, eliminating this kind of inequality is not -- at least in the short run – synonymous with increasing total output or welfare.

The equal-opportunity approach, which focuses upon eliminating inequalities that are due to circumstances for which persons should not be held responsible, is both good ethics and also good policy – by which I mean it is policy supported by the majority of people in many countries. For we know from survey data that, globally, people believe injustice occurs when low incomes are due to bad luck as opposed to low effort. What differs across countries is the extent to which citizens attribute low incomes to bad luck as opposed to low effort: in Brazil, a much larger fraction believe poverty is due to bad luck than in the United States (and perhaps this reflects reality). Indeed, the popular moniker associated with equality of opportunity – it levels the playing field -- can be interpreted as a way of saying that disadvantages that some face due to circumstances beyond their control should be eliminated before the competition for economic goods begins.

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Country	level	degree
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CZ	4438.18	0.919772
DK	31040.6	0.990947
DE	24099.6	0.995659
EE	3511.13	0.956504
ES	3511.13	0.953383
FI	27328.7	0.988751
FR	21683.9	0.971633
GR	14609.	0.994
HU	3257.44	0.946974
IS	41968.6	0.984799
IT	18564.2	0.985046
LT	2942.47	0.965407
LU	33755.2	0.964373
LV	2713.6	0.964469
NL	28377.6	0.991502
PL	3246.67	0.983872
PT	9974.57	0.95876
SE	19544.8	0.984744
SI	8404.	0.982
UK	28535.6	0.991047

Table 1. Values of W^{EO} and η for 22 OECD countries

Figures

Figure 1. CDFs of income for three types of Austrian male worker

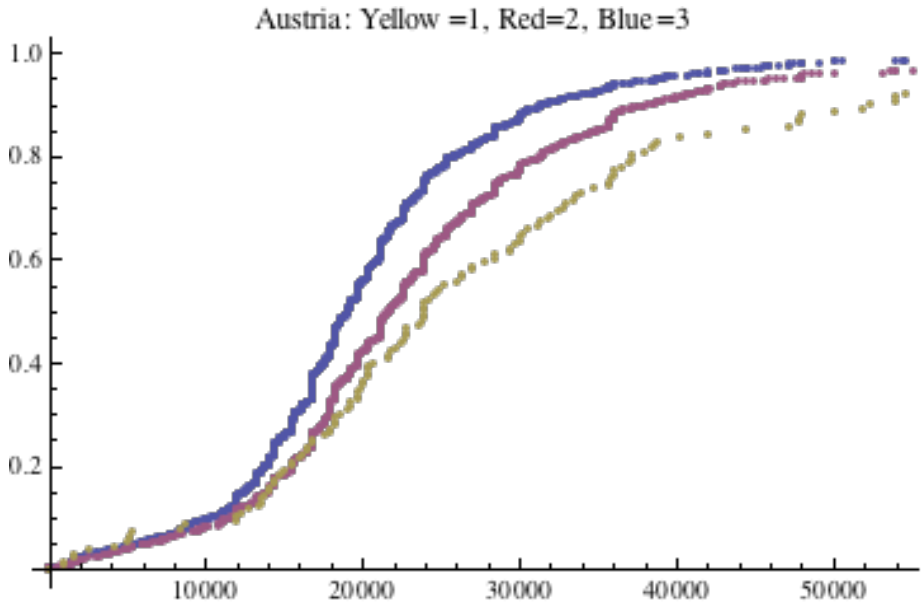


Figure 2a. CDFs of income for three types of Hungarian worker

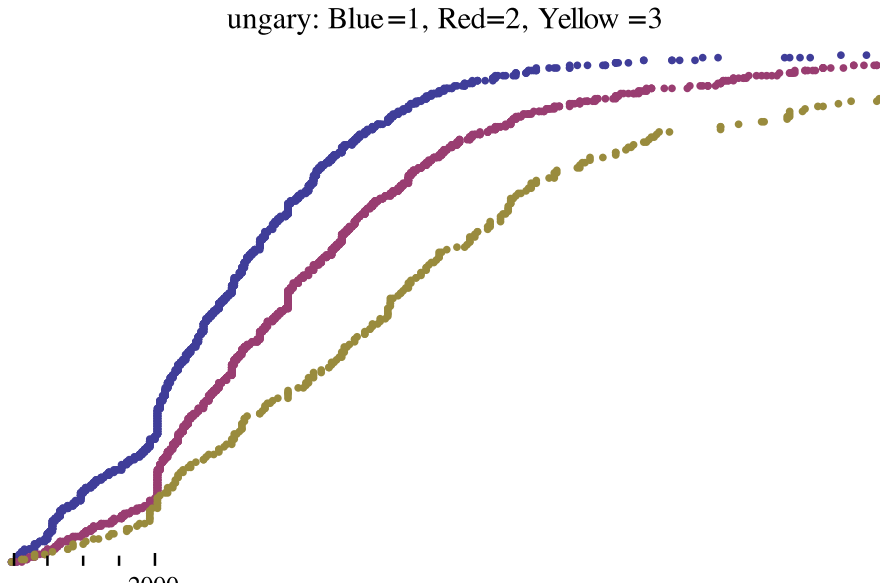


Figure 2b. CDFs of income for three types of Danish worker

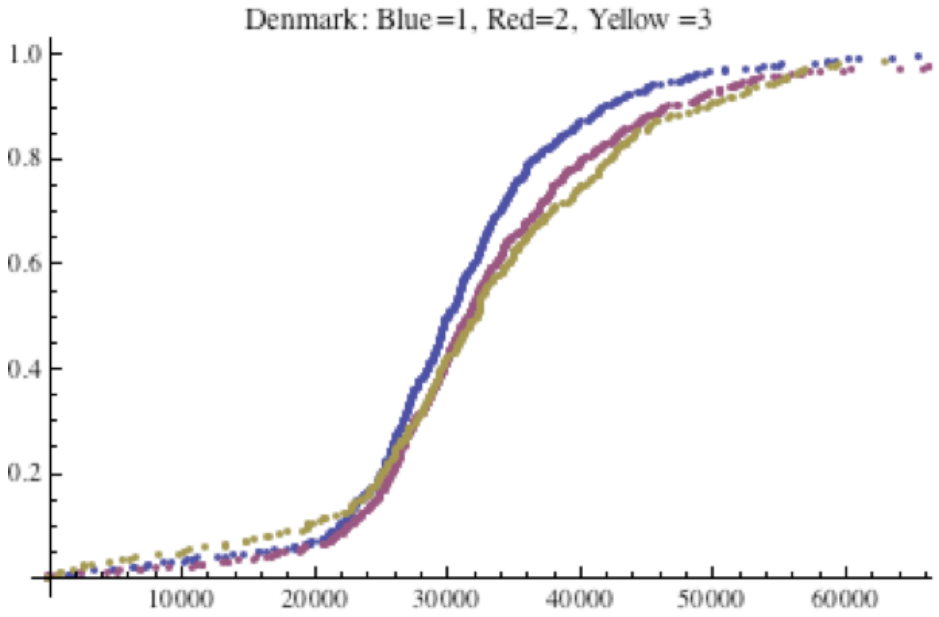


Figure 3 Ordered pairs (W_j^{EO}, η_j) for European countries with best-fitting (least-quares) regression line

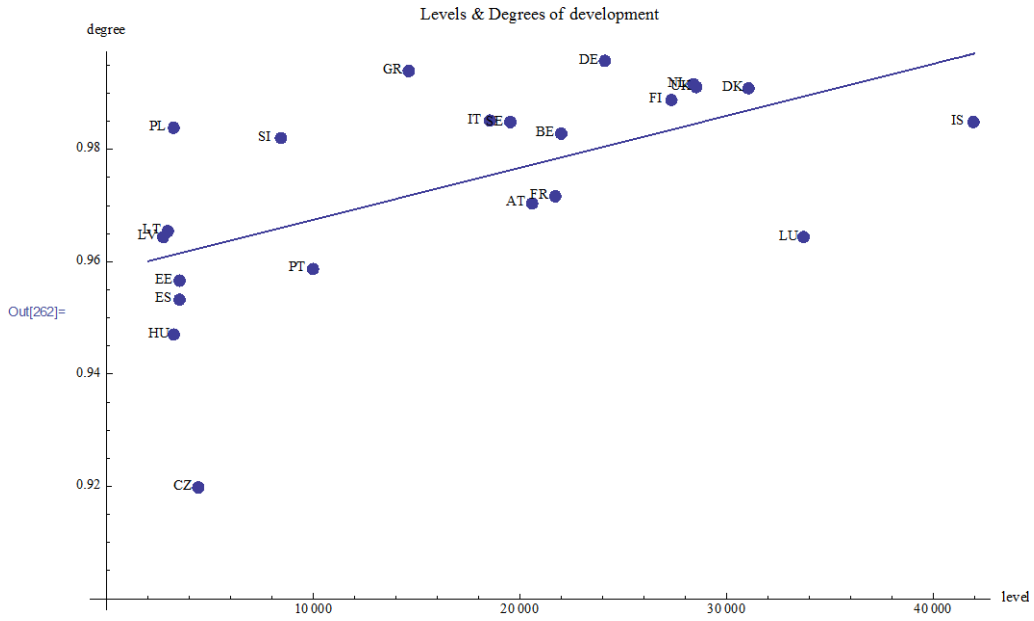


Figure 4a. Distribution functions of three white types in Brazil

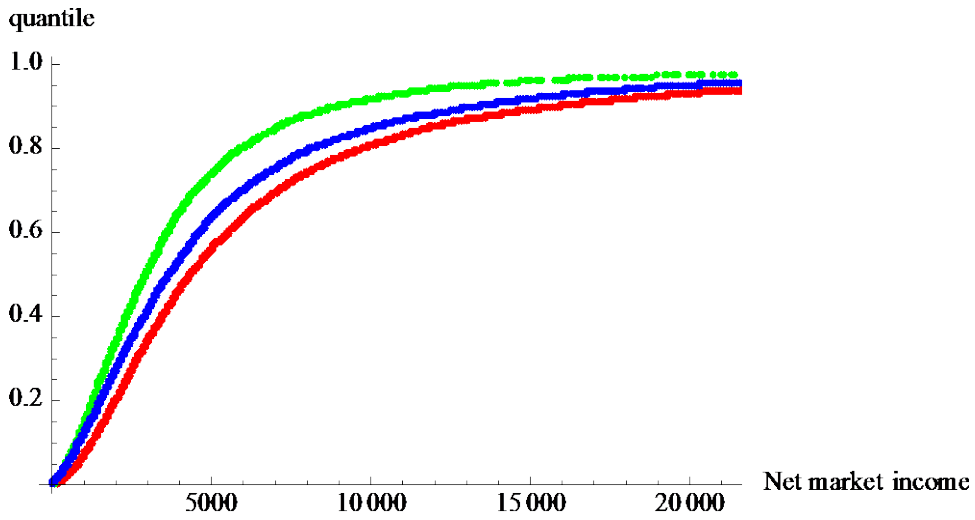


Figure 4b. Distribution functions of three 'mixed' types in Brazil

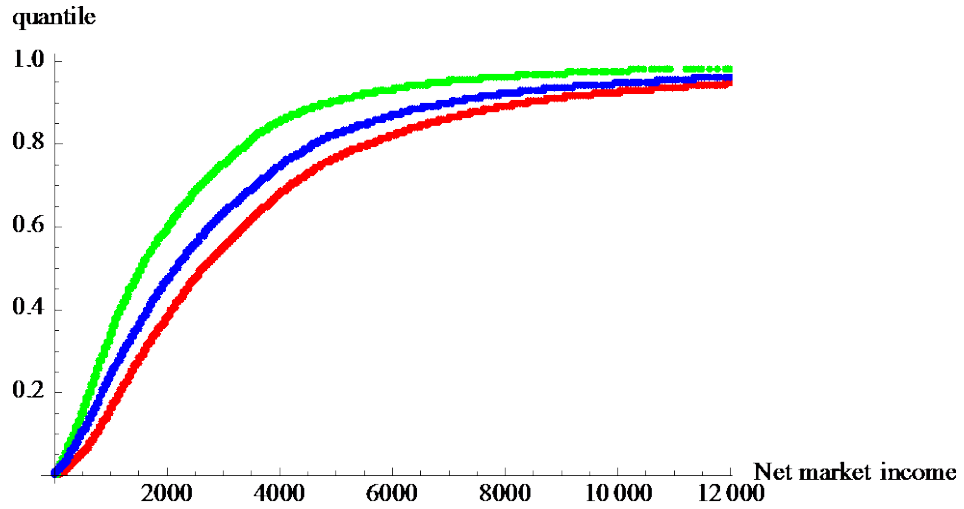


Figure 4c. Plotting figures 4a and 4b in the same plane

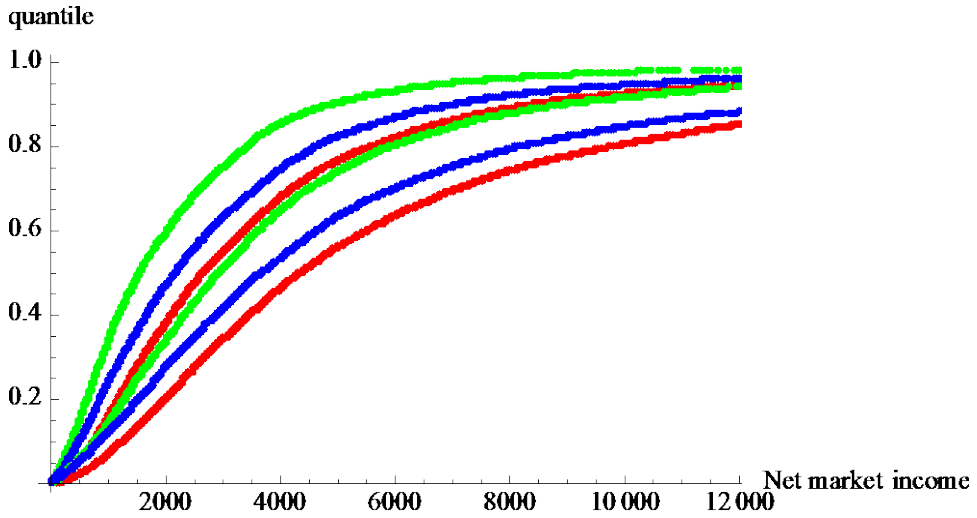
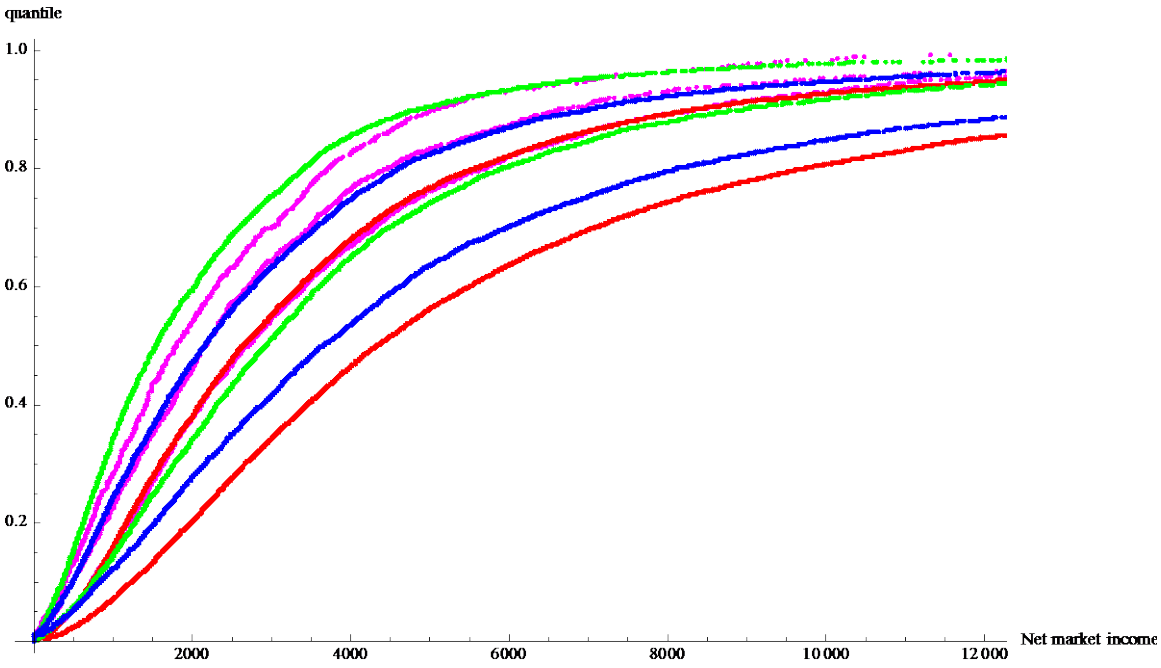
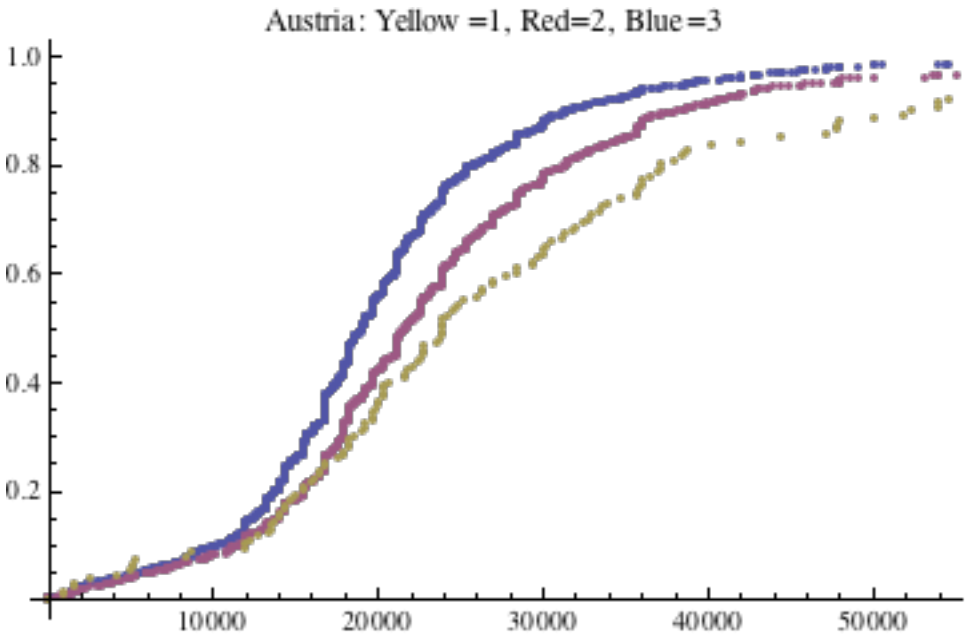
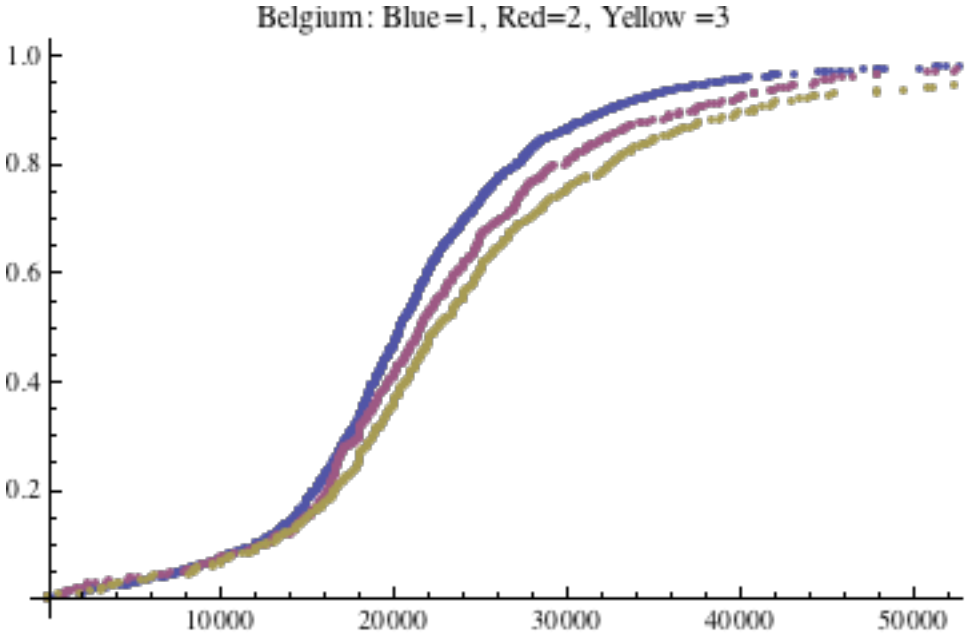


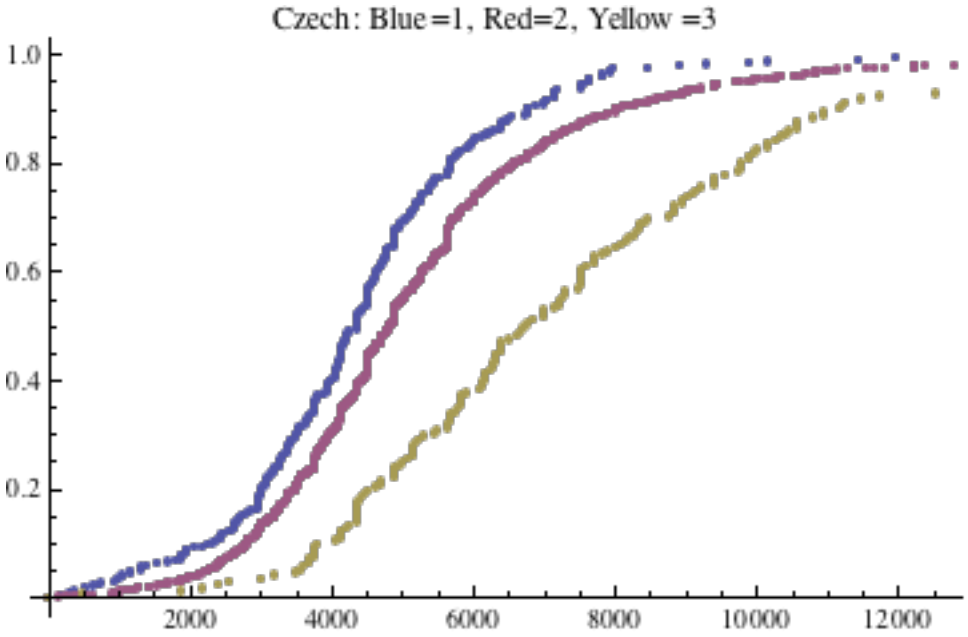
Figure 5. Superimposition of the three black types on figure 4c, Brazil



Appendix: J. Roemer, “Economic development as opportunity equalization”



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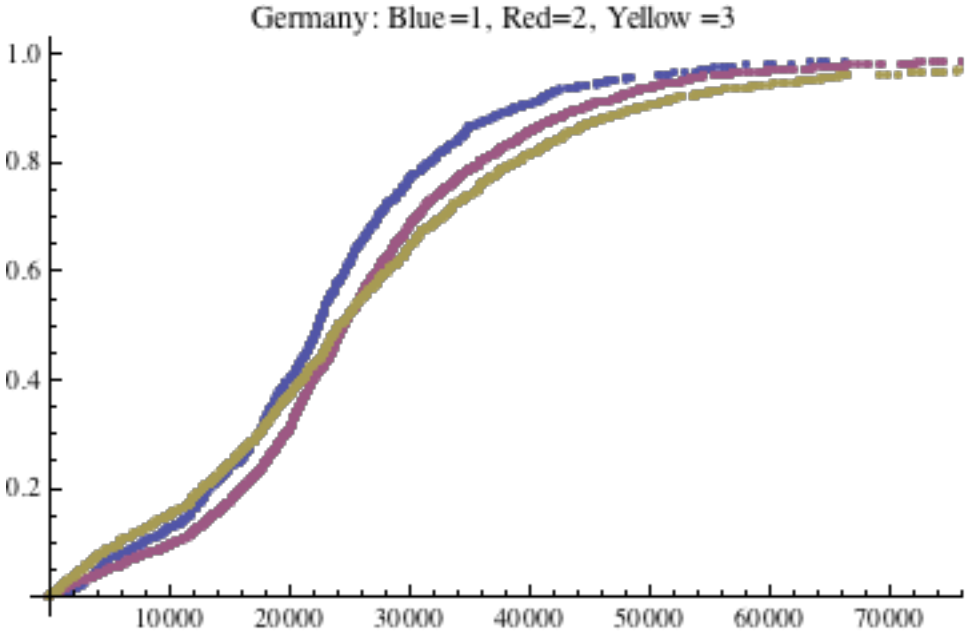
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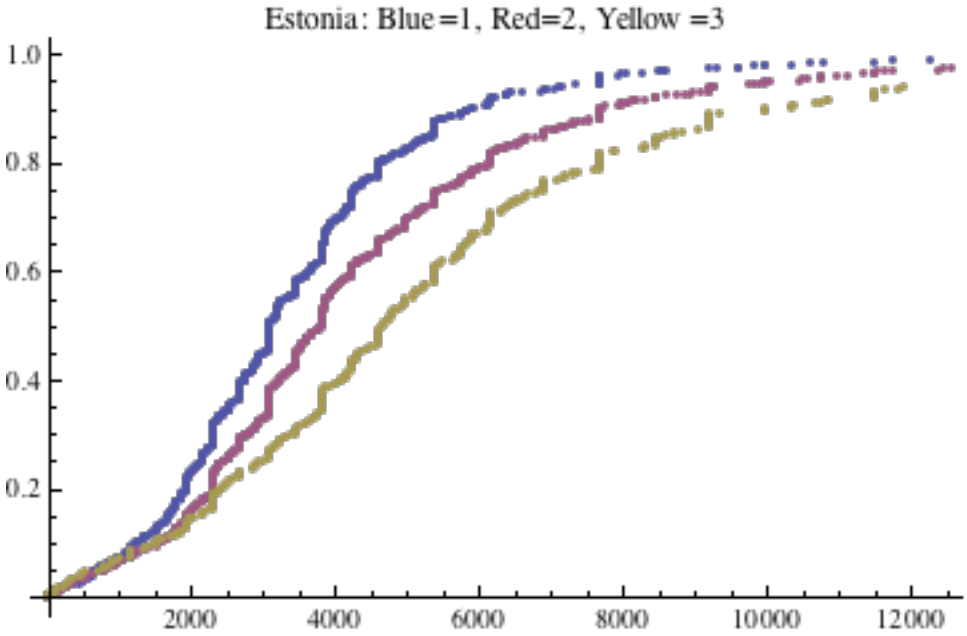
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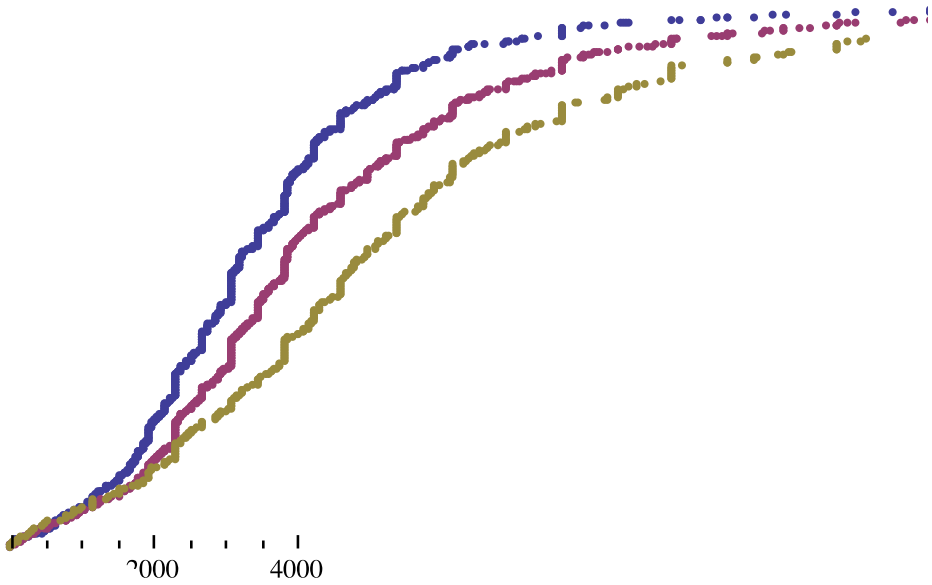
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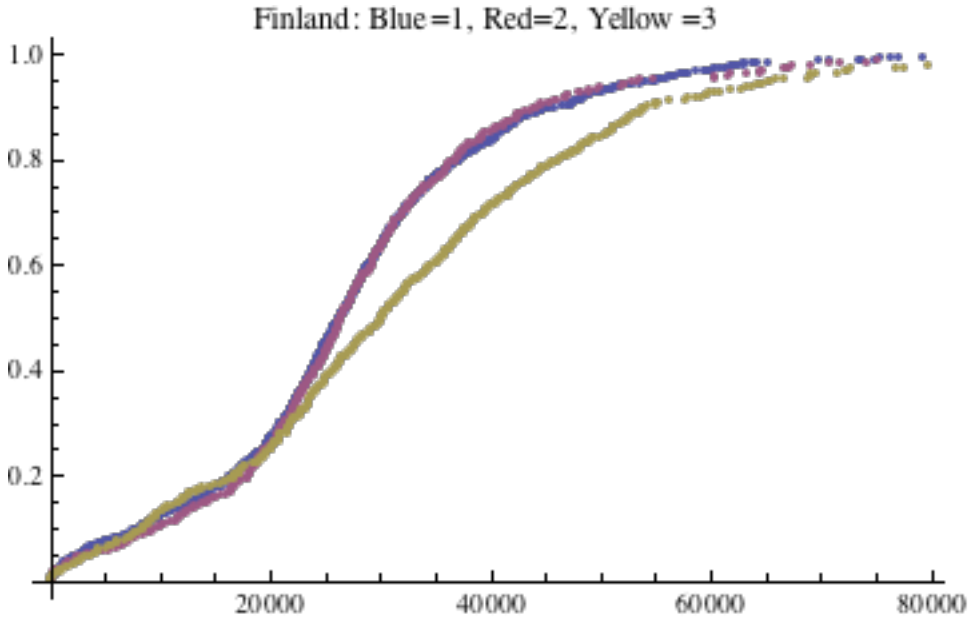
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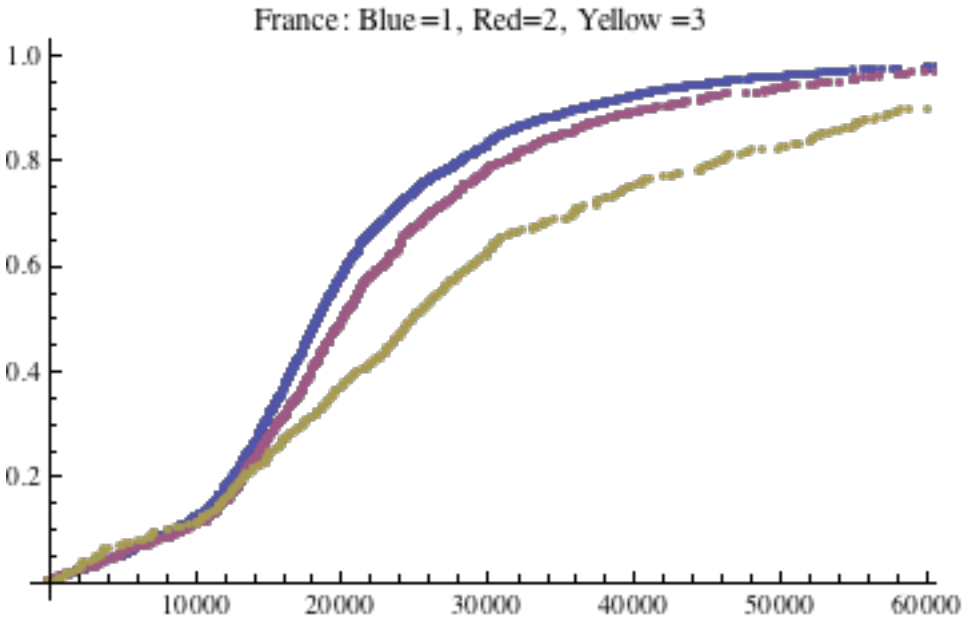
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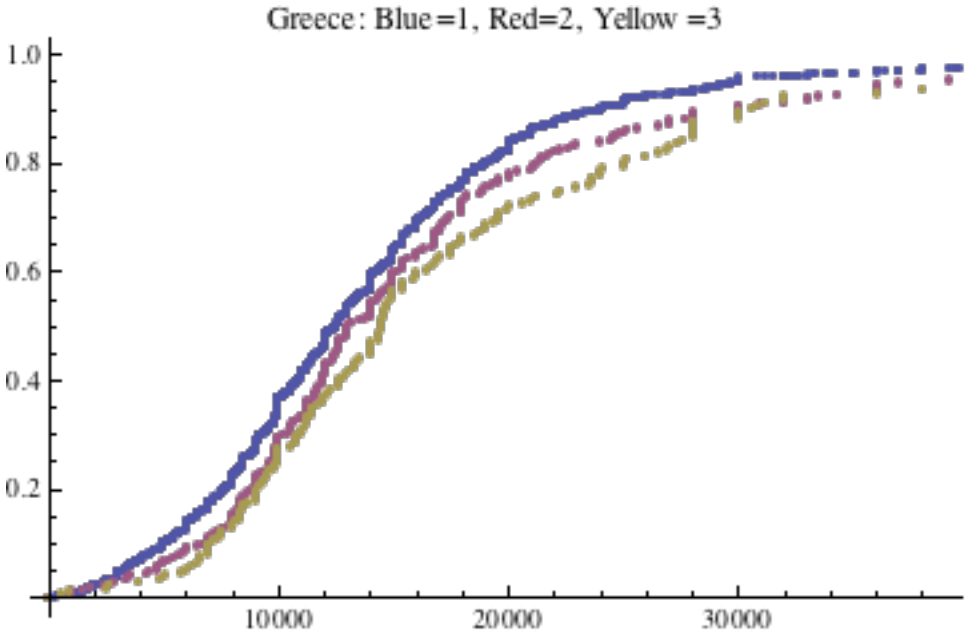
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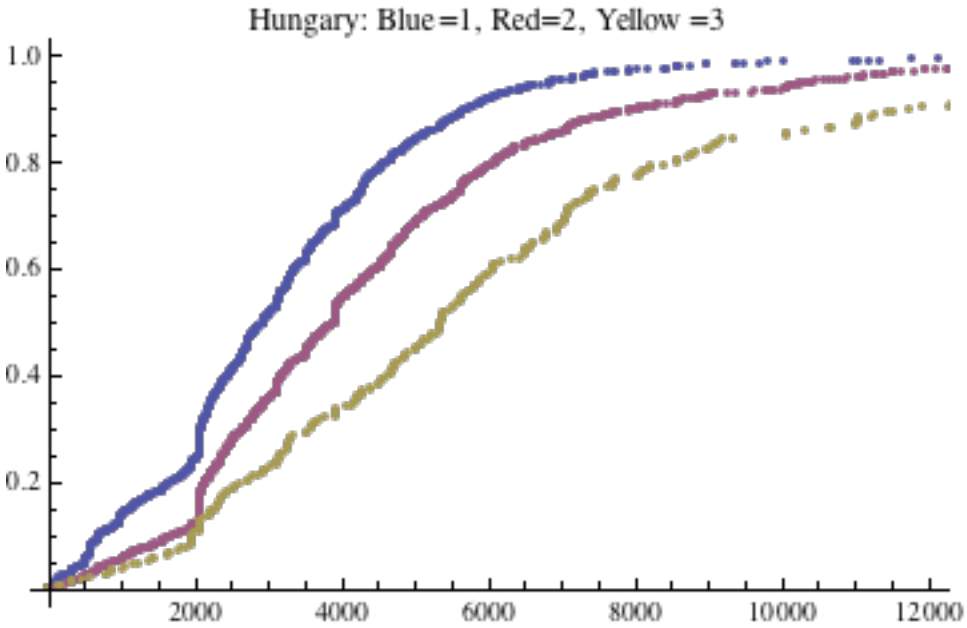
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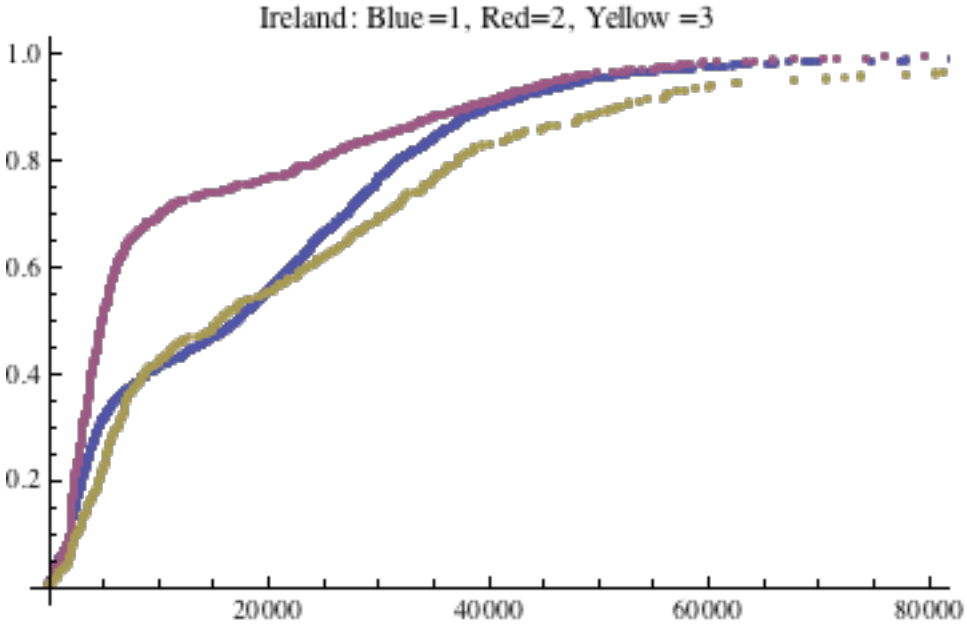
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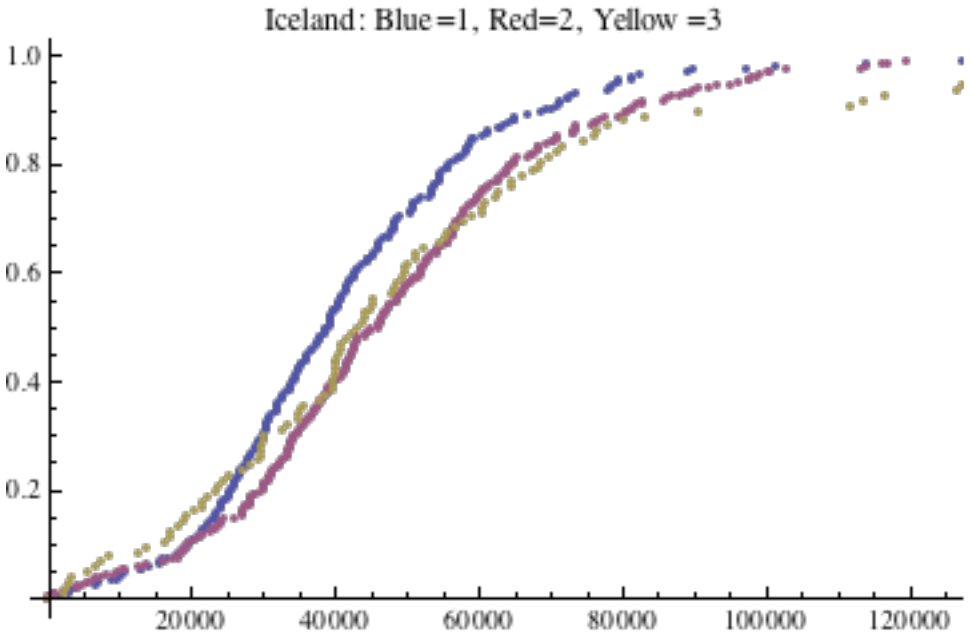
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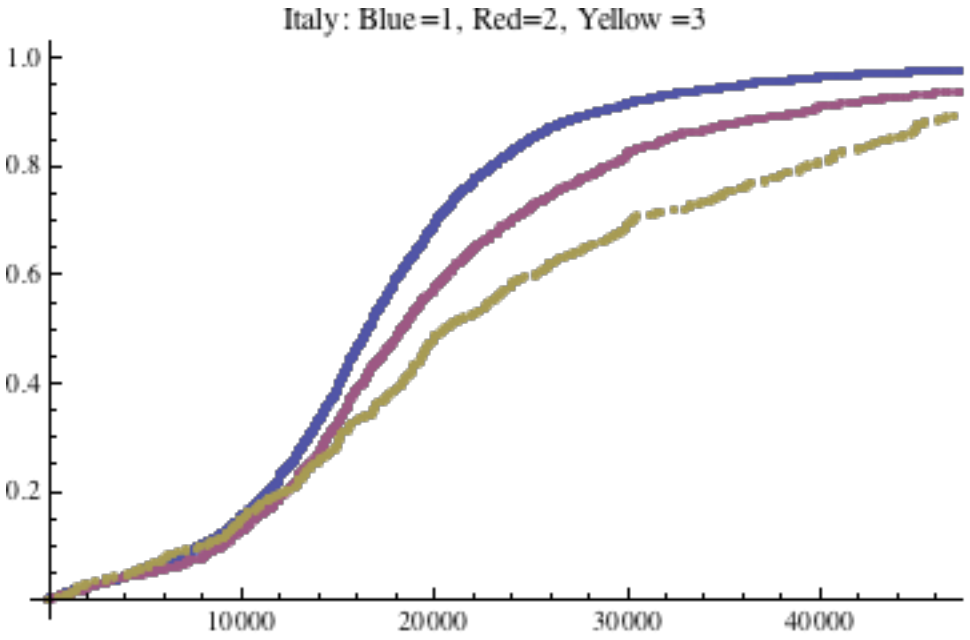
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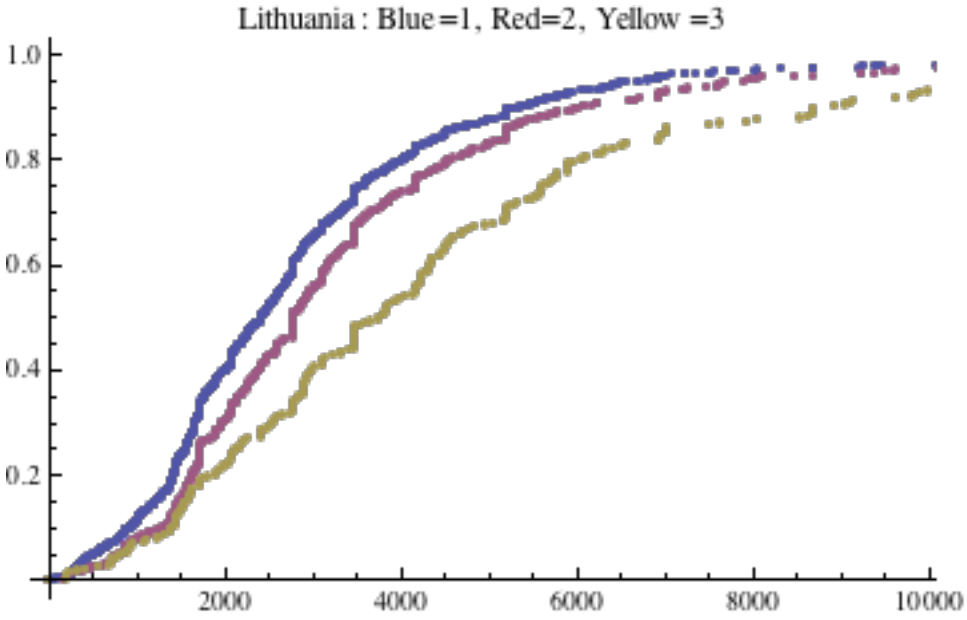
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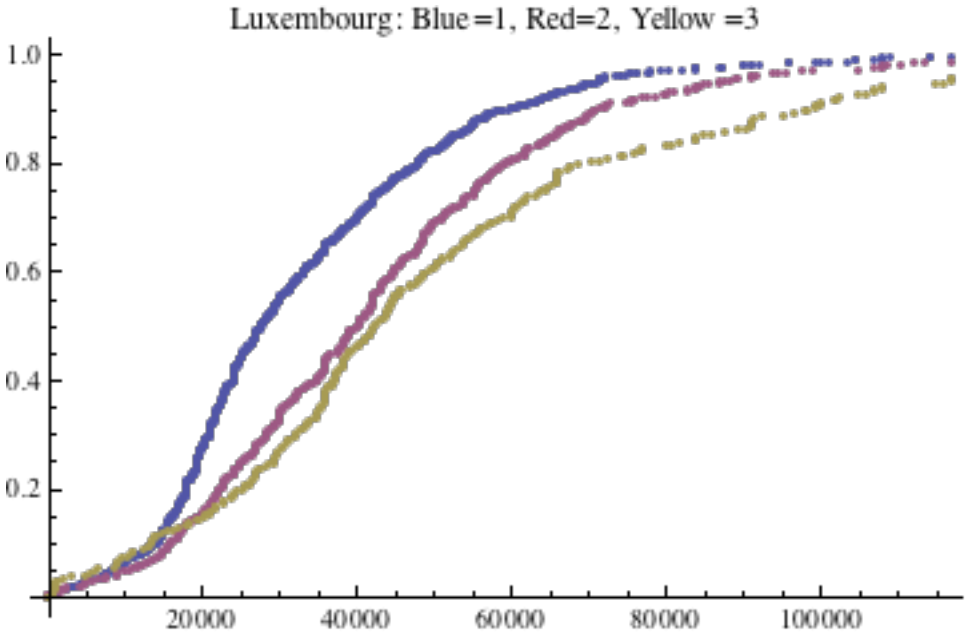
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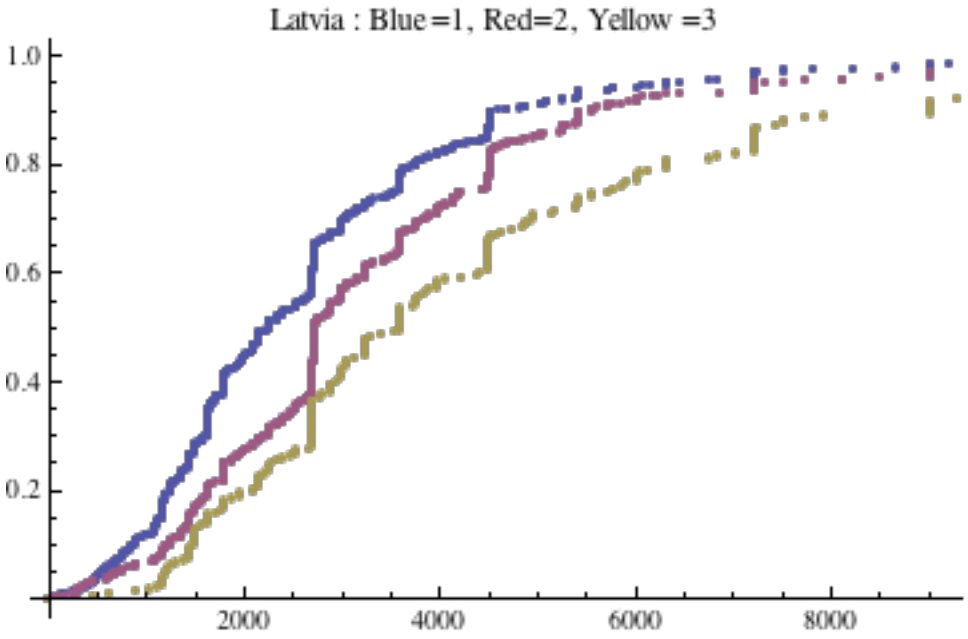
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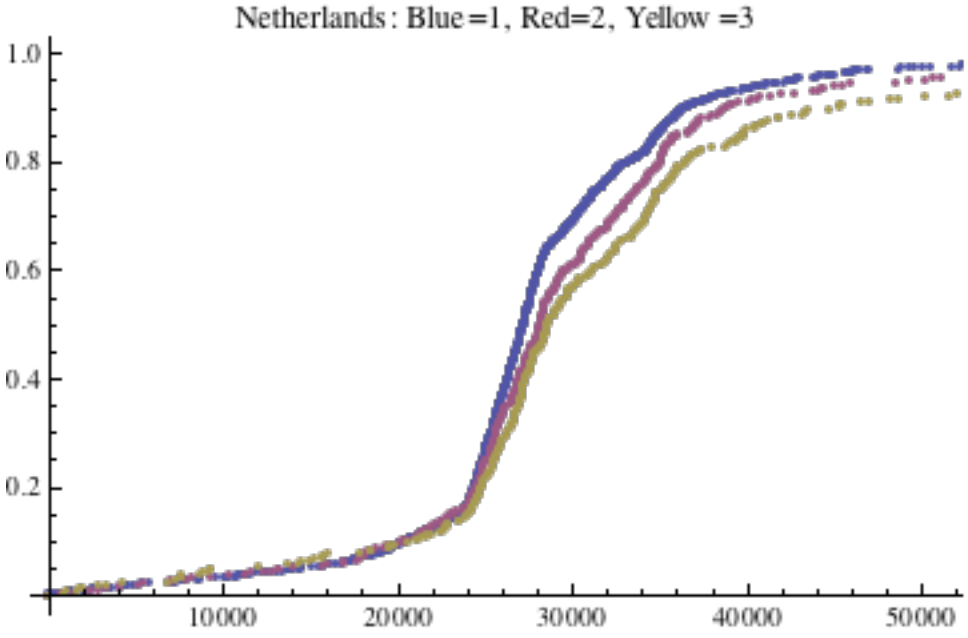
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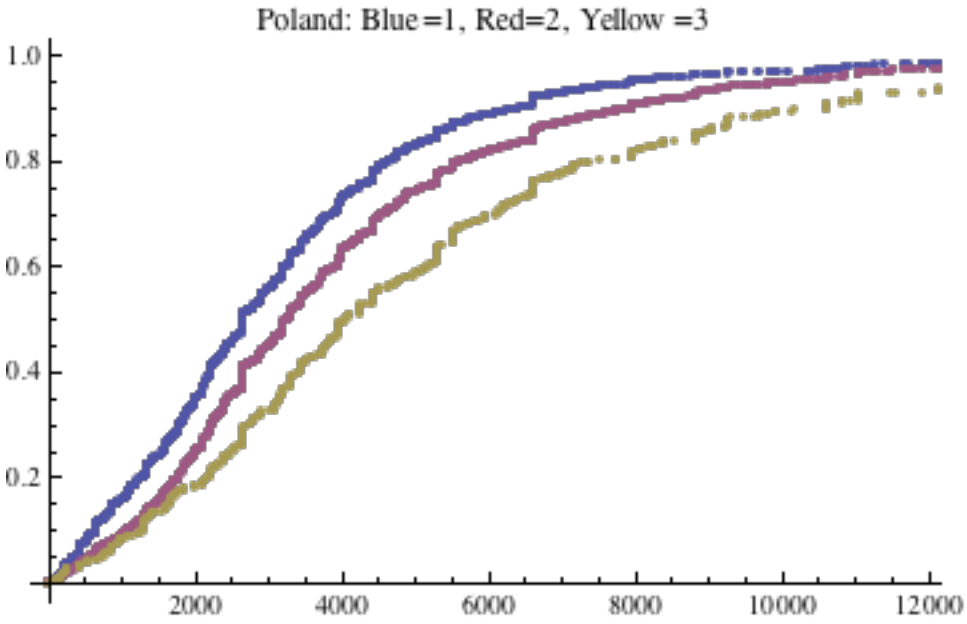
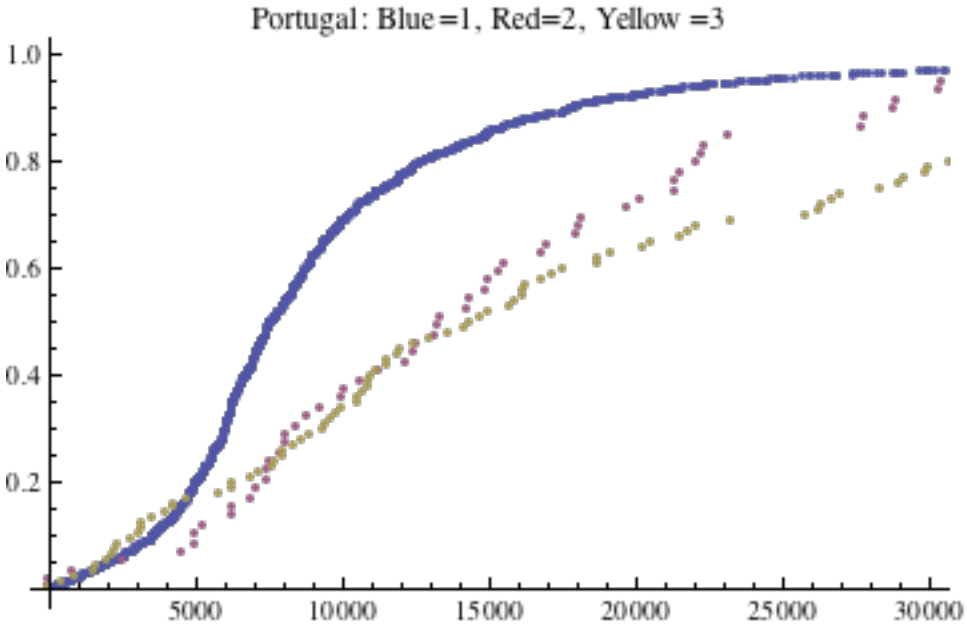
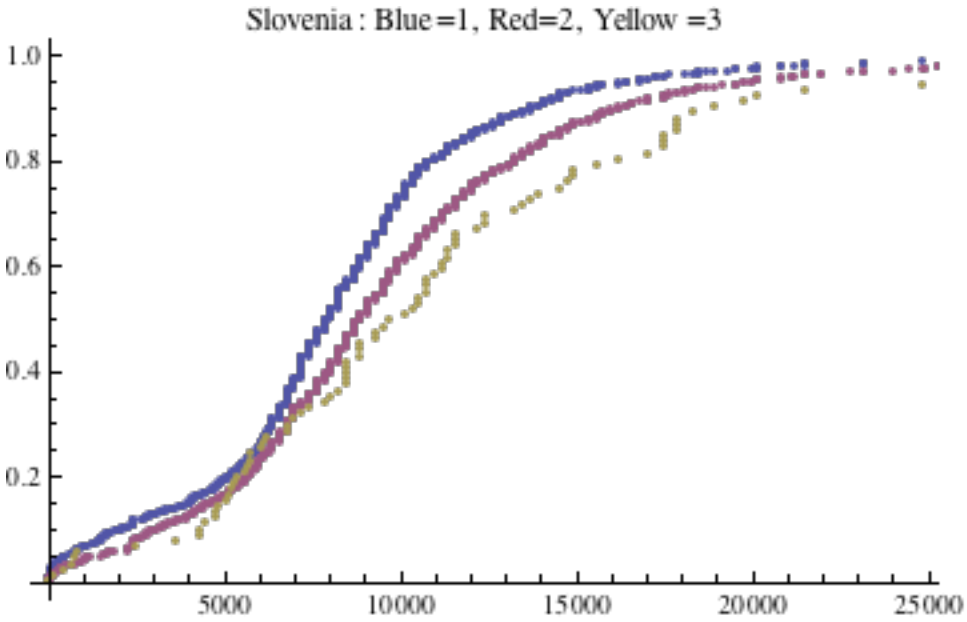
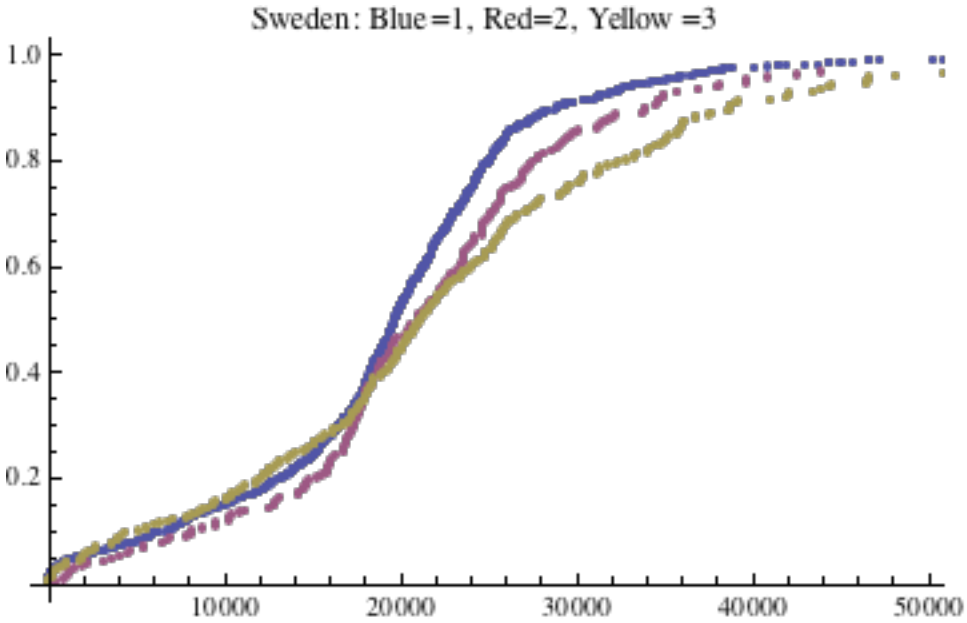
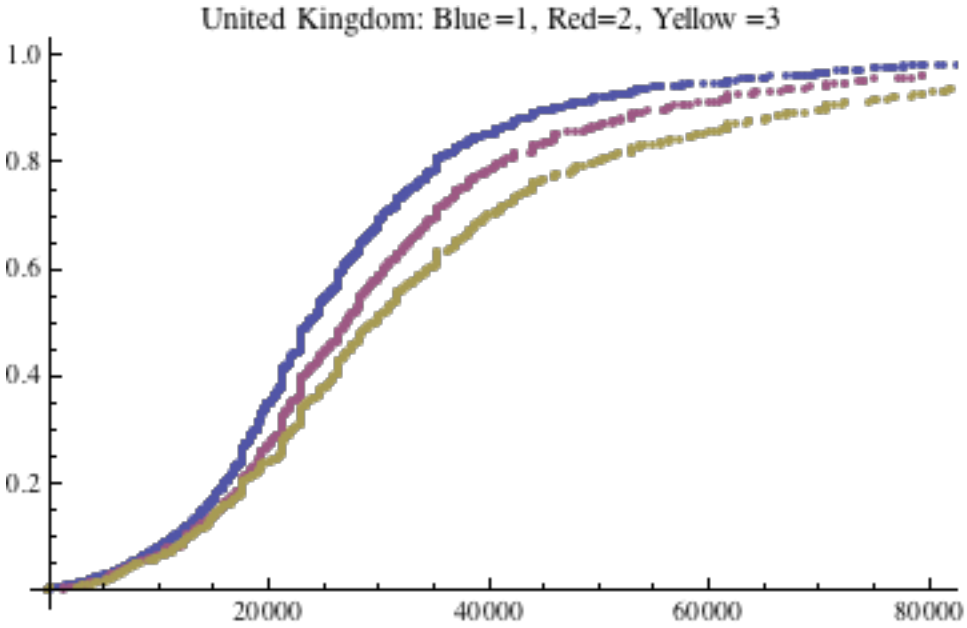

Poland: Blue =1, Red=2, Yellow =3
1.0
0.8
0.6
0.4
0.2
2000
4000
6000
8000
10000
12000


Portugal: Blue =1, Red=2, Yellow =3
1.0
0.8
0.6
0.4
0.2
5000
10000
15000
20000
25000
30000


Slovenia : Blue =1, Red=2, Yellow =3
1.0
0.8
0.6
0.4
0.2
5000
10000
15000
20000
25000


Sweden : Blue =1, Red=2, Yellow =3
1.0
0.8
0.6
0.4
0.2
10000
20000
30000
40000
50000


United Kingdom: Blue=1, Red=2, Yellow =3
1.0
0.8
0.6
0.4
0.2
20000
40000
60000
80000