



ZEF Bonn
Zentrum für Entwicklungsforschung
Center for Development Research
Universität Bonn

Oded Stark, Walter Hyll,
and Doris A. Behrens

Number

135

**Gauging the potential for
social unrest**

ZEF – Discussion Papers on Development Policy
Bonn, September 2009

The CENTER FOR DEVELOPMENT RESEARCH (ZEF) was established in 1995 as an international, interdisciplinary research institute at the University of Bonn. Research and teaching at ZEF aims to contribute to resolving political, economic and ecological development problems. ZEF closely cooperates with national and international partners in research and development organizations. For information, see: <http://www.zef.de>.

ZEF – DISCUSSION PAPERS ON DEVELOPMENT POLICY are intended to stimulate discussion among researchers, practitioners and policy makers on current and emerging development issues. Each paper has been exposed to an internal discussion within the Center for Development Research (ZEF) and an external review. The papers mostly reflect work in progress.

Oded Stark, Walter Hyll, and Doris A. Behrens. Gauging the potential for social unrest, ZEF- Discussion Papers On Development Policy No. 135, Center for Development Research, Bonn, September 2009, pp. 14.

ISSN: 1436-9931

Published by:

Zentrum für Entwicklungsforschung (ZEF)
Center for Development Research
Walter-Flex-Strasse 3
D – 53113 Bonn
Germany
Phone: +49-228-73-1861
Fax: +49-228-73-1869
E-Mail: zef@uni-bonn.de
<http://www.zef.de>

The authors:

Oded Stark, Universities of Bonn, Klagenfurt, and Vienna; Warsaw University; Warsaw School of Economics. Contact: ostark@uni-bonn.de
Walter Hyll, University of Klagenfurt. Contact: walter.hyll@uni-klu.ac.at
Doris A. Behrens, University of Klagenfurt; Vienna University of Technology. Contact: doris.behrens@uni-klu.ac.at

Contents

Acknowledgements

Abstract	1
Kurzfassung	2
1 Introduction	3
2 A measure of total relative deprivation, and a measure of polarization	6
2.1 Measuring total relative deprivation	6
2.2 Measuring polarization	7
3 The <i>P</i> index and the <i>TRD</i> index as sensors of PSU: three scenarios	8
<i>Scenario 1: Income redistribution from the poorer members of a population to the richer members of the population</i>	8
<i>Scenario 2: The poor catch up</i>	9
<i>Scenario 3: Biased income growth</i>	11
4 Conclusion	13
References	14

List of Figures

- 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 $\alpha \in [1, 1.6]$ 9
- 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 $\alpha \in [1, 1.6]$ 10
- Figure 3: Change of the P index, upon revision of the income distribution
from $I_0' = \{2, 3, 6, 7\}$ to $I_1'^{+1} = \{5, 5, 8, 8\}$, as a function of $\alpha \in [1, 1.6]$ 11

Acknowledgements

We are indebted to William F. Shughart II for enlightening comments, large and small.

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.

Kurzfassung

Unruhen entstehen nicht aus heiterem Himmel. Obwohl es viele Gründe dafür gibt, dass soziale Unzufriedenheit zu Unruhen führt, existieren nur wenige Maßstäbe oder Indizes um das „Potenzial für Unruhen“ (PSU) zu messen. Wenn Entscheidungsträger Maßnahmen ergreifen wollen um die Eskalation sozialer Unzufriedenheit in Unruhen zu verhindern, ist es notwendig, dass sie auf geeignete Sensoren zurückgreifen können. In dieser Arbeit werden zwei solche Indikatoren kritisch bewertet; der Polarisierungsindex (P), sowie der relative Deprivationsindex (TRD). Dieser Beitrag liefert Aufschluss über die Verwendbarkeit der beiden Indizes. Auf Basis dreier stilisierter Szenarien kommen die Autoren zu dem Schluss, dass der P -Index dem TRD -Index für eine PSU-Prognose vorzuziehen ist, wenn Einkommensumverteilungen die Anzahl unterschiedlicher Einkommensgruppen reduzieren und jede Gruppe durch eine starke Gruppenidentität charakterisiert ist. Wenn die Identifikation eines Individuums mit einer Gruppe jedoch schwach ausgeprägt ist, empfiehlt sich der TRD -Index zur PSU-Prognose.

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 earners 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.

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 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

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 $Gini(I_A) = 0.550$ to $Gini(I_B) = 0.549$), 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.

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, $y_1 < y_2 < \dots < y_n$, 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

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

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

$$RD(y_i) = [1 - F(y_i)] \cdot E(y - y_i | y > y_i), \quad (2)$$

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

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

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

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

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:

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

where, as in (1), π_i , $i = 1, \dots, n$, 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

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

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

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.

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 .

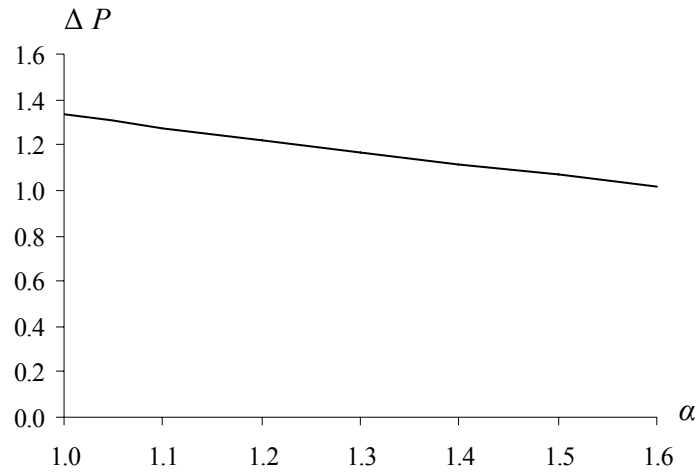


Figure 1: Change of the P index, upon income redistribution from $I_0 = \{3,3,3,4,6,7\}$ to $I_1 = \{2,2,2,2,9,9\}$, as a function of $\alpha \in [1,1.6]$

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.

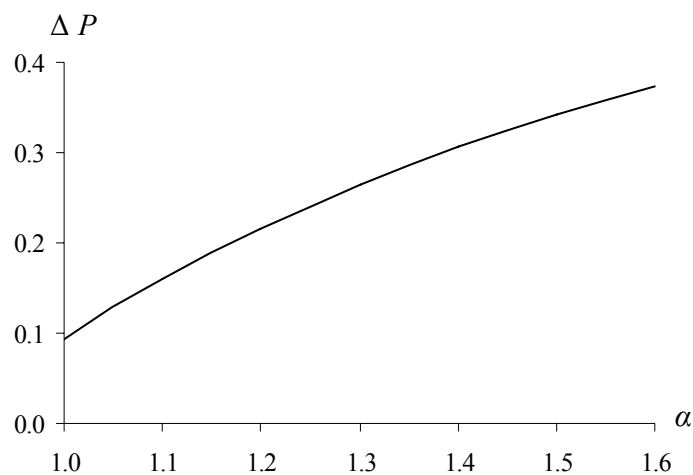


Figure 2: Change of the P index, upon income redistribution from $I_0 = \{2,2,2,3,3,10,10\}$ to $I_1 = \{3,3,3,3,3,10,10\}$, as a function of $\alpha \in [1,1.6]$

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.

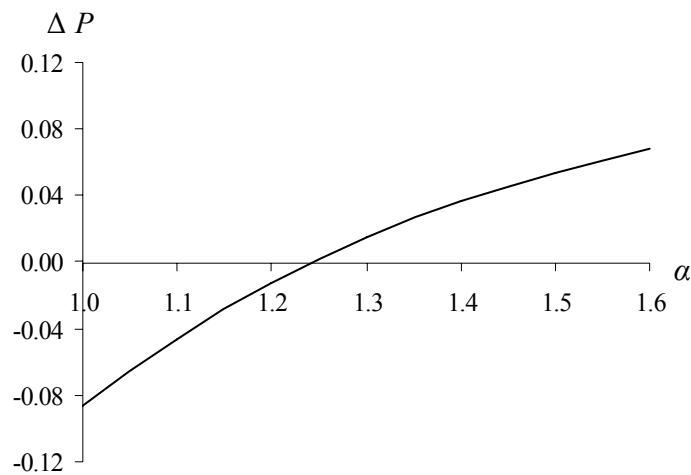


Figure 3: Change of the P index, upon revision of the income distribution from $I_0^t = \{2, 3, 6, 7\}$ to $I_1^{t+1} = \{5, 5, 8, 8\}$, as a function of $\alpha \in [1, 1.6]$

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: $TRD(I_1^{t+1}) = 12 / 4 = 3 < TRD(I_0^t) = 18 / 4 = 4.5$. 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

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

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.

References

- Basuchoudhary, A., & Shughart, W.F. II (forthcoming). On ethnic conflict and the origins of transnational terrorism. *Defence and Peace Economics*.
- Bossert, W., & D'Ambrosio, C. (2006). Reference groups and individual deprivation. *Economics Letters*, 90, 421–426.
- Choe, J. (2008). Income inequality and crime in the United States. *Economics Letters*, 101, 31–33.
- Duclos, J.-Y., Esteban, J., & Ray, D. (2004). Polarization: concepts, measurement, estimation. *Econometrica*, 72, 1737–1772.
- Esteban, J., & Ray, D. (1994). On the measurement of polarization. *Econometrica*, 62, 819–852.
- Runciman, W.G. (1966). *Relative deprivation and social justice: a study of attitudes to social inequality in twentieth-century England*. Berkeley: University of California Press.
- Stark, O. (2006). Inequality and migration: a behavioral link. *Economics Letters*, 91, 146–152.
- Yitzhaki, S. (1979). Relative deprivation and the Gini coefficient. *Quarterly Journal of Economics*, 93, 321–324.

The following papers have been published so far:

- | | | |
|--------|--|--|
| No. 1 | Ulrike Grote,
Arnab Basu,
Diana Weinhold | Child Labor and the International Policy Debate
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 1998, pp. 47. |
| No. 2 | Patrick Webb,
Maria Iskandarani | Water Insecurity and the Poor: Issues and Research Needs
Zentrum für Entwicklungsforschung (ZEF), Bonn,
Oktober 1998, pp. 66. |
| No. 3 | Matin Qaim,
Joachim von Braun | Crop Biotechnology in Developing Countries: A
Conceptual Framework for Ex Ante Economic Analyses
Zentrum für Entwicklungsforschung (ZEF), Bonn,
November 1998, pp. 24. |
| No. 4 | Sabine Seibel,
Romeo Bertolini,
Dietrich Müller-Falcke | Informations- und Kommunikationstechnologien in
Entwicklungsländern
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 1999, pp. 50. |
| No. 5 | Jean-Jacques Dethier | Governance and Economic Performance: A Survey
Zentrum für Entwicklungsforschung (ZEF), Bonn,
April 1999, pp. 62. |
| No. 6 | Mingzhi Sheng | Lebensmittelhandel und Konsumtrends in China
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 1999, pp. 57. |
| No. 7 | Arjun Bedi | The Role of Information and Communication Technologies
in Economic Development – A Partial Survey
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 1999, pp. 42. |
| No. 8 | Abdul Bayes,
Joachim von Braun,
Rasheda Akhter | Village Pay Phones and Poverty Reduction: Insights from
a Grameen Bank Initiative in Bangladesh
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 1999, pp. 47. |
| No. 9 | Johannes Jütting | Strengthening Social Security Systems in Rural Areas of
Developing Countries
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 1999, pp. 44. |
| No. 10 | Mamdouh Nasr | Assessing Desertification and Water Harvesting in the
Middle East and North Africa: Policy Implications
Zentrum für Entwicklungsforschung (ZEF), Bonn,
July 1999, pp. 59. |
| No. 11 | Oded Stark,
Yong Wang | Externalities, Human Capital Formation and Corrective
Migration Policy
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 1999, pp. 17. |

ZEF Discussion Papers on Development Policy

- No. 12 John Msuya Nutrition Improvement Projects in Tanzania: Appropriate Choice of Institutions Matters
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 1999, pp. 36.
- No. 13 Liu Junhai Legal Reforms in China
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 1999, pp. 90.
- No. 14 Lukas Menkhoff Bad Banking in Thailand? An Empirical Analysis of Macro Indicators
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 1999, pp. 38.
- No. 15 Kaushalesh Lal Information Technology and Exports: A Case Study of Indian Garments Manufacturing Enterprises
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 1999, pp. 24.
- No. 16 Detlef Virchow Spending on Conservation of Plant Genetic Resources for Food and Agriculture: How much and how efficient?
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 1999, pp. 37.
- No. 17 Arnulf Heuermann Die Bedeutung von Telekommunikationsdiensten für wirtschaftliches Wachstum
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 1999, pp. 33.
- No. 18 Ulrike Grote,
Arnab Basu,
Nancy Chau The International Debate and Economic Consequences of Eco-Labeling
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 1999, pp. 37.
- No. 19 Manfred Zeller Towards Enhancing the Role of Microfinance for Safety Nets of the Poor
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 1999, pp. 30.
- No. 20 Ajay Mahal,
Vivek Srivastava,
Deepak Sanan Decentralization and Public Sector Delivery of Health and Education Services: The Indian Experience
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2000, pp. 77.
- No. 21 M. Andreini,
N. van de Giesen,
A. van Edig,
M. Fosu,
W. Andah Volta Basin Water Balance
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2000, pp. 29.
- No. 22 Susanna Wolf,
Dominik Spoden Allocation of EU Aid towards ACP-Countries
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2000, pp. 59.

ZEF Discussion Papers on Development Policy

- No. 23 Uta Schultze Insights from Physics into Development Processes: Are Fat Tails Interesting for Development Research?
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2000, pp. 21.
- No. 24 Joachim von Braun,
Ulrike Grote,
Johannes Jütting Zukunft der Entwicklungszusammenarbeit
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2000, pp. 25.
- No. 25 Oded Stark,
You Qiang Wang A Theory of Migration as a Response to Relative
Deprivation
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2000, pp. 16.
- No. 26 Doris Wiesmann,
Joachim von Braun,
Torsten Feldbrügge An International Nutrition Index – Successes and Failures
in Addressing Hunger and Malnutrition
Zentrum für Entwicklungsforschung (ZEF), Bonn,
April 2000, pp. 56.
- No. 27 Maximo Torero The Access and Welfare Impacts of Telecommunications
Technology in Peru
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 2000, pp. 30.
- No. 28 Thomas Hartmann-
Wendels
Lukas Menkhoff Could Tighter Prudential Regulation Have Saved Thailand's
Banks?
Zentrum für Entwicklungsforschung (ZEF), Bonn,
July 2000, pp. 40.
- No. 29 Mahendra Dev Economic Liberalisation and Employment in South Asia
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 2000, pp. 82.
- No. 30 Noha El-Mikawy,
Amr Hashem,
Maye Kassem,
Ali El-Sawi,
Abdel Hafez El-Sawy,
Mohamed Showman Institutional Reform of Economic Legislation in Egypt
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 2000, pp. 72.
- No. 31 Kakoli Roy,
Susanne Ziemek On the Economics of Volunteering
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 2000, pp. 47.
- No. 32 Assefa Admassie The Incidence of Child Labour in Africa with Empirical
Evidence from Rural Ethiopia
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2000, pp. 61.
- No. 33 Jagdish C. Katyal,
Paul L.G. Vlek Desertification – Concept, Causes and Amelioration
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2000, pp. 65.

ZEF Discussion Papers on Development Policy

- No. 34 Oded Stark On a Variation in the Economic Performance of Migrants by their Home Country's Wage
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2000, pp. 10.
- No. 35 Ramón Lopéz Growth, Poverty and Asset Allocation: The Role of the State
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2001, pp. 35.
- No. 36 Kazuki Taketoshi Environmental Pollution and Policies in China's Township and Village Industrial Enterprises
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2001, pp. 37.
- No. 37 Noel Gaston,
Douglas Nelson Multinational Location Decisions and the Impact on Labour Markets
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 2001, pp. 26.
- No. 38 Claudia Ringler Optimal Water Allocation in the Mekong River Basin
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 2001, pp. 50.
- No. 39 Ulrike Grote,
Stefanie Kirchhoff Environmental and Food Safety Standards in the Context of Trade Liberalization: Issues and Options
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 2001, pp. 43.
- No. 40 Renate Schubert,
Simon Dietz Environmental Kuznets Curve, Biodiversity and Sustainability
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2001, pp. 30.
- No. 41 Stefanie Kirchhoff,
Ana Maria Ibañez Displacement due to Violence in Colombia: Determinants and Consequences at the Household Level
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2001, pp. 45.
- No. 42 Francis Matambalya,
Susanna Wolf The Role of ICT for the Performance of SMEs in East Africa – Empirical Evidence from Kenya and Tanzania
Zentrum für Entwicklungsforschung (ZEF), Bonn,
December 2001, pp. 30.
- No. 43 Oded Stark,
Ita Falk Dynasties and Destiny: On the Roles of Altruism and Impatience in the Evolution of Consumption and Bequests
Zentrum für Entwicklungsforschung (ZEF), Bonn,
December 2001, pp. 20.
- No. 44 Assefa Admassie Allocation of Children's Time Endowment between Schooling and Work in Rural Ethiopia
Zentrum für Entwicklungsforschung (ZEF), Bonn,
February 2002, pp. 75.

ZEF Discussion Papers on Development Policy

- No. 45 Andreas Wimmer,
Conrad Schetter Staatsbildung zuerst. Empfehlungen zum Wiederaufbau und zur Befriedung Afghanistans. (German Version)
State-Formation First. Recommendations for Reconstruction and Peace-Making in Afghanistan. (English Version)
Zentrum für Entwicklungsforschung (ZEF), Bonn,
April 2002, pp. 27.
- No. 46 Torsten Feldbrügge,
Joachim von Braun Is the World Becoming A More Risky Place?
- Trends in Disasters and Vulnerability to Them -
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 2002, pp. 42
- No. 47 Joachim von Braun,
Peter Wobst,
Ulrike Grote "Development Box" and Special and Differential Treatment for
Food Security of Developing Countries:
Potentials, Limitations and Implementation Issues
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 2002, pp. 28
- No. 48 Shyamal Chowdhury Attaining Universal Access: Public-Private Partnership and
Business-NGO Partnership
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 2002, pp. 37
- No. 49 L. Adele Jinadu Ethnic Conflict & Federalism in Nigeria
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 2002, pp. 45
- No. 50 Oded Stark,
Yong Wang Overlapping
Zentrum für Entwicklungsforschung (ZEF), Bonn,
August 2002, pp. 17
- No. 51 Roukayatou Zimmermann,
Matin Qaim Projecting the Benefits of Golden Rice in the Philippines
Zentrum für Entwicklungsforschung (ZEF), Bonn,
September 2002, pp. 33
- No. 52 Gautam Hazarika,
Arjun S. Bedi Schooling Costs and Child Labour in Rural Pakistan
Zentrum für Entwicklungsforschung (ZEF), Bonn
October 2002, pp. 34
- No. 53 Margit Bussmann,
Indra de Soysa,
John R. Oneal The Effect of Foreign Investment on Economic Development
and Income Inequality
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2002, pp. 35
- No. 54 Maximo Torero,
Shyamal K. Chowdhury,
Virgilio Galdo Willingness to Pay for the Rural Telephone Service in
Bangladesh and Peru
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2002, pp. 39
- No. 55 Hans-Dieter Evers,
Thomas Menkhoff Selling Expert Knowledge: The Role of Consultants in
Singapore's New Economy
Zentrum für Entwicklungsforschung (ZEF), Bonn,
October 2002, pp. 29

ZEF Discussion Papers on Development Policy

- No. 78 Eric T. Craswell
Ulrike Grote
Julio Henao
Paul L.G. Vlek Nutrient Flows in Agricultural Production and International Trade: Ecology and Policy Issues
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 62
- No. 79 Richard Pomfret Resource Abundance, Governance and Economic Performance in Turkmenistan and Uzbekistan
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 20
- No. 80 Anil Markandya Gains of Regional Cooperation: Environmental Problems and Solutions
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 24
- No. 81 Akram Esanov,
Martin Raiser,
Willem Buiter Gains of Nature's Blessing or Nature's Curse: The Political Economy of Transition in Resource-Based Economies
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 22
- No. 82 John M. Msuya
Johannes P. Jütting
Abay Asfaw Impacts of Community Health Insurance Schemes on Health Care Provision in Rural Tanzania
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 26
- No. 83 Bernardina Algieri The Effects of the Dutch Disease in Russia
Zentrum für Entwicklungsforschung (ZEF), Bonn,
January 2004, pp. 41
- No. 84 Oded Stark On the Economics of Refugee Flows
Zentrum für Entwicklungsforschung (ZEF), Bonn,
February 2004, pp. 8
- No. 85 Shyamal K. Chowdhury Do Democracy and Press Freedom Reduce Corruption? Evidence from a Cross Country Study
Zentrum für Entwicklungsforschung (ZEF), Bonn,
March 2004, pp. 33
- No. 86 Qiuxia Zhu The Impact of Rural Enterprises on Household Savings in China
Zentrum für Entwicklungsforschung (ZEF), Bonn,
May 2004, pp. 51
- No. 87 Abay Asfaw
Klaus Frohberg
K.S.James
Johannes Jütting Modeling the Impact of Fiscal Decentralization on Health Outcomes: Empirical Evidence from India
Zentrum für Entwicklungsforschung (ZEF), Bonn,
June 2004, pp. 29

ZEF Discussion Papers on Development Policy

- No. 99 Steve Boucher
Oded Stark
J. Edward Taylor A Gain with a Drain? Evidence from Rural Mexico on the New Economics of the Brain Drain
Zentrum für Entwicklungsforschung (ZEF), Bonn
October 2005, pp. 26
- No. 100 Jumanne Abdallah
Johannes Sauer Efficiency and Biodiversity – Empirical Evidence from Tanzania
Zentrum für Entwicklungsforschung (ZEF), Bonn
November 2005, pp. 34
- No. 101 Tobias Debiel Dealing with Fragile States – Entry Points and Approaches for Development Cooperation
Zentrum für Entwicklungsforschung (ZEF), Bonn
December 2005, pp. 38
- No. 102 Sayan Chakrabarty
Ulrike Grote
Guido Lüchters The Trade-Off Between Child Labor and Schooling: Influence of Social Labeling NGOs in Nepal
Zentrum für Entwicklungsforschung (ZEF), Bonn
February 2006, pp. 35
- No. 103 Bhagirath Behera
Stefanie Engel Who Forms Local Institutions? Levels of Household Participation in India's Joint Forest Management Program
Zentrum für Entwicklungsforschung (ZEF), Bonn
February 2006, pp. 37
- No. 104 Roukayatou Zimmermann
Faruk Ahmed Rice Biotechnology and Its Potential to Combat Vitamin A Deficiency: A Case Study of Golden Rice in Bangladesh
Zentrum für Entwicklungsforschung (ZEF), Bonn
March 2006, pp. 31
- No. 105 Adama Konseiga Household Migration Decisions as Survival Strategy: The Case of Burkina Faso
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2006, pp. 36
- No. 106 Ulrike Grote
Stefanie Engel
Benjamin Schraven Migration due to the Tsunami in Sri Lanka – Analyzing Vulnerability and Migration at the Household Level
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2006, pp. 37
- No. 107 Stefan Blum East Africa: Cycles of Violence, and the Paradox of Peace
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2006, pp. 42
- No. 108 Ahmed Farouk Ghoneim
Ulrike Grote Impact of Labor Standards on Egyptian Exports with Special Emphasis on Child Labor
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2006, pp. 50
- No. 109 Oded Stark Work Effort, Moderation in Expulsion, and Illegal Migration
Zentrum für Entwicklungsforschung (ZEF), Bonn
May 2006, pp. 11

ZEF Discussion Papers on Development Policy

- No. 110 Oded Stark
C. Simon Fan International Migration and "Educated Unemployment"
Zentrum für Entwicklungsforschung (ZEF), Bonn
June 2006, pp. 19
- No. 111 Oded Stark
C. Simon Fan A Reluctance to Assimilate
Zentrum für Entwicklungsforschung (ZEF), Bonn
October 2006, pp. 12
- No. 112 Martin Worbes
Evgeniy Botman
Asia Khamzina
Alexander Tupitsa
Christopher Martius
John P.A. Lamers Scope and Constraints for Tree Planting in the Irrigated
Landscapes of the Aral Sea Basin: Case Studies in
Khorezm Region, Uzbekistan
Zentrum für Entwicklungsforschung (ZEF), Bonn
December 2006, pp. 49
- No. 113 Oded Stark
C. Simon Fan The Analytics of Seasonal Migration
Zentrum für Entwicklungsforschung (ZEF), Bonn
March 2007, pp. 16
- No. 114 Oded Stark
C. Simon Fan The Brain Drain, "Educated Unemployment,"
Human Capital Formation, and Economic Betterment
Zentrum für Entwicklungsforschung (ZEF), Bonn
July 2007, pp. 36
- No. 115 Franz Gatzweiler
Anke Reichhuber
Lars Hein Why Financial Incentives Can Destroy Economically
Valuable Biodiversity in Ethiopia
Zentrum für Entwicklungsforschung (ZEF), Bonn
August 2007, pp. 14
- No. 116 Oded Stark
C. Simon Fan Losses and Gains to Developing Countries from the
Migration of Educated Workers: An Overview of Recent
Research, and New Reflections
Zentrum für Entwicklungsforschung (ZEF), Bonn
August 2007, pp. 14
- No. 117 Aimée Hampel-Milagrosa Social Capital, Ethnicity and Decision-Making in the
Philippine Vegetable Market
Zentrum für Entwicklungsforschung (ZEF), Bonn
September 2007, pp. 74
- No. 118 Oded Stark
C. Simon Fan Rural-to-Urban Migration, Human Capital, and
Agglomeration
Zentrum für Entwicklungsforschung (ZEF), Bonn
December 2007, pp. 25
- No. 119 Arnab K. Basu
Matin Qaim Pricing, Distribution and Adoption of Genetically
Modified Seeds under Alternative Information Regimes
Zentrum für Entwicklungsforschung (ZEF), Bonn
December 2007, pp. 32
- No. 120 Oded Stark
Doris A. Behrens Yong
Wang On the Evolutionary Edge of Migration
as an Assortative Mating Device
Zentrum für Entwicklungsforschung (ZEF), Bonn
February 2008, pp. 19

- No. 121 Nancy H. Chau
Rolf Färe Shadow Pricing Market Access: A Trade Benefit Function Approach
Zentrum für Entwicklungsforschung (ZEF), Bonn
January 2008, pp. 42
- No. 122 Nicolas Gerber Bioenergy and Rural development in developing Countries: a Review of Existing Studies
Zentrum für Entwicklungsforschung (ZEF), Bonn
June 2008, pp. 58
- No. 123 Seid Nuru
Holger Seebens The Impact of Location on Crop Choice and Rural Livelihood: Evidences from Villages in Northern Ethiopia
Zentrum für Entwicklungsforschung (ZEF), Bonn
July 2008, pp. 27
- No. 124 Anik Bhaduri, Nicostrato
Perez and Jens Liebe Scope and Sustainability of Cooperation in Transboundary Water Sharing of the Volta River
Zentrum für Entwicklungsforschung (ZEF), Bonn
September 2008, pp. 28
- No. 125 Arnab K. Basu and Robert
L. Hicks Label Performance and the Willingness to Pay for Fair Trade Coffee: A Cross-National Perspective
Zentrum für Entwicklungsforschung (ZEF), Bonn
October 2008, pp. 22
- No. 126 Prof. Dr. habil. Michael
Bohnet Chinas langer Marsch zur Umweltrevolution Umweltprobleme und Umweltpolitik der Chinesischen Volksrepublik
Zentrum für Entwicklungsforschung (ZEF), Bonn
October 2008, pp. 22
- No. 127 Nicolas Gerber
Manfred van Eckert
Thomas Breuer The Impacts of Biofuel Production on Food Prices: a review
Zentrum für Entwicklungsforschung (ZEF), Bonn
December 2008, pp.19
- No. 128 Oded Stark and Doris A.
Behrens An Evolutionary Edge of Knowing Less (or: On the "Curse" of Global Information)
Zentrum für Entwicklungsforschung (ZEF), Bonn
March 2009, pp.21
- No. 129 Daniel W. Tsegai,
Teresa Linz,
Julia Kloos Economic analysis of water supply cost structure in the Middle Olifants sub-basin of South Africa
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2009, pp.20
- No. 130 Teresa Linz,
Daniel W. Tsegai Industrial Water Demand analysis in the Middle Olifants sub-basin of South Africa: The case of Mining
Zentrum für Entwicklungsforschung (ZEF), Bonn
April 2009, pp.27

