"Gauging the Potential for Social Unrest"

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Gauging the potential for social unrest

by

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Abstract

It stands to reason that social unrest does not erupt out of the blue. Although there are a great many reasons why social dismay might descend into social disorder, only few yardsticks or indices can plausibly be used to gauge the potential for social unrest (PSU). If policy makers want to undertake public action to prevent social dismay escalating into social disruption, they obviously need to draw on practical sensors. This paper assesses critically the adequacy of two such measures, the polarization (P) index, and the total relative deprivation (TRD) index. The paper proposes a tentative guide to selecting between these two measures. A review of three stylized scenarios suggests that, where income redistributions reduce the number of distinct income groups, and when each group is characterized by a strong sense of within-group identity, the P index surpasses the TRD index as a basis for predicting PSU. When the within-group identification is weak, however, it is better to use the TRD index to predict PSU.

Keywords: Social dismay; The potential for social unrest; Polarization; Total relative deprivation; Policy choice

JEL Classification: D31; D63

1. Introduction

Even highly developed economies can face the prospect of social unrest. Think of the December 2008 events in Greece, or recall the riots that erupted in November 2005 and November 2007 in the poor neighborhoods of Paris. Usually, social turbulence does not appear out of the blue. It goes without saying that any responsible government will seek to identify the potential for social unrest (PSU) as early as possible, allowing it to take steps to nip it in the bud. What indicator could inform a government that social unrest is brewing? It is quite natural to expect that an early-warning measure could draw on, or incorporate, income inequality.[1]

An intriguing body of empirical research seeks to find out what foments ethnic strife, violent conflicts, civil wars, and terrorism. The obvious objective of this body of work is enable governments to address the origins of social unrest and civil strife. If, for example, as Basuchoudhary and Shughart (forthcoming) find, economic freedoms and property rights significantly reduce the likelihood that terrorism will emerge, governments will want to promote economic liberties and market-friendly institutions. Clearly, tensions and potentials need to be measured. Our present inquiry thus complements the said empirical research in that we study ways to measure PSU rather than explore its root causes. Measuring tensions is a helpful tool in a drive to reduce tensions.

Following Runciman (1966), a measure of an individual's social dismay was developed by Yitzhaki (1979), and subsequently axiomatized by Bossert and D'Ambrosio (2006). In line with a rich sociology literature, the measure was termed "relative deprivation," and was shown to be equal to the fraction of people earning more than the individual times their mean excess income. The sum of the relative deprivation of all the individuals in a population yields the population's "total relative deprivation" (TRD). This index can serve as a proxy for the "aggregated degree of discontent" of a population and could thus be used to measure PSU, since for any individual, an increase in the income of any higher income earner results in greater relative deprivation (even when the individual's rank in the hierarchy of incomes remains unchanged), and for any individual (except the richest), a decline in the number of

[1] Income inequality is also used as a key independent variable in investigating a stark form of social disruption - crime. For instance, Choe (2008) finds that income inequality impacts strongly and positively on the incidence of burglary and robbery.

earners of lower incomes results in more relative deprivation (even when the number of higher income earners and their incomes remain unchanged).

A second possible indicator that could be used to measure PSU is the "polarization" (P) index (Esteban and Ray, 1994, and Duclos et al., 2004). Designed as a means of identifying the likely emergence of the tension between heterogeneous groups, polarization is taken to arise from the simultaneous sensing of within-group identity (or intra-group homogeneity), and between-group alienation (or inter-group heterogeneity): an individual's degree of within-group identification increases with the number of individuals who share the same "fate," when fate is measured in terms of income. The intensity of the within-group identification then depends on the number of individuals who share the same level of income. The feeling of alienation of a homogenous group towards another homogeneous group is measured by the difference in incomes between the two groups. Specifically, Esteban and Ray (1994) proceed as follows: they calculate the sum of a group's income differences from all other income groups (the alienation component of the measure), which they then multiply by the within-group identification (the identification component of the measure). Summing up over all income groups yields the P index. A fall in the number of income groups and a rise in the income inequality between the groups will both increase P.

In section 2 we present these two measures, and in section 3 we evaluate their usefulness as predictors of PSU.[2] In particular, we seek to find out under which conditions the two measures point in the same direction, and whether, as predictors of PSU, one of the measures is preferable to the other.[3] To this end, we analyze income changes in three stylized scenarios. From Esteban and Ray (1994: 821) and Duclos et al. (2004: 1738) we know that the standard inequality measures may fail to generate admissible indicators of PSU in cases in which the P index succeeds. We find, however, that while the P index might indeed serve as a helpful sensor of PSU in some settings, in others its predictive power is poor. If policy design

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[2] The need to resort to measures such as the P index and the TRD index stems from standard inequality measures falling short of the required sensitivity for predicting PSU. Consider, for example, the Gini coefficient. Let an income distribution change from $I_A=\{2,3,35\}$ to $I_B=\{3,3,45\}$. Whereas the Gini coefficient registers a decline (the Gini coefficient changes from $\text{Gini}(I_A) = 0.550$ to $\text{Gini}(I_B) = 0.549$), the TRD index is rising (from $TRD(I_A) = 22$ to $TRD(I_B) = 28$) as there is more disgruntlement in population I_B than in population I_A.

[3] In this paper we do not address the issue of the conversion or the translation of PSU into actual social unrest. This issue requires a separate analysis. But it is unlikely that social disorder will occur in the absence of PSU. In discussing stylized scenarios of income redistribution and biased income growth we seek to highlight the change in PSU rather than its likely manifestation.

and implementation were cost-free, policy makers could safely act upon the more "pessimistic" of the two measures. Since implementation of policy measures is resource-intensive, there is a need to choose. We conclude that when the within-group identification is known to be strong, the *P* index is superior to the *TRD* index. When there is reason to believe that the within-group identification is weak, it is better to use the *TRD* index. Brief summary and concluding remarks are presented in section 4.

2. A measure of total relative deprivation, and a measure of polarization

2.1 Measuring total relative deprivation

Drawing on four requirements presented by Runciman (1966), which together result in the sensing of relative deprivation, Yitzhaki (1979) derived a measure of the relative deprivation of an individual, *RD*. Let the incomes, y_i, of *n* distinct income groups in a population be ranked from the lowest to the highest, $y_1 < y_2 < ... < y_n$, and let π_i, $i = 1,\dots,n$, denote the number of individuals earning income y_i. Then, the *RD* sensed by an individual whose income is y_i is defined as

$$RD(y_i) \equiv (\sum_{i=1}^{n} \pi_i)^{-1} \sum_{j=i+1}^{n} \pi_j (y_j - y_i)\,, \tag{1}$$

where it is understood that $RD(y_n) = 0$; irrespective of his (their) level of income y_n, the individual(s) earning the highest income in the population does (do) not experience any relative deprivation.

Let $F(y_i)$, $i = 1,\dots,n$, be the fraction of those in the population whose incomes are smaller than or equal to y_i. Then it can be shown that

$$RD(y_i) = [1 - F(y_i)] \cdot E(y - y_i \mid y > y_i)\,, \tag{2}$$

that is, the relative deprivation of an individual whose income is y_i is the fraction of those in the population whose incomes are higher than y_i times their mean excess income.[4]

[4] For a succinct proof of (2), see Stark (2006).

The sum of the levels of relative deprivation of all the individuals in a population yields the population's total relative deprivation

$$TRD \equiv \sum_{i=1}^{n} RD(y_i) = (\sum_{i=1}^{n} \pi_i)^{-1} \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \pi_i \pi_j (y_j - y_i) . \tag{3}$$

We use *TRD* as a measure of social dismay, and we consider it a useful tool for predicting PSU.

2.2 Measuring polarization

Drawing on four axioms, Esteban and Ray (1994) derived a measure of polarization for the case of a discrete income distribution. Their *P* index is defined as follows:

$$P \equiv K \sum_{i=1}^{n} \sum_{j=1}^{n} \pi_i^{1+\alpha} \pi_j \,|\ln y_i - \ln y_j| , \tag{4}$$

where, as in (1), π_i, $i = 1,\ldots,n$, is the number of individuals in the population earning income y_i, and $K > 0$ is some constant. The degree of "polarization sensitivity," α, is set between 1 and 1.6 (Esteban and Ray 1994: 841, Theorem 3).

The parameter α determines the magnitude of the identification component of the measure (the degree, or the intensity, of sensing within-group identity) and serves as a means of placing more "weight" on the *identification component*, $\pi_i^{1+\alpha}$, than on the *alienation component*, $\pi_j \,|\ln y_i - \ln y_j|$. If α is "low" (close to 1), the within-group identification component plays a smaller role than when α is "high" (close to 1.6), and the alienation between groups is more pronounced. Conversely, if α is "high," the within-group identification component is relatively important, and the alienation between income groups plays a minor role in determining the *P* index.

Since K is an arbitrary positive constant, for mathematical convenience we set $K = (\sum_{i=1}^{n} \pi_i)^{-(1+\alpha)}$, which enables us to rewrite (4) as

$$P = (\sum_{i=1}^{n} \pi_i)^{-(1+\alpha)} \sum_{i=1}^{n} \sum_{j=1}^{n} \pi_i^{1+\alpha} \pi_j \, |\ln y_i - \ln y_j| \, .^5 \tag{5}$$

In the remainder of this paper we use (5) to calculate (changes in) the *P* index.

3. The *P* index and the *TRD* index as sensors of PSU: three scenarios

We evaluate the usefulness of the *P* and *TRD* indices as tools for predicting PSU, and we ask under which conditions the two measures are on par. To this end, we present three stylized scenarios. We argue that it is the *sign of the change* in the value of the *P* index and the *sign of the change* in the value of the *TRD* index that should be of interest, since an increase (decrease) in an index reflects, or indicates, an increase (decrease) in PSU. Changes in the values of the *P* and *TRD* indices could be brought about by a variety of processes.

Scenario 1: *Income redistribution from the poorer members of a population to the richer members of the population*

Let the income distribution be $I_0 = \{3,3,3,4,6,7\}$. Suppose that some of the income of the four lowest income earners is shifted to the two highest income earners, such that the resulting income distribution is $I_1 = \{2,2,2,2,9,9\}$. That is, while keeping aggregate income intact, the poorest individuals in the population lose income, whereas the richest gain.

The P index. The alienation component of the index increases. The identification component increases too (because instead of two small "groups" of low income earners, {3,3,3} and {4}, there is now a larger group of low income earners, {2,2,2,2}, and instead of two high income "groups," {6} and {7}, there is now a single group of high income earners {9,9}). Thus, upon reducing the number of income groups, the identification component of the *P* index increases, and simultaneously, upon stretching the difference between income groups, the alienation component increases. Therefore, use of the *P* index predicts an increase in PSU. Figure 1 illustrates this outcome for alternative degrees of the polarization sensitivity α.

[5] When $K = (\sum_{i=1}^{n} \pi_i)^{-(1+\alpha)}$, both the *TRD* index and the *P* index exhibit population homogeneity of degree one.

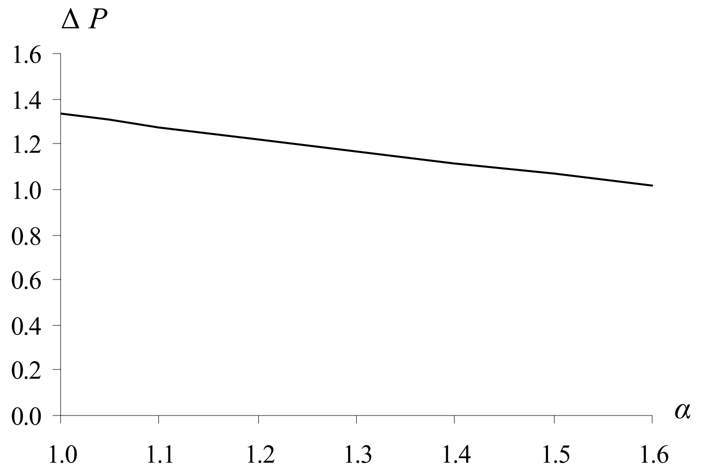

Figure 1: Change of the *P* index, upon income redistribution from $I_0 = \{3,3,3,4,6,7\}$ to $I_1 = \{2,2,2,2,9,9\}$, as a function of $\alpha \in [1,1.6]$

The TRD index. The four poorer income earners, {3,3,3} and {4}, experience an increase in their relative deprivation, which by far outweighs the reduction in the relative deprivation of the individual with the pre-redistribution income {6}. The richest individual did not, and continues not to, sense any social dismay. Therefore, upon the shift from $I_0 = \{3,3,3,4,6,7\}$ to $I_1 = \{2,2,2,2,9,9\}$, the *TRD* index increases: $TRD(I_1) = 56/6 = 9.3 > TRD(I_0) = 30/6 = 5$. Use of the *TRD* index then predicts an increase in PSU.

In conclusion: when the alienation component of the *P* index and the identification component of the *P* index simultaneously increase (decrease), then the *TRD* index will also increase (decrease). Therefore, a PSU guidance based on the *P* index is on par with that which is based on the *TRD* index. For the purpose of predicting the direction of the change in PSU, one measure is as good as the other.

Scenario 2: *The poor catch up*

Consider an income distribution $I_0 = \{2,2,2,3,3,10,10\}$. Suppose that the poorest individuals catch up with the middle income individuals, such that the resulting income distribution is $I_1 = \{3,3,3,3,3,10,10\}$.

The P index. The alienation component of the *P* index decreases, because the individuals who earned income 2 now earn income 3. The identification component of the *P* index increases, however, because instead of two small low income groups, {2,2,2} and {3,3}, we have one large homogeneous low income group, {3,3,3,3,3}, exhibiting a higher degree of within-group identity than {2,2,2} or {3,3}. The identification component and the alienation component thus point in opposite directions. Since in this case the identification component outweighs the alienation component, a prediction based on the *P* index points to a rising PSU. Figure 2 illustrates.

The TRD index. Upon a shift from $I_0 = \{2,2,2,3,3,10,10\}$ to $I_1 = \{3,3,3,3,3,10,10\}$, the *TRD* index declines: $TRD(I_1) = 70/7 = 10 \; < \; TRD(I_0) = 82/7 = 11.7$. Following the improvement in their income situation, the three poorest individuals perceive a decrease in social dismay; for each, relative deprivation decreases (from 18/7 to 14/7). The other individuals are not affected by the income change. Hence, the change in the *TRD* index points to a decline in PSU.

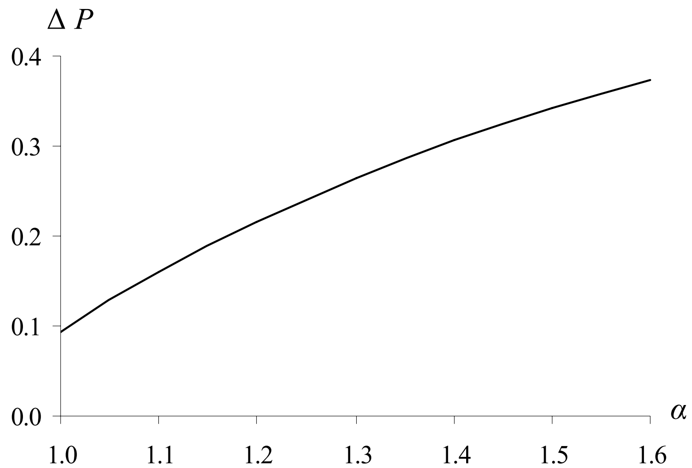

Figure 2: Change of the *P* index, upon income redistribution from $I_0 = \{2,2,2,3,3,10,10\}$ to $I_1 = \{3,3,3,3,3,10,10\}$, as a function of $\alpha \in [1,1.6]$

In conclusion: if the change in the *P* index and the change in the *TRD* index point in opposite directions, and if there are grounds for believing that the underlying environment is characterized by a high degree of intra-group identification, the "advice" of the *P* index should be attended to. If, however, there are grounds for believing that the intensity of the within-group identification is negligible, then the signal emitted by the change in the *TRD* index should carry the day.

Scenario 3: *Biased income growth*

Consider four individuals at two points in time: t, when the income distribution is $I_0^t = \{2,3,6,7\}$, and $t+1$, when the income distribution is $I_1^{t+1} = \{5,5,8,8\}$. That is, in time, all the individuals earn more, yet by different amounts.

The P index. On the one hand, the alienation component of the *P* index decreases, since income groups converge. On the other hand, the reduction in the number of income groups leads to an increase in the identification component of the *P* index. In this case, though, neither the alienation component nor the identification component outweighs the other for all admissible values of α: when the value of α is lower than approximately 1.25, the shift from $I_0^t = \{2,3,6,7\}$ to $I_1^{t+1} = \{5,5,8,8\}$ results in a decline of the *P* index. When the value of α is higher than approximately 1.25, the *P* index increases. Thus, a prediction based on the *P* index critically depends on additional information about the "degree or intensity of polarization" which is embodied in the parameter α.[6] Figure 3 illustrates.

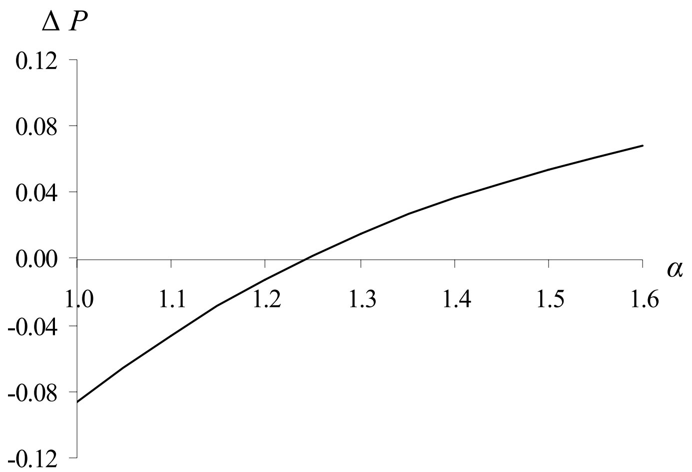

Figure 3: Change of the *P* index, upon revision of the income distribution from $I_0^t = \{2,3,6,7\}$ to $I_1^{t+1} = \{5,5,8,8\}$, as a function of $\alpha \in [1,1.6]$

The TRD index. Intuitively, with wealthier individuals all around, PSU could be expected to register a decline. The *TRD* index changes in line with this intuition: $TRD(I_1^{t+1}) = 12/4 = 3$

[6] Esteban and Ray (1994) do not specify how to convert the "degree of within-group identification" into a specific α value.

< $TRD(I_0^t) = 18/4 = 4.5$. For no individual does the fraction of those who earn more increase, and for all the individuals, except the richest, the mean excess income of those who earn more decreases. Therefore, each individual's relative deprivation (except that of the richest) declines. Thus, a *TRD*-based prediction of the change in PSU is that PSU declines.

In conclusion: if in the wake of biased income growth a population exhibits an intensified degree of within-group identification, and if a policy maker considers α to be close to 1.6, then the *P* index will guide the policy maker differently from the *TRD* index. Knowing in this case that $\alpha \geq 1$ is insufficient for the *P* index to increase. Without concrete information about the intensity of the within-group identification and an explicit procedure for transforming that information into an α value, the *P* index cannot tell us unequivocally whether PSU increases or decreases when income growth is biased. The *TRD* index, however, can.

4. Conclusion

Groping for indices that could serve as possible advance warnings of looming social unrest, we reviewed stylized scenarios in which changes in the *P* index and in the *TRD* index point in the same direction or in opposite directions. For a population of a given size, this review suggests that as long as the alienation component and the identification component of the *P* index rise or fall simultaneously, the sign of the change in the *P* index is in accord with the sign of the change in the *TRD* index (cf. scenario 1). When the sign of the change in the *P* index is the same as the sign of the change in the *TRD* index, either of the two indices will do as a predictor of PSU. However, as illustrated by scenario 2, the changes in the two indices may well yield conflicting predictions. If an income redistribution results in fewer distinct income groups - assuming that each group is characterized by a strong sense of within-group identity - the *P* index appears to be better than the *TRD* index as a tool for predicting PSU. When the alienation component and the identification component of the *P* index point in opposite directions, the *P* index can lack the consistency (hence reliability) conferred by the *TRD* index (cf. scenario 3): the fact that depending on the magnitude of α (the parameter representing the intensity of within-group identification) the change in the *P* index can exhibit a sign reversal, hinders the applicability of the index, especially when policy makers have little to rely on in assessing the magnitude of α. When the policy maker knows the true value of α, and when this value is larger than one, the *P* index can be more potent than the *TRD* index. Refer again to scenario 3. In the wake of biased income growth, the population becomes highly polarized, which could lead to an increase in PSU (when alienation surpasses a certain threshold). The *TRD* index is not capable of capturing tensions of this type. Being aware that α is "large" in and by itself is insufficient to guarantee that drawing upon the *P* index will yield a clear-cut prediction of PSU. In sum, when the possibility of strong within-group identification can be ruled out, we are inclined to resort to the *TRD* index as a basis for predicting PSU.

If policy design and policy implementation were cost-free, we would conclude that policy makers should "follow the advice of the more pessimistic of the two signals." Since implementing policy measures is resource intensive, a choice needs to be made. We have sought to help guide this choice.

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