Does higher inequality lead to conflict?

Dutta, Indranil; Mishra, Ajit

Publication date:
2003

University of Dundee

Dundee Discussion Papers in Economics

Does Higher Inequality Lead to Conflict?

Indranil Dutta

and

Ajit Mishra

Department of
Economic Studies,
University of Dundee,
Dundee.
DD1 4HN

Working Paper
No. 141
February 2003
ISSN:1473-236X

Does Higher Inequality lead to Conflict?*

Indranil Dutta[†] Ajit Mishra[‡]

ABSTRACT

In this paper we present a simple model to show how distributional concerns can engender social conflict. We have a two period model, where the cost of conflict is endogenous in the sense that parties involved have full control over how much conflict they can create. Unlike the standard results our model shows that it is not current inequality that is important for conflict, rather it is the anticipated future inequality that plays a crucial role. The anticipated inequality, however, has to be significant to result in conflict. Also, as a result of the conflict, total output and growth in the economy is lowered. Finally, in line with empirical evidence, our model also shows that richer societies will have less conflict.

Keywords: Conflict, wealth inequality and Nash bargaining.

JEL Classifications: C78, D31, D74 and D09

Draft: February, 27, 2003.

*We would like to thank Jack Hirshleifer and Prasanta Pattanaik for comments on earlier drafts. The usual disclaimer apply.

[†]School of Development Studies, University of East Anglia, Norwich UK. NR4 7TJ. Email: i.dutta@uea.ac.uk. Tele#:+44(0)1603-592806. Fax#:+44(0)1603-451999.

[‡]Department of Economics, University of Dundee, Dundee, UK. DD1 4HN. Email: a.mishra@dundee.ac.uk. Tele#: +44(0)1382-344372. Fax#: +44(0)1382-344691.

1 Introduction

This paper presents a simple model showing how distributional concerns can engender social conflict. What we have in mind is the phenomena of widescale demonstrations and protests leading to severe disruption of economic activity that has become common in recent years[1]. Often, this has stemmed from proposed economic reforms as in the case of South Asia[2] and Latin America (Sachs 1990). The literature on inequality and growth demonstrate that inequality plays a crucial role in explaining conflict (Alesina and Perrotti (1996), Benhabib and Rustichini (1996), Benabou (1998), Acemoglu and Robinson (2001)). In particular, Rodrik (1998) and Bannerjee and Duflo (2000) have shown that higher inequality leads to more resources being spent over resolving distributional conflicts, thereby leading to misallocation of resources resulting in low growth. Here we use a similar framework to show how inequality can result in conflict. More importantly, we hypothesize that conflict may arise out anticipated future inequality rather than current inequality.

Our model differs from earlier papers in three key areas. First, we take the cost of conflict as endogenous, i.e. the parties involved have full control over how much conflict they can create. Second, most of the literature in this area are static. Therefore conflict in these models stems only from bargaining over the distribution in that period. Relaxing this assumption allows us to derive some interesting results. Third, the distribution of resources in our paper depends on existing levels of wealth. The more wealthy a group gets relative to the other, the higher bargaining power it has. It can use this increased bargaining power to gain a larger share of the output[3]. Wealth inequality

[1] This is different from the other notions of conflict, such as wars and riots which are based on violence. Refer to Nafziger et. al. (2000); Azam and Hoeffler (2000); Addision et. al (2000) for discussions on violent conflicts.

[2] On April 16, 2002, the BBC reported: "Millions of state employed workers in India have gone on nationwide strike to protest against *proposed* changes to labour laws in the country, which have been described 'anti-worker"'. [Italics added.]

In India, with the beginning of major reforms since the early 1990's, strikes have been a crucial instrument in the bargaining process with the government.

[3] This is similar to the models proposed by Grossman (1994), Skaperdas (1992), Hirshleifer (2001) where the distribution of final output depends on how much resources the parties spend on increasing their bargaining power. However, unlike ours, in their model resources can be used either to get a favourable distribution of the ouput or to produce a higher overall output.

then gets reflected in a more skewed distribution of income. When such relative inequality becomes high enough, it forces the disadvantaged group to initiate conflict[4].

The plan of the paper is as follows. In the next section, we describe the model used in the paper. Section 3 derives and discusses the results and Section 4 concludes.

2 Model:Basic Framework

2.1 Agents

2.1.1 Production

Consider two groups, $i = A, B$, who are involved in production of an output over two time periods, $t = 1, 2$. The agents can either go for joint production or decide to produce on their own.

If they produce on their own, their endowments (or wealth, w_t^i) is used as an input in the production process along with their effort levels. We assume that effort is indivisible, i.e. $e_t^i \epsilon \{0, 1\}$. The output they receive is

$$Y_t^i = \begin{cases} f(w_t^i) \text{ when } e_t^i = 1 \\ 0 \text{ when } e_t^i = 0. \end{cases} . \tag{1}$$

where $f' > 0$, $f'' < 0$ and $f''' < 0$.

For the joint production case, we assume that the capital, $\overline{w}$, is given. If $\overline{w}$ is very high compared to $(w_t^A + w_t^B)$ and the production is concave in the level of wealth, there will be insignificant changes to the output even if individuals bring their own wealth to the joint production. We assume such is the case[5]. The joint output is given by

$$Y_t = \begin{cases} F_t(\overline{w}) \text{ when } e_t^A = 1 \text{ and } e_t^B = 1 \\ 0 \text{ when } e_t^A = 0 \text{ or } e_t^B = 0 \end{cases} . \tag{2}$$

[4] Hirshleifer (1991) and Durham et. al. (1998) have shown that disadvantaged groups can resort to conflict to improve their situations.

[5] We could on the other hand, allow the current wealth levels to affect the joint output. In that case, we will have to rule out sequential investments. This means that in period 1 if the parties decide to produce jointly, they invest their wealth in the joint production. The output in period 1 then depends on the total level of wealth invested. In the second period, in case of joint output, there is no need for additional investments.

We assume in period 2 the joint output grows by g percent over the previous period.

2.1.2 Conflict

While both the groups have control over the production aspect, they have little control over the distribution of the output. If any group is unhappy with the distribution, it can use its leverage in the production process to impact the distribution. This can take the form of slow-downs, strikes and outright destruction of infrastructure.

If both the parties agree, the proposed output is produced. On the other hand, any disagreement between the parties over the proposed output, results in conflict leading to some loss in output. The bargaining then proceeds to the next round. Both groups have the same ability to inflict damage. Let δ represent the loss in output in each round of disagreements and n_t^i represent the number of times group i disagrees in time t. Then the total loss of output in period t is $\delta.n_t$, where $n_t = \max\{n_t^A, n_t^B\}$.

Growth rate, g, gets affected negatively by the conflict in period 1. One can imagine this to capture the situation where conflict leads to destruction of essential infrastructure, or leads to capital flight and low investment. Therefore, higher the level of n_1, lower would be g in period 2, i.e. $\frac{\Delta g(n_1)}{\Delta n_1} < 0$. Also $\frac{\Delta^2 g(n_1)}{\Delta n_1^2} < 0$.

2.1.3 Consumption and Savings

Each group maximizes

$$\begin{aligned} V^i(c_1^i, c_2^i) &= U_1^i(c_1^i) + U_2^i(c_2^i), \\ \text{s.t. } c_1^i + c_2^i &= y_1^i + y_2^i, \end{aligned} \tag{3}$$

where U_t^i is the utility of group i in period t from consuming c_t^i and y_t^i is the actual income of group i in period t. We further assume, $U_t^i(c_t^i) = c_t^i$.

Both groups save a constant proportion, α, of their income i.e. $s_1^i = \alpha.y_1^i, \forall i$. If parties decide to go for joint production in period 1, the total wealth in period 2 for group i, is $w_2^i = r^i.(\alpha.y_1^i + w_1^i)$ where r^i is the interest earned on the gross savings in period 1..

2.2 Distribution

The distribution of the joint output follows the Nash bargaining solution (henceforth NBS)[6]. Wealth, used as an input in this situation acts as a threat point and hence relative wealth inequality matters in the outcome. The Nash bargaining solution allows for a party to have a share of the output even if that party does not have any wealth, and its opponents have some wealth. This is a highly desirable property, especially for conflict situations (Hirshleifer (1989)) and not all distribution rules share that property.

$$y_t^A = \frac{1}{2}(Y_t - \max\{n_t^A, n_t^B\} + Y_t^A - Y_t^B) \quad (4)$$

$$y_t^B = \frac{1}{2}(Y_t - \max\{n_t^A, n_t^B\} - Y_t^A + Y_t^B). \quad (5)$$

2.3 The Game

This is a two period repeated game. In each period, there are three stages:

Stage 1: The distribution is determined using the NBS,

Stage 2: Knowing the distribution, the groups can decide either to produce on their own, or to produce jointly,

Stage 3: If they decide to produce jointly, then each party decides on n_t^i.

3 Results and Analysis

3.1 Wealth equality in both periods

We start by considering the case with no wealth inequality i.e. $w_1^A = w_1^B$ and $r^A = r^B$. Notice $r^A = r^B$ implies $w_2^A = w_2^B$. As $Y_t^A = Y_t^B, \forall t$ under the NBS we have,

$$y_t^A = \frac{1}{2}(Y_t - \delta . \max\{n_t^A, n_t^B\}), \quad (6)$$

$$y_t^B = \frac{1}{2}(Y_t - \delta . \max\{n_t^A, n_t^B\}). \quad (7)$$

[6] Instead of using the NBS explicitly, we could have used other kind of distribution rules (or 'contest success functions') where the outcome depend on the relative difference in the level of wealth. NBS, however, allows the model to be tractable and has easy intuitive interpretation and strong axiomatic foundation.

If $y_t^i > Y_t^i, \forall i, t$, both groups will undertake joint production in both periods. We then show that there is no conflict in the economy.

Proposition 1 *Suppose $y_t^i > Y_t^i, \forall i, t$. Under complete equality there would be no conflict in any period.*

Proof: First we show that there would be no conflict in period 2. Suppose we know the consumption in period 1, then from (3), for any group i,

$$Max\ V^i = \max\ U_2^i(c_2^i).$$

In the last period everything will be consumed i.e. $c_2^i = y_2^i$. Suppose the initial division is such that $c_2^B \geq c_2^A$. Since $w_2^A = w_2^B$, $c_2^B \geq c_2^A$ implies $y_2^B \geq y_2^A$. Now, if say group A wants to initiate conflict then $n_2^A > 0$. This means $n_2 > 0$. The new distribution, using NBS, would be $y_2^B - \frac{\delta}{2} \geq y_2^A - \frac{\delta}{2}$. Clearly, it is not beneficial for group A to initiate conflict. It is easy to show that even if $y_2^B \leq y_2^A$, it is not beneficial for A to initiate conflict. Similarly for group B. Therefore, whatever the outcome in period 1, in period 2, $n_2^A = n_2^B = 0$.

Given that $w_1^A = w_1^B$, for period 1, one can easily show that, conflict is not going to be beneficial for either party.. Hence, $n_1^A = n_1^B = 0$. Q.E.D.

We normalize $Y_1 = 1$. Therefore $Y_2 = 1 + g(n_1)$. Let $\overline{g} = g(0)$.

Remark 1. *Since $n_t^i = 0\ \forall i, t$, the total output produced in the economy, taking both periods into consideration, is $Y_{\max} = (2 + \overline{g})$.*

3.2 Wealth inequality in period 2 only

Suppose due to some anticipated shock one group earns a higher rate of interest on the savings, relative to the other group. Without loss of generality, let $r^B > r^A$. In this case we have $w_1^A = w_1^B$ and $w_2^B > w_2^A$.

Period 1 distribution is given by (6) and (7). In period 2, when wealth levels are different the Nash bargaining solution will yield

$$y_2^A = \frac{1}{2}(Y_2 - \max\{n_2^A, n_2^B\} + f(w_2^A) - f(w_2^B)) \tag{8}$$

$$y_2^B = \frac{1}{2}(Y_2 - \max\{n_2^A, n_2^B\} - f(w_2^A) + f(w_2^B)). \tag{9}$$

We would show that in this case, it will be beneficial for A to increase n_1^A. First, we show the following:

Proposition 2 *Let $y_2^i > Y_2^i, \forall i$ and $w_2^B > w_2^A$. There will be no conflict in period 2. Hence, $n_2^A = n_2^B = 0$.*

Proof: The arguments are similar to Proposition 1 and hence omitted. Q.E.D.

For the next proposition we assume that $y_1^i > Y_1^i, \forall i$. We can now show the following result.

Proposition 3 *Let $r^B > r^A$. Group A will prefer to initiate conflict in period 1 if the inequality is substantial, i.e. $r^B - \beta r^A > \gamma$, where $\beta > 0$, $\gamma > 0$.*

Proof: The proof proceeds in two steps. First when $n_1^A \geq n_1^B$ and second, when $n_1^A < n_1^B$.

Step 1: When $n_1^A \geq n_1^B$ we show that group A will be better off increasing n_1^A. Clearly $n_1 = n_1^A$. Now, using (3), (6) (8) and Proposition 2 we can write

$$V^A = (1-\alpha)\frac{1}{2}(1-\delta.\max\{n_1^A, n_1^B\}) + \frac{1}{2}(1+g(n_1)+f(w_2^A)-f(w_2^B)) \quad (10)$$

If A decides to increase the conflict then

$$\frac{\Delta V^A}{\Delta n_1^A} = -\frac{(1-\alpha).\delta}{2} + \frac{1}{2}.\frac{\Delta g(n_1)}{\Delta n_1} + \frac{\Delta f(w_2^A)}{\Delta w_2^A}.\left(-\frac{r^A.\alpha.\delta}{2}\right)$$
$$-\frac{\Delta f(w_2^B)}{\Delta w_2^B}.\left(-\frac{r^B.\alpha.\delta}{2}\right) = 0 \quad (11)$$

$$\theta[(r^B - \overline{\beta}.r^A) - \gamma] = l(n_1) \quad (12)$$

where $\theta = \alpha.\delta.\frac{\Delta f(w_2^B)}{\Delta w_2^B}, \overline{\beta} = \frac{\Delta f(w_2^A)/\Delta w_2^A}{\Delta f(w_2^B)/\Delta w_2^B}$, $\gamma = \frac{(1-\alpha)/\alpha}{\Delta f(w_2^B)/\Delta w_2^B}$ and $l(n_1) = -\frac{\Delta g(n_1)}{\Delta n_1}$,. Let l^{-1}exist. From above we can write

$$n_1 = l^{-1}\left[\theta\left\{(r^B - \overline{\beta}.r^A) - \gamma\right\}\right]. \quad (13)$$

Clearly $n_1^A > 0$, if $r^B - \overline{\beta}.r^A > \gamma$, where $\gamma > 0$. Since $w_2^B > w_2^A$, $\overline{\beta} > 1$. Given, $\frac{\Delta^2 g(n_1)}{\Delta n_1^2} < 0$, we can show

$$\frac{\Delta^2 V^A}{\Delta (n_1^A)^2} < 0 \text{ if } [(r^B)^2 - \underline{\beta}.(r^A)^2] \text{ where } \underline{\beta} = \frac{\Delta^2 f(w_2^A)/\Delta(w_2^A)^2}{\Delta^2 f(w_2^B)/\Delta(w_2^B)^2}.$$

Let $\beta = \max\{\sqrt{\underline{\beta}}, \overline{\beta}\}$. Therefore the restriction $r^B - \beta r^A > \gamma$ is sufficient to show that there will be an increase in conflict.

Step 2: When $n_1^A < n_1^B$, increasing n_1^A does not make A worse-off. Q.E.D.

In this case, even though there was equality in the first period, a situation of conflict still arose. The disadvantaged group anticipated that in period 2, the other group will have higher wealth and hence greater bargaining power. This bargaining power would mean that the group with higher wealth will also corner a higher proportion of the output in period 2. Therefore, it is in the interest of the group with anticipated lower wealth in period 2, to engender conflict in the first period so as to reduce the other group's bargaining strength. The anticipated inequality, however, has to be significant to result in conflict.

Remark 2. *Due to conflict, the total output produced in the economy, is less than* $(2 + \overline{g})$. *Hence, compared to the complete equality case, we have loss in output arising from conflict.*

Empirical evidence (Nafziger and Auvien (2002)) have shown that countries with high GDP have less conflict. In our model, whether a country is rich or poor is defined by the initial level of wealth. Our next proposition deals with what happens to the level of conflict in a richer society. In this framework, we increase the initial level of wealth for both groups, making the society richer.

Proposition 4 *Let* $n_1^A > n_1^B \geq 0$. *Then an increase in the initial level of wealth, such that* $\Delta w_1^A \leq \Delta w_1^B$, *will reduce conflict.*

Proof: See Appendix Q.E.D.

This shows that if raising the level of current wealth reduces the negative impact of a high anticipated future inequality.

3.3 Wealth inequality in period 1 only

Now consider the case where $w_1^A > w_1^B$ and r^A, r^B are such that $w_2^A = w_2^B$[7]. From (4) and (5) we can show that, $y_1^A > y_1^B$ and $y_2^A = y_2^B$. We assume that in both periods the groups prefer joint production rather than produce on their own.

[7]Notice that r^A and r^B will depend on n_1. To be more precise, for every n_1, we will be able to find r^A, r^B such that $w_2^A = w_2^B$.

Proposition 5 *Let $w_1^A > w_1^B$ and $w_2^A = w_2^B$. There will be no conflict in the society.*

Proof: Similar to Proposition 1 and hence omitted. Q.E.D.

Few remarks are in order here. What the above proposition clearly show that initial inequality does not play any role in engendering conflict. What matters is anticipated future inequality. This intuition goes against standard notion in the literature where high initial inequality does result in conflict. Moreover, in this situation, if group A anticipated being seriously disadvantaged in the future, it would initiate conflict in the current period, even though in the current period it happens to be the advantaged group in the sense of having more initial wealth than group B.

4 Conclusion

There are several interesting conclusions that emerge from the above results.

First, we have shown that anticipated future inequality can play an important role in generating conflict. Notice that conflict emerges here even though there was no inequality to begin with. Also, as Proposition 5 shows, current inequality without future inequality, does not lead to any conflict. This may shed some light on why some research conclude that inequality does not play any role in conflict (see Collier (2000)).

Second, the anticipated inequality has to be significant to result in conflict. Future inequality as such may not lead to conflict. Even if the rate of returns of the different groups are different, thus resulting in higher wealth for one group, the difference may not be high enough to make it worthwhile for the disadvantaged group to initiate conflict. Note, under conflict, the disadvantaged group also suffers from the loss in consumption and savings due to an overall lower output.

Third, the model clearly show that high level of initial wealth will result in low conflict. Our results are in line with the empirical evidence which shows that conflict will be less in richer countries. Further, conflict in this model, leads to a lower output in both periods. In period 1 it reduces output because of conflict, and in period 2 the output is reduced due to lower growth.

The paper can be extended in several directions. One can generalize the model by making the rate of returns, r^A and r^B uncertain. In that case, the expectation of each group over the others rate of return becomes crucial. The analysis then gets more complicated and needs further investigation. Also, we implicitly assume that enforceable contracts are not viable and therefore parties cannot forge some kind of ex-ante contract to avoid conflict. That will become difficult to sustain if we allow for long term interaction between the groups, instead of just two periods. In such case, there may be a possibility of overcoming the incomplete contract problem. What the structure will be of such long term contracts under uncertainty is an issue for future research.

References

Acemoglu, D., J. Robinson 2000. Why Did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective. Quarterly Journal of Economics, 115, 1167-1199.

Addison, T., P. L. Billion, S. Mansoob Murshed 2000. Conflict in Africa: The Cost of Peaceful Behaviour. Mimeo, WIDER, Helsinki.

Alesina, A., R. Perrotti 1996. Income Distribution, Political Instability, and Investment. European Economic Review, 40, 1203-1228.

Azam, J-P. A. Hoeffler 2000. Looting and Conflict between Ethno-Regional Groups: Lessons for State Formation in Africa. Mimeo, University of Toulouse.

Bannerjee, A. E. Duflo 2000. Inequality and Growth? What Can the Data Say. Working Paper # 7793, NBER, Cambridge, Mass.

Benabou, R. 1996. Inequality and Growth. Research Report #96-22, New York University, USA

Benhabib, J. A. Rustichini 1996. Social Conflict and Growth. Journal of Economic Growth, 125-142.

Collier, P. 2000. Economic Causes of Civil Conflict and Their Implications for Policy. In A.C.Chester, F.O. Hampson and P. Aall (Eds), Managing Global Chaos, Institute of Peace and World Bank, Washington DC.

Durham, Y., J. Hirshleifer, V. L. Smith 1998. Do the Rich Get Richer and the Poor Poorer? American Economic Review, 88, 970-983

Hirshleifer, J. 1989. Conflict and Rent Seeking Success Functions: Ration vs. Difference Models of Relative Success. Public Choice, 63, 101-112.

Hirshleifer, J. 1991. The Paradox of Power. Economics and Politics, 3, 177-200.

Hirshleifer, J. 2001. The Dark Side of the Force: Economic Foundations of Conflict Theory. Cambridge University Press, Cambridge.

Grossman, H. 1994. Production, Appropriation and Land Reform, American Economic Review, 84, 705-712.

Rodrik, D. 1998. Where Did All the Growth Go? External Shocks, Social Conflict and Growth Collapses. Mimeo, Harvard University.

Nafziger, E.W., F. Stewart and R. Väyrynen 2000. War Hunger and Displacemet: The Origins of Humanitarian Emergencies, Oxford University Press, Oxford.

Nafziger, E. W., J. Auvien 2002. Economic Development, Inequality, War and State Violence. World Development, 30, 2, 153-163.

Sachs, J. 1989. Social Conflict and Populist Policies in Latin America. Working Paper # 2897, NBER, Cambridge, Mass.

Skaperdas, S. 1992. Cooperation, Conflict, and Power in the Absence of Property Rights. American Economic Review, 82, 720-739.

Appendix: Proof of Proposition 4.

First we calculate the impact of Δw_1^A and Δw_1^B on n_1. We show that $\frac{\Delta n_1^A}{\Delta w_1^A} > 0$ and $\frac{\Delta n_1^A}{\Delta w_1^B} < 0$. This means that conflict will increase if we increase w_1^A and it will decrease if we increase w_1^B. Next we show that the decrease in conflict from an increase in w_1^B can outweigh the increase in conflict from an increase in w_1^A. Therefore, if we increase the level of initial wealth such that $\Delta w_1^A \leq \Delta w_1^B$ it will lead to an overall decrease in conflict.

Proof: $n_1^A > n_1^B \geq 0$ implies $w_2^B > w_2^A$. From (12) we can write

$$l(n_1^A) = \theta\left[(r^B - \overline{\beta}.r^A) - \gamma\right].$$

If w_1^A increase, it will also increase w_2^A as $w_2^A = r^A.(\alpha.y_1^A + w_1^A)$.

$$\frac{\Delta l(n_1^A)}{\Delta n_1^A}\frac{\Delta n_1^A}{\Delta w_1^A} = -\theta.\frac{\Delta\overline{\beta}}{\Delta w_2^A}.\frac{\Delta w_2^A}{\Delta w_1^A}.r^A = -\theta.\frac{\Delta\overline{\beta}}{\Delta w_2^A}.(r^A)^2 > 0 \tag{A1}$$

Since $\frac{\Delta^2 f(w_2^A)}{\Delta(w_2^A)^2} < 0$, $\theta.\frac{\Delta\overline{\beta}}{\Delta w_2^A} = \alpha.\delta.\frac{\Delta^2 f(w_2^A)}{\Delta(w_2^A)^2} < 0$. We know $\frac{\Delta l(n_1^A)}{\Delta n_1^A} > 0$, hence $\frac{\Delta n_1^A}{\Delta w_1^A} > 0$.

For a Δ increase in w_1^B we have

$$\frac{\Delta l(n_1^A)}{\Delta n_1^A}\frac{\Delta n_1^A}{\Delta w_1^B} = \frac{\Delta\theta}{\Delta w_2^B}.\frac{\Delta w_2^B}{\Delta w_1^B}.\lambda - \theta.\frac{\Delta\overline{\beta}}{\Delta w_2^B}.\frac{\Delta w_2^B}{\Delta w_1^B}.r^A - \theta.\frac{\Delta\gamma}{\Delta w_2^B}.\frac{\Delta w_2^B}{\Delta w_1^B} < 0. \tag{A2}$$

where $\lambda = (r^B - \overline{\beta}.r^A - \gamma) > 0$ and $\frac{\Delta w_2^B}{\Delta w_1^B} = r^B$. It is easy to check that $\frac{\Delta\theta}{\Delta w_2^B} < 0$, $\frac{\Delta\overline{\beta}}{\Delta w_2^B} > 0$, $\frac{\Delta\gamma}{\Delta w_2^B} > 0$. Also $\theta.\frac{\Delta\overline{\beta}}{\Delta w_2^B} = -\alpha.\delta.\frac{\Delta f(w_2^A)/\Delta w_2^A}{\Delta f(w_2^B)/\Delta w_2^B}.\frac{\Delta^2 f(w_2^B)}{\Delta(w_2^B)^2}$.

As $w_2^B > w_2^A$ we have $\frac{\Delta f(w_2^A)/\Delta w_2^A}{\Delta f(w_2^B)/\Delta w_2^B} > 1$ and $\frac{\Delta^2 f(w_2^B)}{\Delta(w_2^B)^2} < \frac{\Delta^2 f(w_2^A)}{\Delta(w_2^A)^2} < 0$, comparing (A1) and (A2) we can conclude

$$-\theta.\frac{\Delta\overline{\beta}}{\Delta w_2^A}.(r^A)^2 - \theta.\frac{\Delta\overline{\beta}}{\Delta w_2^B}.r^B.r^A < 0.$$

Hence,

$$\left|\frac{\Delta l(n_1^A)}{\Delta n_1^A}\frac{\Delta n_1^A}{\Delta w_1^B}\right| > \left|\frac{\Delta l(n_1^A)}{\Delta n_1^A}\frac{\Delta n_1^A}{\Delta w_1^A}\right|.$$

The decrease in n_1^A due to an increase in w_1^B, will be greater than an increase in n_1^A from an increase in w_1^A. Hence increase of wealth in the society will reduce conflict. Q.E.D.