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Do pro-openness policy reforms increase wage inequality? Some empirical evidence

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ABSTRACT

The objective of the paper is to answer an often-asked question : if there are pro-liberalization and pro-openness reforms, what will happen to wage inequality ? We consider two types of wage inequality : between occupations (skills premium), and between industries. We use two large data bases of wage inequality that have become recently available and a large data database of reforms covering the 1975-2000 period. We find that trade reforms increase skills premium but that the increase is less in rich than in poor countries. Trade reforms increase wage inequality between industries in ruch countries and reduce it in poor countries.

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1. Introduction

The relationship between globalization and the distribution of income remains a hotly debated issue in part because the link is complex and commingled with many other factors. In these circumstances, careful specification of the issue is essential. Theory offers the natural place to search for precision. And indeed theory does provide well specified analyses leading to apparently unambiguous predictions. The standard theoretical framework is the two-factor, two-county Heckscher-Ohlin model. In this model, trade liberalization will increase the relative price of the abundant factor which is usually taken to be unskilled labor in the case of developing countries. This in turn should reduce inequality. Thus, a well-specified question leads to an unambiguous prediction.

The Heckscher-Ohlin specification, however, is a drastic simplification of a complex phenomenon and relatively minor steps towards greater realism or a shift in focus towards different aspects of globalization complicate matters. To take just one example, Feenstra and Hanson (1996) focus on a different form of globalization: the transfer of production from developed to developing countries. In their model, the wage gap between skilled and unskilled workers in developing countries increases, pointing towards increased inequality. Thus, plausible models can lead to quite different predictions.

Whenever theory leads to different predictions, empirical evidence is required to help choose among alternatives. The available empirical literature, however, does not lead easily to robust conclusions regarding the relationship between globalization and inequality. The combination of a complex phenomenon and data inadequacies renders empirical work both hazardous and partial. Different authors focus on different aspects of the phenomenon ranging from within-country wage-inequality to global inequality. They employ different specifications sometimes relating levels of openness to levels of inequality and sometimes relating changes in openness to changes in inequality. And various alternative definitions of key variables are used including the measure of

openness with some authors using quantities (trade volumes or flow of FDI) and others using policies (tariff levels). The end result is that a careful interpretation of the existing literature requires attention to all these possible points of differences in the various studies.

The primary purpose of this paper is to present the results of a new empirical investigation of the relationship between globalization and inequality, one that we hope addresses some of the concerns raised above. In this respect, the paper makes two contributions. First, it presents a simple analytical model that focuses on the element of income distribution that is most likely to be affected by globalization, namely, wage income. And second, it draws on a review of the existing empirical literature to identify preferred ways of specifying the empirical counterpart to our theoretical model. An important advantage of this approach is that abundant data are available on the distribution of wage income in various forms.

A secondary purpose is to incorporate one aspect of globalization that has not been captured in the academic literature but is prominent in the popular press. The media and many governments often interpret globalization as something that happens in the global economy and affects different countries in different ways. To see this, imagine a country that does not change its trade policy over a period of years. And imagine that over the same period most other countries liberalize their trade policies and the global volume of trade increases. The question then is whether the observed "globalization" can affects inequality in the country that has not changed its trade policies. The answer is "yes" if the global expansion of trade reduces the export volumes or prices of the non-globalizing country. In this scenario, the non-globalizing country not only fails to participate in the benefits of an expanding world volume of trade but actually sees a deterioration in its position compared with the pre-globalization era. In other words, it may be insufficient to focus on a country's own liberalization efforts. It may be more appropriate to focus on those efforts relative to the efforts of major trading competitors. In this view, the direction of causation is from a worldwide phenomenon to inequality.

The lack of attention to the media view in the academic literature is surprising since it is in fact an example of a well-known economic concept, namely, pecuniary externalities.

The paper begins in Section II with a justification of our focus on the inequality of wage income. It then presents a simple, reduced form, model of the equilibrium relationship between wages and trade policy. Four categories of wages are examined: for skilled and unskilled labor; and for labor in protected and unprotected sectors. The model thus allows us to explore the ways in which trade liberalization affects the skill premium and the protection premium. The model also allows for different forms of unionization: it can be either skill-based or sector-based.

To further guide the model to be estimated, Section III turns to a review of existing empirical work in three critical dimensions: domain, specification, and variable selection. *Domain* refers to the type of globalization (products, capital, or labor) and the type of inequality (global inequality between all individuals in the world, inequality between the countries, within-country inequality between individuals, or wage-inequality between wage-earners) under examination. It also refers to the locus of the study and whether it is a single-country or a multi-county study. *Specification* is of two types with variables being measured either in levels or in first differences. This subsection also deals with the important issue of interaction between policy variables and initial conditions. Finally, v*ariable selection* refers to the measures chosen to represent inequality and to capture openness. The many combinations implicit in this menu help explain why empirical work to date has failed to arrive at a conclusive result regarding the relationship between globalization and inequality. Existing empirical investigations can at best focus on only a single aspect of the issue, and can therefore arrive at different but not necessarily inconsistent results.

Section IV draws together the theoretical model of Section II and our view of where research can best inform the debate given our assessment of the existing literature in the three dimensions discussed in Section III. With these considerations in mind, we focus on globalization as it manifests itself through the impact of trade liberalization on within-

country, wage inequality. Unlike much of the existing literature, we choose to look at changes in variables rather than levels. We want to know whether a *change* in a country's stance towards trade liberalization causes a *change* in inequality. Finally, we allow for interaction between trade reforms and various initial conditions to capture the idea that effects may be different at different levels of development or trade protection.

The empirical model is estimated in two different ways to take full advantage of the availability of data. The first approach draws on two large data sets and has the advantage of broad coverage. One is a database of Occupational Wages around the World (OWW) covering the period from 1983 to 1999 and more than 150 countries. The data were collected from the ILO sources (the *October Inquiry*), and then put together and analyzed by Richard Freeman and Remco Oostendorp (2000).[2] The other is a database of inter-industrial wage differences created by James Galbraith and associates. This University of Texas Inequality Project (UTIP) database covers on average about 90 countries annually over the period 1975-99.[3]

II. Policy reforms and wage inequality: a model

Model focus and justification

In this section, we present a simple, reduced form model of wage determination for four types of labor: skilled, unskilled; and labor employed in the protected and unprotected sectors. We also allow for different types of unionization: skill-based or sector-based. We focus the model in this way for two theoretical reasons and one empirical reasons.

The first theoretical reason is that the link between policy reforms and wage inequality is likely to be much stronger than the link between policy reforms and inequality in total income. What happens to total income and its inequality is mediated by

[2] The *Occupational Wages around the World* (OWW) database in available at www.nber.com.

a number of other factors, including the role of social transfers (pension spending or family benefits), demographics of the population, family formation and mating, labor force participation, and so. Since wage inequality is relatively immune to such factors, the link between policy and the distribution of wages should be much stronger than that between policy and the distribution of total income, and should therefore be easier to detect empirically.

The second theoretical reason stems from the complexity of the relationship between policy and the distribution of wages in a country (let alone between policy and inequality of total income among all individuals or households) and how best to model it. Consider some of the puzzles and complexities that have been discussed in the recent literature. For example, a number of factors have been adduced to explain rising inter-occupational inequality (or an increasing skill premium) following trade liberalizations in developing countries[4]. This is in direct contradiction to what one might expect based on the Stolper-Samuelson theorem, namely that increased demand for low-skilled products (the alleged comparative advantage of poor countries) should increase relative wages of unskilled workers.

Moreover, recent developments differ from those in the 1950's and 1960's when trade liberalization in Asian countries did produce the expected effect (Singh and Dhumale, 2000, p. 25; Arbache, Dickerson and Green 2003, p. 5). Some of the most popular explanations for increasing wage inequality in both poor and rich countries are the role of skill-biased technological progress (for a review see Slaughter, 1999; also Slaughter 1997; Singh and Dhumale, 2000), skill-skewed demand of foreign investors (Feenstra and Hanson, 1997; Kramer 2002), complementarity between lower cost of capital (which follows upon financial reforms that accompany trade liberalization) and

[3] The data are available at http://utip.gov.utexas.edu/.

[4] This seems to be an almost universal finding. For Chile, see Bayer, Rojas and Vergara (1999) who speculate (p. 121) that it may be caused either by skill-biased technological progress, or by demand for resource intensive and skill-intensive sectors. In the Chilean context, Robbins (1994) finds that relative demand shifts were crucial for explaining widening wage disparity. For Brazil, see Green, Dickerson and Arbache (2001, p. 1936), who also hold that the influx of new skill-intensive technologies contributed to the rising university education premium (and decline in returns to secondary education).

skilled labor (Greiner and Semmler 2001; Murphy, Ridell and Romer, 1998; Arbache, Dickerson and Green 2003). Wage-setting rules may also be a cause as argued by Warner (2002) who finds that wage inequality is greater in poor countries because the highly-skilled workers' (like managers') wages respond to global wage-setting conditions, while the low-skilled wages depend on local conditions. Or, poor countries may also be resource-rich in those tradables that are not labor or low-skill intensive like oil and other natural resources (Stewart, 2000, p.16 and papers quoted there) etc.[5] Some, but not all of these factors, require that the model distinguish labor by skill or occupation as well as by the location in a protected or unprotected sector.

Turning to the empirical reason, inequality measures of total income are not available annually; we have inequality statistics for most countries only for a few years in a decade. The Deininger-Squire database, for example, gives on average an inequality statistic for 1 out of every 5 possible country/year combinations. In contrast, the two database on wages that we use – Freeman and Oostendorp (2000) and the University of Texas Inequality Project (UTIP) database – have annual data for a large number of countries and years. This should increase the power of our empirical estimation and tests. Moreover, these databases provide information on inter-occupational and inter-industry wage inequality as required by the theoretical approach.

[5] This is also one of the conjectures made by Beyer, Rojas and Vergara (1999, p. 121) for explaining increased skill premium and wage inequalty in Chile. Although natural-resource based exports account for about ¾ of Chilean exports today as they did in the 1970's, the new resource-based sectors may be more heavily skill-dependent than the traditional ones. Similarly, in the issue of *Journal of International Development* dedicated to country studies of globalization, Manda and Sen (2004) find that Kenyan exports were concentrated on manufacturing products intensive in natural agricultural resources and this stimulated increasing demand for skilled labor and resulted in rising earnings inequality (see Jenkins, 2004, in the same issue). Behrman, Birdsall and Szekely (2003) which we discuss more in detail below come to the same conclusion: high-technology exports of Latin Ameerican countries are behind the rising education premium.

An accounting model

We begin with the following simple 2x2 model with two sectors (protected and unprotected) and two types of labor (unskilled and skilled). We shall make two different assumptions. First, that collective bargaining is skill-based (all unskilled workers are unionized, and only unskilled workers are unionized), and second, that collective bargaining is sector-based [6] so that the benefits of unionization are shared by all workers in a sector regardless of their skill level.

Skill-based bargaining. Let us start with skill-based unionization and let the basic unskilled wage be w, and unskilled wages in protected (p) and unprotected sector (u) respectively,

(1) $w_{up} = w(1 + \lambda t)(1 + s)$

(2) $w_{uu} = w(1 + s)$

where the first subscript denotes type of labor (unskilled=*s*) and the second subscript the sector, t = tariff rate (protection level), λ = share of increased protection that is "transferred" to wages (XX: mention what it implies for the model of wage setting), and *s*=percentage by which wage is increased thanks to collective bargaining and other union activities ("syndicalization"). The extent to which unionization helps unskilled labor in both sectors is the same.

Skilled wages in the two sectors will be

(3) $w_{sp} = w(1 + p)(1 + \lambda t)$

(4) $w_{su} = w(1 + p)$

[6] The terms "industry" and "sector" are used interchangeably.

where all the symbols are the same as before except for p = skilled labor premium. The premium too is supposed to be the same across the two sectors. Before reform (liberalization) the *observed* skill premium π will be

$$(5) \qquad \pi = \frac{ws}{wu} = \frac{1+p}{1+s}$$

and the inter-sectoral wage differential[7]

$$(6) \qquad \Delta = \frac{P}{U} = 1 + \lambda t$$

Reform involves, most obviously, the decrease in *t* and thus in wages in the protected sector; [8] then decrease in *s* brought about by "flexibilization" of labor markets and reduced power of trade unions. Both imply an erosion of wage rents whether they were accrued through protection or unionization. Greater opening to foreign investments and trade should result in dp>0 for rich countries and, according to theory (although not empirical evidence), in dp<0 for poor countries. In any case, we can posit that the increase in the demand for skilled labor is an increasing function of country's income level *y* (in accordance with Heckscher-Ohlin), and is also increasing in the extent of trade reform (approximated by dt). The rationale for this second effect is that greater the reform, greater the opportunity for the comparative advantage, and in our case, demand for skilled labor to manifest itself. Notice that the distinction between the "pure" skill premium (p) and the observed skill premium (π) allows to let the first behave as the theory would imply while the second, the observed premium, captures in also the effects of union bargaining and sectoral protection. In other words, even if the "pure" premium follows the theory, what we observe may look quite different. The change in the observed premium will then be

[7] We assume that there are only four workers (or differently, the same shares of skilled and unskilled labor in both sectors). In a more complicated model (see below) this assumption will be relaxed by allowing for the difference in skill intensity between protected and unprotected sectors.

[8] Obviously, the adjustment to the reduction in protection may be through labor-shedding rather than wage cuts. The latter (at least partly and at times fully) seems however to be a common mechanism as argued by Goldberg and Pavcik (2004, p. 22). This is consistent with a noted absence of labor mobility in developing countries following trade liberalization.

(7) $$d\pi = \frac{1}{1+s}(dp(y,dt) - \pi ds)$$

and the change in inter-sectoral wage differential

(8) $$d\Delta = \lambda dt < 0$$

We would therefore expect that the observed premium will go up because of the dismantlement of pro-unskilled labor regulations (ds<0) but the role of increased demand for skilled labor is ambiguous. In higher-income countries, dp(y)>0 as trade is opened up, but in low income countries, dp may be negative, that is the skill premium may decline if there is an increase in demand for unskilled labor (relative to skilled). Unless this effect is very strong (which, based on the empirical evidence, is unlikely), we would still expect $d\pi>0$ in both poor and rich countries. Wage inequality *within* each sector and the observed wage inequality between various skills would go up. At the same time, inter-industry wage differences will be reduced as the protected sector loses its advantage. Thus, within this simple model of pro-openness reform we expect a widening of skill differences and narrowing of inter-sectoral wage differences. In other words, even if Hekscher-Ohlin hypothesis holds for the poor countries, that is if dp<0, labor market reforms would tend to produce ds<0, and the *observed* change in the premium $d\pi$ may still be positive.

Industry-based bargaining. We have so far assumed that unionization is skill-based, that is that the gain from unionization is shared by unskilled workers across all sectors. But a different type of unionization can be horizontal, that is unionization premium is enjoyed by all workers in an industry whether they are skilled or unskilled. This is what industry-level collective bargaining is about. In that case our model changes as *s* becomes a premium captured by a whole industry. We shall assume that the premium is captured by the protected sector. And indeed protected sectors like steel or textiles in rich countries are specific because they are both protected from foreign competition and there is across-sector unionization. Openness combined with labor reforms will therefore affect them particularly since workers there would lose on two accounts: both trade and unionization rents will dissipate.

Wage rates in that case become

$w_{up} = w(1+\lambda t)(1+s)$

$w_{uu} = w$

$w_{sp} = w(1+p)(1+\lambda t)(1+s)$

$w_{su} = w(1+p)$

and the observed skill premium will be

$$\pi = 1 + p$$

The change in the premium is

(9) $$d\pi = dp(y, dt)$$

If Heckscher-Ohlin is right, dp<0 in poor countries and since labor reforms do not affect the observed premium, we must also have dπ<0. The opposite holds for the rich countries (dπ>0). Note that the change in the premium will not depend on what happens to labor market conditions (that is on labor market reforms) since these reforms have industry-wide effects and thus affect both skilled and unskilled workers equally. In other words, a change in *s* does not affect $d\pi$.

The inter-industry wage differential will be

(10) $$\Delta = \frac{P}{U} = (1+\lambda t)(1+s)$$

with the change

(11) $$d\Delta = \lambda dt(1+s) + (1+\lambda t)ds < 0$$

Inter-industry wage differences will be reduced even more if protection from external competition is associated with strong unionization (both dt<0 and ds<0). Trade liberalization erodes both of these advantages (enjoyed by assumption by the same sector).

Introducing different skill-intensities.

So far we have assumed that the skill intensity of the two industries is the same: each had the same share of skilled and unskilled workers. This is clearly an unrealistic although helpful assumption. By removing it, we may affect the conclusions regarding the effects on inter-industry inequality. [9]

We shall consider first the case of skill-level bargaining. The ratio between the average wages will be

$$\Delta = \frac{P}{U} = \frac{\sigma_1 wup + (1-\sigma_1)wsp}{\sigma_2 wuu + (1-\sigma_2)wsu} = \frac{\sigma_1 w(1+\lambda t)(1+s) + (1-\sigma_1)w(1+p)(1+\lambda t)}{\sigma_2 w(1+s) + (1-\sigma_2)w(1+p)} =$$

$$(12) \qquad \Delta = (1+\lambda t)\frac{\sigma_1[(s-p)] + (1+p)}{\sigma_2[(s-p)] + (1+p)}$$

where σ_1=low-skill labor intensity in the protected sector, and σ_2=low-skill labor intensity in the unprotected sector.

If the shares are the same, as assumed before, the second term in (12) becomes unity. The change in Δ can be as before calculated by taking the partial derivatives with respect to policy changes which affect the new Δ, that is with respect to *t* and *s*, as well as with respect to *p*. [10] But in order to simplify the matters we shall assume that skill composition in the protected sector varies in function of country's income level: in rich countries, the protected sector will be low-skill intensive, in poor countries, the protected sector will be high-skill intensive.[11] In other words, $\sigma 1$ varies in function of *y*. The assumption is in keeping with what we would expect from the theory: countries will tend to protect sectors in which they do not enjoy comparative advantage. Consider then the two polar cases where $\sigma 1=1$ and $\sigma 2=0$ for the rich country (protected sector is entirely

[9] Inter-occupational inequality will not be affected by different sectorial skill intensity.

[10] The change in the premium is not a policy change but depends on what is country's comparative advantage and how increased openness (or its reverse) affect it.

[11] This however may not be true for many poor countries. Richardson 2000, Harrison and Hansen 1999 and Currie and Harrison 1997, have argued that protection in Mexico and Morocco prior to trade reforms was biased in favor of low-skill intensive sectors.

low skilled; unprotected is entirely high-skilled); and σ1=0 and σ2=1 for the poor country (the reverse). The expression (12) then becomes, for the rich (**r**) country

$$\Delta r = (1+\lambda t)\frac{(1+s)}{(1+p)}$$

and for the poor (**p**) country

$$\Delta p = (1+\lambda t)\frac{(1+p)}{(1+s)}$$

Accordingly, the changes in inter-industry inequality will be respectively for the rich and poor country

$$d\Delta r = \lambda\frac{1+s}{1+p}dt + \frac{1+\lambda t}{1+p}ds - \frac{(1+\lambda t)(1+s)}{(1+p)^2}dp < 0$$

(13)

$$d\Delta p = \lambda\frac{1+p}{1+s}dt + \frac{1+\lambda t}{1+s}dp - \frac{(1+\lambda t)(1+p)}{(1+s)^2}ds$$

where we take into account as before that dt<0, ds<0 and dp>0 (for the rich country) and dp<0 (for the poor country).

Thus, we expect a difference in the evolution of inter-industry inequality after reforms in rich and poor countries—*if* skill composition by sector is different and decision on what industry to protect depends on overall income level. Liberal policy reforms will tend to reduce inter-industry inequality in the rich country, while the effect in the poor country will be ambiguous. This can be relatively simply explained. Consider a rich country like the European Union or the United States that protects its low-skill intensive industries (say, textiles or steel). The tariffs "artificially" raise the average wage of the protected sector. In addition, that sector, being predominantly low-skilled, is more unionized and enjoys a "union rent" as well. The wage ratio between it and the unprotected sector will be high. In other words, steel workers' wages compared to those in services will be high. Trade liberalization by destroying the premium enjoyed by the protected sector, and by reducing the "union rent", will lower the relative wage of steel

workers and the wage gap between the two sectors and thus will reduce the overall inter-sectoral inequality. [12] The essential point however is that –*if* along the continuum of GDP per capita protection moves from high-skill intensive toward low-skill intensive sectors—[13] we can expect that inter-industry wage inequality will tend to be reduced more in rich than in poor countries.

However, when bargaining is industry-based and skill compositions differ between the industries, the expression (10) becomes

$$\Delta = \frac{P}{U} = (1+\lambda t)(1+s)\frac{p+1-\sigma 1 p}{p+1-\sigma 2 p}$$

which in the two polar cases of a poor and rich country becomes

$$\Delta p = w(1+\lambda t)(1+s)(1+p)$$

$$\Delta r = w(1+\lambda t)(1+s)\frac{1}{(1+p)}$$

Now the change in inter-industry inequality will be for the rich country

(14) $$d\Delta p = w\lambda(1+s)(1+p)dt + w(1+\lambda t)(1+p)ds + w(1+\lambda t)(1+s)dp < 0$$

(15) $$d\Delta r = \frac{w\lambda(1+s)}{(1+p)}dt + \frac{w(1+\lambda t)}{(1+p)}ds - \frac{w(1+\lambda t)(1+s)}{(1+p)^2}dp < 0$$

Both expressions (14) and (15) must be negative because dt<0, ds<0 and dp<0 in the case of a poor, and dp>0 in the case of a rich country. In conclusion, inter-sectoral inequality is expected to decrease in both poor and rich countries if bargaining is industry-based (regardless of the skill composition of the industries).

[12] Note however that if the pre-reform average wage of the protected sector is less than of the unprotected sector, then the opposite follows. In other words, in our model the P/U ratio plays the role of an inequality measure which it can only so long as P>U.

[13] That is, protection moves exactly in the opposite direction from country's comparative advantage.

Summary

Hypothesis 1: If comparative advantage moves from unskilled to skilled labor as a country's income level goes up, and

Hypothesis 2: if protection moves in the opposite direction from the country's comparative advantage (so that the poor countries protect skilled, and rich countries, unskilled sectors), and

Hypothesis 3: if the protected sector's average wage is greater than unprotected sector's average wage, so that P/U>1 serves as an indicator of inequality [14]

then changes in inter-industry differences following trade liberalization can be summarized as in Table 1.

Table 1. Change in various types of wage inequality

	Skill-based bargaining	Industry-based bargaining	Explanation
Change in inter-industry wages (Δ)			
Poor country	$d\Delta$ unclear	$d\Delta<0$	(i) P sector (high-skilled) loses protection premium, but (ii) gains from anti-labor policies. If bargaining is industry-based, (ii) does not apply.
Rich country 1/	$d\Delta<0$	$d\Delta<0$	P sector (low-skilled) loses protection; loses also from anti-labor policies and from increased *p*
Change in observed skill premium (π)			
Poor country	$d\pi$ unclear	$d\pi<0$	Low-skilled workers gain from comparative advantage but lose from anti-labor policies
Rich country	$d\pi>0$	$d\pi>0$	

1/ See footnote 11 however.

[14] This condition is easily satisfied in the case of a poor country where the protected sector is also more skilled. But in the context of a rich country it requires that the effect of protection overwhelms the effect of higher skill intensity. If this is not the case, then the protected secor wage will be less than the unprotected, and liberalization will result in an increase in inter-industry inequality.

In a nutshell the foregoing model argues that in rich countries where unskilled sectors tend to be protected, trade liberalization will always reduce inter-industry wage differences and increase the skill premium. For the poor countries, the results are more ambiguous. In poor countries where the relatively skilled sectors tend to be protected, trade liberalization will, on the one hand, erode the skill premium (due to the action of comparative advantage) but on the other hand will, due to the introduction of anti-labor policies, have the reverse effect. The same two effects will also produce an ambiguous outcome regarding the inter-industry wage differences in poor countries. However, this holds only if bargaining in poor countries is skill-based. If bargaining is done at the sectoral level, both skill premium and sectoral wage inequality should go down.

When would we observe skill premium increasing in both countries? For rich countries, the answer is easy: whether bargaining is skill- or sector-based, skill premium should go up as trade is liberalized. But for a poor country, observed skill premium will go up only if bargaining is skill-based and the effect of dismantling pro-labor regulations overwhelms the "pure" trade effect that is favorable to unskilled labor. [15]

[15] A further modification of this model—moving it toward a general equilibrium type of models—could include the effects of wage changes brought about by reform on labor demand and supply. These are longer-term effects of reforms and we do not take them into account here. For example, after the reform in a rich country, there should be an increased demand for skilled workers in the unprotected sector. This should bring about an increase in their numbers, and the U sector will become (even) more skill-intensive compared to the P sector. The effect on the measured Δ will be to reduce it even further as the average wage in unprotected sector catches up with the average wage in protected sector. (As mentioned before, we assume that in the short-run at least, there is no "overturn" of this relationship, so that P/U ratio does not become less than 1. However, in the medium term as U sector becomes more skill-intensive and P sector loses its skilled workers, this could be the case.)

III. Review of the Empirical Literature and Data Description

As noted in the Introduction, the literature contains a diverse collection of empirical efforts to identify the relationship between globalization and inequality. This diversity plagues the interpretation of results and comparisons across studies but at the same time it provides a valuable source of material to guide the empirical specification of the model presented in Section II. We thus review the existing literature with the specific objective of determining the lessons for the estimation of out theoretical model.

Our review covers 15 papers completed within the last ten years**. (Lyn: we need the list of all the authors)** Of these, six point to a positive relationship between the chosen measure of globalization and the chosen measure of inequality. That is, globalization increases inequality. Three indicate that globalization increases inequality in low-income countries. Five studies find no impact on inequality. Only one paper points to declining inequality among the "globalizing countries" including the OECD. In addition, two other papers (Freeman, 1995, and Richardson, 1995) provide reviews of the then existing empirical literature and conclude that trade liberalization has a positive (increasing) albeit modest impact on inequality. What is surprising about this quick summary is that none of the studies indicate declining inequality in low-income countries, the one region where standard theory predicts such an outcome. The choice, then, seems to be between no impact and increased inequality.

Two qualifications are in order, however. First, the results are often quite fragile: small changes in specification or definition of variables can undermine statistical significance. And second, each of the 15 studies focuses by necessity on only one aspect of the relationship between globalization and equity. In principle, then, these apparently contradictory results could in fact be perfectly consistent. To explore this further, we examine the studies in each of three dimensions: domain, or the focus of the investigation; specification, especially whether estimates are levels on levels, or changes on changes; and variable selection, including the choice of variable to represent trade

liberalization. At the end of our discussion of each dimension, we select our preferred option(s) for our subsequent empirical analysis.

Domain

Globalization in the majority of papers is defined as increased openness in trade policy. Only two papers (Milanovic, 2001 and Behrmann, Birdsall and Szekely, 2003) look at capital account liberalization. None define globalization in terms of increased labor mobility. And with respect to inequality, both global inequality (inequality between all citizens in the world) and within-country inequality receive attention in the context of multi-country studies. Interestingly, there is also a significant group of studies that focus on wage-inequality, typically in the context of single-country studies exclusively in Latin America.

Clark, Dollar and Kraay (2001) is a good example of a paper dealing with global inequality. They find that inequality between the population-weighted mean incomes of the globalizing countries has decreased substantially between 1975 and 1995. This reflects increases in average incomes in key developing countries (especially China) relative to the OECD average, so that population-weighted between-country inequality has fallen. At the same time, they point to rising within-country inequality for this group of countries but not enough to offset the (population-weighted) between-country decline. This appears to be a fairly firm result but does not of course incorporate the countries that have not globalized. Here, Clark, Dollar and Kraay point to decline and divergence. Since these are some of the poorest countries in the world, this is clearly a matter of concern. Nevertheless, they show that inequality worldwide has declined between the second half of the seventies and the second half of the nineties despite these disparate experiences.

If, however, one looks at the world as a whole, the conclusions regarding the global inequality (inequality between all individuals) are not so firm. Milanovic (2004) finds a sharp increase between 1988 and 1993, and then a moderate decline during the next five-year period. Sala-i-Martin (2002) and Bhalla (2002) argue that global

inequality has gone down although their approach which combines household survey and national accounts (GDP data) is questionable, and the results may be driven by a number of strong assumptions that, in the absence of sufficient data, the authors make. [16] Global inequality is an area of intense controversy, but it is worth stating, whatever the "correct" results, neither of these studies explores the issues of causality—that is, the link between increased globalization and global inequality.

Within-country inequality is the subject of several papers and is the area where results are also unclear. An early example of a paper concerned with within-country inequality is that by Edwards (1997). He regresses the change in the Gini index between the 1970s and the 1980s on a dummy indicating whether or not a country had engaged in trade liberalization as measured by the average black-market premium or the average collected tariff ratio. He finds that trade reform did not significantly affect inequality. Other authors arriving at similar results albeit using different specifications, time periods, and data include Londono (2002) and Dollar and Kraay (2001). Barro (2000), however, finds that openness, as measured by trade volumes, is associated with higher levels of inequality in a panel of countries. He concludes: "Basically, the data reveal a long-term positive association between the levels of openness and inequality". Other authors, again using different methods and variable definitions, concur. Spilimbergo, Londono, and Szekely (1999) and Lundberg and Squire (2003) also detect a link between openness and increased inequality.

Reconciling these results is difficult because they cover different countries and time periods (and could therefore be reflecting different relationships) and because they use different specifications and variable definitions. One possibility that emerges from other work is that country categorization may be very important. Several authors (Ravallion, 2001, Milanovic 2001, Savvides 1998) find that their preferred measure of openness increases inequality in low-income countries. Barro (2000) also finds the relationship more pronounced in poorer countries. In Spilimbergo, Londono and Szekely (1999, p.88) openness affects countries differently depending on their

[16] See Milanovic (2003).

endowments: in capital-rich countries, openness reduces inequality while in countries with abundant skilled-labor, openness increases inequality. The authors argue that the former effect is driven by reduction of capital rents, the latter effect, however, is consistent with Heckscher-Ohlin.

The mix of countries in aggregate studies may therefore be the crucial factor leading to different results. Either way, this is a very significant result for two reasons. First, it runs counter to the prediction of conventional trade theory and raises obvious policy concerns. And second, it suggests that empirical work would benefit from some attempt to interact policy changes and initial conditions to capture the possibility of different effects at different levels of development, a point to which we return below.

Wage-inequality is addressed by several authors in the context of Latin America. For example, Harrison and Hanson (1999) examine the extent to which the increase in wage-inequality in Mexico was associated with the 1985 trade reform. They find that the reform did play a part but that other factors including foreign direct investment, export orientation, and technological change were also important. Regarding Mexico, Robertson (2000) argues that trade liberalization and "labor flexibilization" led to an erosion of rents in protected industries (which in the case of Mexico were less-skilled) while foreign investments increased demand for highly-skilled labor. The two effects resulted in widening wage distribution. Beyer, Rojas and Vergara (1999) find a similar effect of trade reform on wage-inequality in Chile because skill-intensive, resource-based industries expanded following liberalization. Arbache, Dickerson and Green (2003) find that following the extensive trade liberalization in Brazil in the 1990's, average wage in the traded sector fell compared to the non-traded sector (even after adjusting for education, experience etc.), and that the only category that was spared a decline were the highly educated because the returns to education went up. Arbache, Dickerson and Green (2003) argue that these results are consistent with the erosion of rents in the traded sector in the wake of opening up, and complementarity between new technology brought in by globalization and skilled labor.

A very important paper is the one by Behrman, Birdsall and Szekely (2003) who look at the impact of various policies (trade, financial liberalization, privatization, and tax reform) jointly or independently on wage differentials in Latin America during the last twenty years. Its use of policy indicators (developed by the Inter-American Development Bank) rather than of outcomes is very similar to the approach we shall adopt here. Behrman et al. conclude that more liberal trade regimes did not have an impact on wage differentials between different education categories. But financial liberalization and high-technology exports in the context of a liberal trade regime, however, contributed to the rising inequality. They conclude (p. 30), "it is not increases in trade but changes in technology that are associated with growing wage gaps."

These studies suggest three overall conclusions. First, it is extremely important to investigate each country's production structure, the pre-reform sectoral structure of protection, and the reduction in protection by sector in order to understand the impact of trade reform. Second, trade reforms are seldom undertaken in isolation. Most often, they come together, in a "package" with labor reforms. Disentangling the two effects—in addition to accounting for the effects of technological progress that may be non-neutral—is extremely difficult. Third, the impact of trade reform on wage inequality is likely to be modest if firms adapt to liberalization in a variety ways such as reducing excess profits and raising productivity as well as reallocating labor. Indeed, a study for Brazil finds no impact on wage inequality. Although returns to college education increased (Green and Dickerson, 2001), the share of college-educated workers in the total labor force was insufficient to influence overall inequality.

Each of the possible combinations of types of globalization and inequality is an appropriate subject for research. Each provides valuable information in its own right. For our subsequent work, we follow the majority of other researchers in this field and focus on liberalization of trade rather than other aspects of globalization such as investment flows and labor migration, data for the latter being especially difficult to obtain. Globalization in products is also worthy of study because it affects far more countries than globalization in capital flows or labor flows. And as far as inequality is

concerned, we select within-country, wage inequality for the theoretical and empirical reasons given in Section II and because this has been a focus of lots of literature reviewed here.

Specification

Turning to the econometric specification of the relationship to be estimated, we take two points from our review: first, although most researchers have regressed levels on levels, we believe that the work undertaken to date points to the importance of focusing on changes in both the dependent and explanatory variables; and second, several studies as well as our theoretical model suggest the impact of policy change depends on the level of development and that therefore interactive relationships need to be incorporated.

The specification in most studies is a relationship between levels of inequality and levels of globalization. These studies generally have more success in finding statistically significant results. Thus, the studies that find a negative impact of globalization on inequality rely on regressions run in levels. For example, Barro (2000) regresses the Gini index on the share of trade in GDN. Lundberg and Squire (2003) regress the Gini index on the Sachs-Warner measure of openness. On the other hand, the studies that regress changes in inequality on changes in globalization have a much more difficult time finding significant results. For example, Edwards (1997) uses the change in inequality between the 1970s and the 1980s as his dependent variable and a dummy indicating whether a country undertook trade reform as his explanatory variable. Dollar and Kraay (2001) use the growth in the income of the bottom 20 percent and changes in trade volume. Both sets of authors conclude that trade reform and/or changes in openness have no impact on inequality.

Interestingly, two papers undertake both levels-on-levels and changes-on-changes analyses. Milanovic (2001) finds that openness hurts poorer deciles in low-income countries when the analysis relates levels to levels, but funds no measurable effect when he switches to changes on changes. Similarly, Harrison and Hansen (1999) find that

high industry tariffs are associated with greater wage inequality when they conduct the analysis in levels but not in changes. This suggests that either there is no relationship between changes in openness and changes in inequality, or the data are not sufficiently fine to capture such a relationship.

This is an important observation because in our view changes-on-changes is the preferred specification. Globalization is presumably a dynamic concept and a continuing one. Regressions of levels-on-levels, however, typically attempt to compare stable points of equilibrium. Consider this argument. Define globalization for present purposes as trade openness measured by trade policies. Now imagine two countries, one of which liberalized trade policy ten years ago while the other has literally just implemented its trade liberalization. One would imagine that resource reallocation, changes in factor prices, and other adjustments would have played out in the ten years following the reform in the first country, and the distribution of income would have arrived at a new stationary state. The relationship between policy and inequality could therefore be interpreted as an equilibrium. In the other country, however, trade policy will have changed but the economy, including inequality, will not have had a chance to adjust. If these two countries appear as two observations in a cross-country regression of levels on levels, it is very difficult to interpret the meaning of any results whether statistically significant or not. On the other hand, if the change in policy is related to the change in inequality after some common period of time in both countries, then the results, whatever they may be, are easily interpreted. With this argument in mind, we focus our empirical work on variables measured in first differences. That is, we focus on *changes* in countries' policy stances and *changes* in inequality outcomes.

A second point that emerges clearly from the review is that the impact of liberalization may differ depending on the initial conditions of the liberalizing country. However in the empirical work this approach is not always implemented. The implicit assumption is often that the effects of reforms are the same regardless of the initial level of policy openness. In other words, opening up an entirely closed economy by one reform point yields the same results as further opening of an already open economy. We shall

try to avoid this type of simplification by controlling for the initial level of openness and, of course, for other initial differences between economies. Similarly, reforms which are each represented by one policy variable are seen, for econometric convenience, to affect outcomes additively. This is a strong simplification: reforms might often act multiplicatively in that the absence of one type of reform negates the effects of another. We shall try to allow for this by including interaction terms.

Variable selection

The two key decisions in selecting variables concern of course the measures used to represent inequality on the one hand and globalization on the other. As far as inequality is concerned, we have already decided to focus on wage inequality. That said, however, there are still questions of how best to capture the distribution of wages in a measure suitable for econometric analysis and what data to use. And as far as globalization is concerned, even though we have decided to focus on trade liberalization, there are still numerous choices including the fundamental one of whether to focus directly on policy measures or indirectly via measures of trade outcomes. These issues are addressed in this subsection.

Inequality measures

The first of the two large databases we use to derive inequality measures is that of Occupational Wages around the World (OWW). As mentioned before, the data cover the period from 1983 to 1999 and more than 150 countries. The coverage in all its dimensions, however, is problematic and fragmentary. Although there are 156 countries in total, each country does not provide data (occupational wages) for every year. The yearly country coverage varies between 48 and 76. Occupations included also vary from country to country. Moreover for a given country even when it does provide the annual data, the occupational coverage is not necessarily uniform for each year. [17]

[17] For example, the US gives the data on 11 occupations in 1983 and 150 occupations in 1999.

Furthermore, it should be noticed that each observation is an observation on "habitual" country-wide wages for a given occupation. Thus some averaging is already built into the data. That however need not be a problem since, for example, the differences in earnings by skill levels are also based on averaging. There is however a difference in that the latter are obtained through a statistical analysis that covers a well defined spectrum of wage earners (labor force survey) and controls for other relevant factors (gender, experience), while the ILO data represent a mish-mash of average "habitual" wages for different underlying populations: some countries—for some years—report monthly wage rates, other report collectively bargained wages, yet others report hourly wages. At times men and women are combined, and at times only wages for men are reported. Freeman and Oostendorp overcome the problems of data comparability by "calibration" which is essentially a process of finding the adjustment coefficients (based on a regression analysis) for the data given in a "non-standard" form, where the standard form is defined as the most common form being used in the dataset, *viz*. monthly wages for male workers.[18]

The great advantage of the database (which incidentally also makes the calibration possible) is its size: in the Freedman-Oostendorp's "summary" (compendium) of the ILO sources,[19] there are more than 72,000 observations of average occupational wages. For each of the three coefficients of inter-occupational wage inequality which we calculate (Gini coefficient, standard deviation and absolute mean deviation from the median). Inequality indexes are calculated only for the country/years that contain more than 25 occupational wages (of the "calibrated" type). There are thus 723 observations (country/years) covering the 1983-99 period and 103 countries.[20] A summary of the data is given in Annex 3. These inequality statistics can be, according to Freeman and

[18] They do several such calibration and show (in the Annex) that the results (inequality statistics) do not depend on a particular calibration. For our calculations, we have used their suggested base-wage calibration denoted *x1wu* in the oww.dta database.

[19] The Freeman-Oostendorp database is indeed a "summary" of ILO data since the data on occupational wages have been collected by the ILO since 1924 while Freeman-Oostendorp data begin with 1983.

[20] Some countries are dropped because they do not provide 25 occupational wages per year and the inequality statistics are not calculated.

Oostendorp regarded as both indicators of occupational wage inequality and skill premium.[21]

The second large database of inter-industrial wage differences is created by James Galbraith and associates and is known as the University of Texas Inequality Project (UTIP) database (see Galbraith and Kum, 2003).The original data come from UNIDO statistics. The UNIDO statistics provide average manufacturing pay by industry. The number of industries (which provide their mean wages) varies between countries and years. On average, there are 24 industries per country/year (with the standard deviation of about 7). From these average industrial wages for a given country/year, Galbraith and his associates calculate Theil index of inequality (for that country/year). The UTIP database covers on average about 90 countries annually over the period 1975-99.[22] In total, we use 1651 Theil indexes from 141 countries (see Annex 3 for details).[23]

Table 2 shows simple correlations between different inequality measures from the two databases. We have three inequality statistics from the OWW database (Gini coefficient, standard deviation and absolute mean deviation from the median) and only one from UTIP (Theil coefficient). Different inequality statistics from the OWW database are obviously strongly correlated (see the shaded cells). The correlation between Theil index from UTIP and Gini from the inter-occupation inequality is much less—around 0.4. The two datasets capture, it seems, two different aspects of wage inequality. Figure 1 shows the scatterplot of OWW's Gini and UTIP's Theil. The correlation between the changes in the two measures (which we shall be using in our regressions) is virtually zero.

[21] Implicitly, the greater dispersion of inter-occupational wages, the greater the return to skills.

[22] The data are available at http://utip.gov.utexas.edu/. More recently, the database has expanded to the years prior to 1975. As of January 2004, UTIP data base has almost 3200 country/year Theils, and covers more than 150 countries.

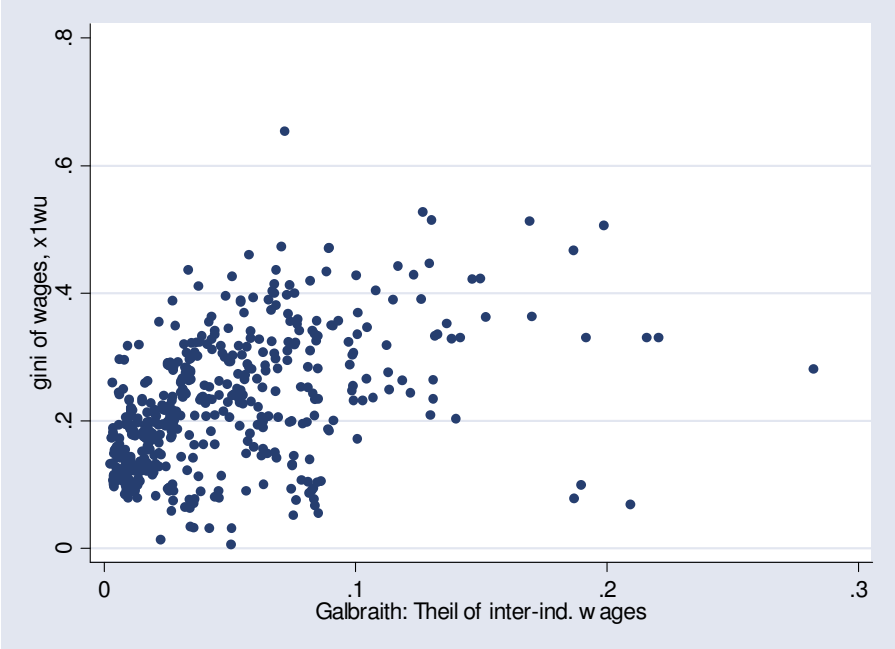
[23] It will be noticed that we do not use Gini coefficient here (although we would have linked, for a more direct comparison with OWW dataset to do so). The reason is that UTIP database does not provide individual mean industrial wages which would allow us to calculate different inequality measures. The authors only provide the "finished" statistic, that is the Theil index, and not the underlying data. This is not the case with the OWW database where individual occupational wages by country/year are available and one can thus calculate various inequality indexes.

Table 2. Simple correlations between various inequality measures and inequality concepts

Database	UTIP	OWW		
Inequality of:	Average **wage** by industry	Average **wage** by occupation		
Measure	Theil	Gini_oww	Stdev	Absdev
Theil		0.45** (513)	0.48** (513)	0.41** (518)
Gini_oww			0.96** (723)	0.81** (723)
Stdev				0.85** (723)

Note: Number of observations given between brackets. Each country/year represents one data point, that is for each country/year, there is one inequality statistic. The level of significance (null hypothesis: correlation = 0): ** = less than 1%, * = less than 5%. Shaded are cells with correlation coefficients calculated between various inequality measures from the same database.

Figure 1. Inter-occupational (Gini) and inter-industry (Theil) inequality



Note: Calculated from 513 observations from 79 countries Total number of observations is 723 (from 103 countries) for inter-occupational inequality and 2160 (from 141 countries) for inter-industry inequality.

Globalization and reform measures. Trade liberalization can also be measured in many different ways. The primary choice is between policies – tariff reductions, elimination of non-tariff barriers, etc -- that are thought to help globalization, and outcomes such as trade volumes that are a consequence of trade policies. Both approaches have been used in the literature. Most of the studies reviewed here used trade shares as their measure of globalization. Lundberg and Squire (2003) use the Sachs-Warner Index which, although linked to policies, has been criticized on the grounds that it captures more that trade policy. **(Lyn: please explain)** Edwards (1997) uses a variety of policy measures: average tariff; average QR (quantitative restrictions) coverage; and average black-market premium. Savvides (1998) uses a specially created measure of protection covering both tariff and non-tariff barriers compiled from UNCTAD data at the four-digit level of the Customs Cooperation Council Nomenclature. The measure is only available, however, for 1988. Finally, those studying wage-inequality within a country are often able to make use of industry-specific tariff rates and quotas.

All of the various ways of specifying variables representing trade liberalization are useful and answer interesting questions. If trade volumes are chosen then the study says something about the impact of trade volumes on inequality. And for some purposes that may be an interesting question (see Milanovic, 2001). But, in our view, it does not say much about the impact of policy on inequality, primarily because trade volumes are not determined exclusively by policy. A wide range of factors will influence a country's trade volume: country's geography, technology, demand conditions in importing countries, competitors' supply conditions, weather, and so on. Even attempts to control for these other factors will inevitably leave a residual that captures more than trade policies. We suspect that widespread reliance on trade volumes in the empirical literature reflects the relative ease of obtaining data compared with the difficulty of achieving the same for trade policies. Since we are interested primarily in how pro-openness reforms affect inequality, we prefer to focus on policies and thus place ourselves squarely in the policy-maker's corner. We attempt to answer the question that many policy-makers naturally formulate when they envisage trade reforms: "What will

be the effect of reforms on wage differences between various occupations and industries?"

This approach, however, creates a new set of problems because the measurement of reforms is extremely complicated. For example, it is not clear how to create a single reform indicator when reforms are undertaken in different sectors; nor is it clear how to account for intensity and duration of reforms. Thus measurement of policy changes is unlikely to be error-free, and, as documented in Annex 1, there are frequent disagreements between different data sources on whether some policies are indeed reformist or not.

Before undertaking the empirical analysis, we need first to determine what countries have conducted comprehensive reforms in the foreign sector. We shall use the term "reform" to indicate a significant policy change whether that change is in the direction of greater liberalization ("pro-openness") or the reverse. Of course, most of our attention will be directed toward "pro-openness" reforms, that is, reforms that have something to do with enhancing "openness" defined as the facility to conduct foreign transactions and facilitate the circulation of goods across borders. Such reforms include reduction of tariff rates, removal of quantitative restrictions, and joining an international free trade zone.

One problem when trying to link such reforms to domestic outcomes such as income or wage distribution is that they are seldom undertaken in isolation. Most frequently, pro-openness trade reforms are accompanied by other "globalization" policies that may well affect labor market outcomes: for example, easier direct or portfolio investment by foreign residents or more liberal regulation of international labor flows. And just as frequently trade reforms are accompanied by domestic reforms that impact directly on labor markets: "flexibilization" of the labor market, changes in the minimum wage legislation, more (or less) liberal severance pay, reform in the pension regimes etc. These accompanying domestic reforms often concern labor—whether they are "anti" or "pro" labor. Sometimes "anti" labor legislation accompanies openness reforms because it is felt that liberalization in the foreign arena can be emptied of content (or cannot

produced the desired results) if there is no improvement in the domestic legislation, i.e. if the latter is deemed too restrictive. Mexico provides one such example (Robertson, 2000 and Hanson and Harrison, 1999). Alternatively, labor policies can, for a segment of labor force at least, become more generous if that is the short-term cost the government needs to pay in order to convince trade unions not to wreck the reforms. In that case, more generous severance pay, low interest loans to start own businesses, early retirement schemes can all be used to reduce the resistance to reforms and to "buy off" potential losers. In addition to labor reforms, there may be also "accompanying" financial reforms: liberalization of interest rates, increased competition in the banking sector etc. All of this complicates any attempt to isolate the impact of trade reform on wage inequality. We shall therefore try to control for some of these other policies (labor markets, social transfers).

To measure policies for our cross-country analysis, we the Gwartney-Lawson *Free the World* Index. (The other indexes, the Heritage Foundation Index and the World Bank Country Policy and Institutional Assessment (CPIA) index have also been tried but for the reasons explained in Annex 1, have been rejected.) The general rule is that we are interested in identifying the years of reform in different policy areas, and in some cases estimating the intensity of reforms. We eliminate from the sample all transition (post-Communist) countries because the liberalizations which they underwent were so extensive and covered such a vast array of issues that linking any one of these liberalizations to income or wage distribution outcomes would be impossible. A number of fundamental structural changes—privatization, trade reorientation, an end to obstacles to free movement of labor etc—were so extensive and dramatic that the effects of individual policy changes would be lost. In this case we deal with a wholesale systemic change, not with discrete policy changes.

The *Free the World* (FTW) data are taken from the 2002 Fraser Institute report.[24] The report provides information on the extent of economic freedom[25] in 123 countries at

[24] Available at www.freetheworld.com. The report is issued by the Fraser Institute, Vancouver (see http://www.fraserinstitute.ca/shared/readmore.asp?sNav=nr&id=537). The entire recent issue of *European Journal of Political Economy*, September 2003 was dedicated to the issue of reform measurement and in

five-year intervals starting with 1975 and with the most recent year being 2000. [26] We have selected four variables. For the restrictiveness of trade policies we use FTW's percentage of trade-related taxes in the value of trade, and mean unweighted tariff rate. For other policies, we use two subjective indicators: one for the exchange rate regulation (ranging from 1 to 10 with 10 indicating the most liberal regime), and another for the interest rate regulation (with 10 again being the most liberal).

We have transformed the two trade-related indicators into ordinal measures of reform by assuming that there is a meaningful pro-liberal policy change when a country's index of restrictiveness decreases by ½ of the initial period's overall standard deviation. Thus if the mean trade revenues as a share of trade value in the world are 10 percent, and the standard deviation is 5 percent (both in year 1970), then if a country's trade taxes (as a share of its total trade) decrease by more than 2.5 percentage points between 1970 and 1975, the country is deemed a pro-openness reformer over the entire 1970-750 period. (XX: redefine reform with ¼ of standard deviation; have more cases of reform) The same but in the opposite direction means that the country is an anti-openness reformer. The transformation from a cardinal to an ordinal measure, or more exactly "trinomial" (-1,0,+1) measure, has one big advantage: it reduces significantly the measurement error which, as mentioned above, seems to be fairly large in cardinal indicators, and thus allows us to focus on what may be considered unambiguous cases of reform.[27] Measurement error arises because the reporting of trade taxes and trade values is not uniform across countries; the definition of what is included as a trade tax varies; some

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particular to the *Free the World* database. For the description of the procedures used in defining and "grading" reforms see Gwartney and Lawson (2003) in the same issue.

[25] Basically as understood by the free trade right-wing non-redistributionist view of the world.

[26] The number of countries is almost constant: FTW has 116 countries in 1975 and 120 in 2000.

[27] Both *Free the World* trade-related cardinal statistics appear subject to considerable error. A comparison between the FTW data and a superior recent World Bank source (kindly provided by Francis Ng) shows significant discrepancies in values. For example, for the year 2000, Pakistan's average unweighted tariff is, according to the World Bank data, less than 25 percent while it is 46 percent according to FTW data; similarly Nigeria's average tariff is 22 percent according to World Bank, and 32 percent according to FTW. The overall correlation however is high—which is not surprising since the World Bank data are the major source of the FTW database. It is the differences between the two sources which are more difficult to explain and more intriguing and may be important if the "outlier" data drive the regression results.

exports and imports may be unrecorded, or recorded twice; the treatment of re-exports is far from uniform; and so on. In addition to differences in accounting conventions between the countries, the FTW data which are derived from various international sources (UN, World Bank, IMF, regional development banks) suffer from the fact that these international sources often do not agree among themselves.

The two trade-related measures focus on somewhat different aspects of reform. The trade tax/value of trade variable is of course weighted and adjusts for the two sides of trade: treatment of exports and imports. Liberalization thus might involve either reduction in import or export barriers or both. The second trade measure, unweighted mean tariff rate, reflects a general import policy stance and does not adjust for the relative importance of different trade barriers (as value-weighted measures do). [28]

For the other two variables (exchange and interest rate regulation) a country is deemed a liberalization reformer if the index increases by one point. The total number of observations for each variable is about 3100 but since the five-yearly data are ascribed to all intervening years, we have in effect 716 independent observations (country/years) for each policy.

Table 3 shows simple correlation coefficients for different reform measures. The correlations are quite weak (between 0.04 and 0.1) even if several are statistically significantly different from zero. Most of the correlations are positive as we would expect from the fact that reforms tend to be undertaken together. The only exception of some significance is a negative correlation between liberalization of the exchange rate and trade reforms. Liberalization of the exchange rate is accompanied by an increase in trade taxes (although not by an increase in average tariff rate). In other words, the exchange rate devaluation (most often implied in foreign exchange liberalizations) which by

[28] The weighted measures do not present full story either. For example, a prohibitively high import duty which would cut all imports to zero would appear in a weighted measure as irrelevant (the weight would be zero) while it would affect the unweighted measure.

definition leads to an increase in value of trade seems to lead to an even greater increase in collected trade taxes.[29]

Table 3. Simple correlation coefficients for different reform measures
(*Free the World* data, 1970-2000, policy changes)

	Trade reform	Tariff reform	Exchange rate reform
Tariff reform	0.054**		
ER reform	-0.045*	0.098**	
Interest rate reform	-0.032	0.065**	0.044*

Note: Does not include transition countries. Two (one) asterisk indicate that the coefficient is significant at 1(5) percent level.

Not too many countries were consistent reformers in all the areas. We find only eight episodes of simultaneous reform in three out of four areas (Table 4). Reforms have been much more frequent in the area of interest and exchange rate policy than in tariffs and trade. In all the areas however pro-liberalization reforms have been much more common than the years of "anti-liberalization" (Table 5). In the area of interest rate policies, for example, 37 percent of country/years have witnessed liberalization of policies, and only 11 percent of country/years have seen more restrictive policies. It seems that interest and financial market liberalization (which have indeed received quite a lot of attention of late) have been some of the most important reforms during the last quarter of the century. As for trade and tariff reforms, some 7 to 8 percent of country/years have been characterized by liberalizing reforms, 2 to 7 percent by "anti-liberalization", and most of the time the trade stance was unchanged—or at least not sufficiently changed to qualify as reform.

[29] Assume a devaluation with no effect on volume and composition of trade. Values of exports and imports will both increase and the share of trade taxes will also go up if trade taxes are progressive (that is, their rate goes up with value).

Table 4. The most comprehensive reformers, 1975-2000

	Type of reforms	Period
Bangladesh	Tariff, exchange, interest rate	1995-2000
Belize	Tariff, exchange, interest rate	1985-90
Cote d'Ivoire	Trade, tariff, interest rate	1995-2000
Ghana	Trade, exchange, interest rate	1995-2000
Mexico	Tariff, exchange, interest rate	1985-90
Paraguay	Tariff, exchange, interest rate	1985-90
Peru	Tariff, exchange, interest rate	1990-95
Turkey	Tariff, exchange, interest rate	1980-85

Table 5. Percentage of country/years of reform
(out of total number of country/years, 1975-2000)

	Trade	Tariff	Exchange rate	Interest rate
"Anti- liberalization"	7	2	10	11
No change	85	91	68	52
Liberalization	8	7	22	37
Total	100	100	100	100
Number of independent observations (country/years)	716	716	716	716

Note: Total number of observations is about 4.4 times greater than the number of independent observations since the five-year interval values were assigned to all intervening years.

Finally, note that even the apparent disadvantage of the FTW index, namely that the FTW estimates are available at five-year intervals and a country is assigned a reformer status during the entire five-year period if its policy level in year *t+5* is much more/less liberal than the level in year *t* index, has a positive aspect. While it is true that we do not know exactly when the reforms were undertaken during these five years, the lengthening of the period of coded reform allows us to deal, indirectly, with the lagged effect of reforms. So long as all the reforms were not undertaken in year *t+5* only, we shall be able to capture some of their lagged effects precisely by coding all five years as reform years. Overall, we are able to "escape" two common measurement problems which we think are generally important: (i) how intense are reforms, and (ii) when did they exactly start and with what time lag they affect wage inequality. We do so because we introduce a fairly high threshold for the intensity of reforms and can be thus more confident that whatever is coded a reform was indeed a reform (that is, we take a conservative approach) while the issue of the timing and lags is, as explained, "taken care" by the use of the five-year periods.

IV. Empirical Analysis and Results

We begin the empirical analysis with an examination of the links between different types of reform and inequality. Table 6 shows mean changes in inter-occupational and inter-sectoral inequality with anti- and pro-liberalization reforms. The results show that according to the FTW index, trade liberalization (compared to no policy change) is associated with increases in both inter-occupational and inter-industry inequality. For example, during the years of trade liberalization (defined as above, in terms of lower trade taxes as a share of total trade value), inter-occupation Ginis increase on average by 1.58 points per year while (on average) they does not change when there is no policy change.[30] Exchange rate liberalization is also associated with increases in occupational inequality, but declines in sectoral inequality. Interest rate liberalizations seems to reduce both types of inequalities.

Table 6. Reforms according to *Free the World* Index 1975-2000, and changes in mean inter-occupational and inter-industry inequality

	(1) Anti-liberalization reforms	(2) No change	(3) Liberalization reforms	Difference (3)-(2)
Change in mean Gini_oww, points pa				
Trade	0.87	0.00	1.58	+1.58
Tariffs	--	0.10	0.26	+0.16
Exchange rate	0.71	-0.01	0.40	+0.41
Interest rate	0.43	0.08	-0.03	-0.05
Change in mean Theil, points pa				
Trade	0.13	0.12	0.40	+0.28
Tariffs	0.34	0.13	0.13	0
Exchange rate	0.11	0.18	0.01	-0.17
Interest rate	0.53	0.05	0.15	-0.10

Note: Transition countries excluded. Gini and Theil in percent. Cell where there are not more than three observations are left empty. For the definition of reforms in each case, see the text above.

Gini_oww = inter-occupational inequality. Theil = inter-industry inequality.

(XX: t values here).

[30] The averages are run across all country/years, that is the sample of countries that are trade reformers is not necessarily the same as the entire sample (or the sample of anti-liberalization reformers).

We now want to investigate whether these simple relations hold when subject to a more rigorous analysis. To do this, we draw on equations (7) and (9) and write the change in inter-occupation (Ineq(o)) inequality as

Δinequality(o) = fct (trade reform, labor market conditions, change in labor market conditions, income level) (A)

or

$$\Delta Ineq(o) = fct(\Delta t, s, \Delta s, y)$$

When bargaining is industry-based, only the first two factors will matter. Note that *y* should matter only if interacted with dt, if we consider that without policy reforms, income level alone cannot lead to a change in inter-occupational inequality.

From equations (13) and (15), change in inter-industry inequality (ΔIneq(i)) can be written as

Δinequality(i) = fct (trade reform, level of trade protection, labor market conditions, change in labor market conditions, income level) (B)

where the level of the skill premium is subsumed in the income variable, that is the skills premium moves in the reverse direction from average country income.

Thus, if policy level in a given area (*j*-th area, say, trade) in country *i* in year *t* is denoted P_{ijt}, change (reform) in that policy area is given by R_{ijt}, other country relevant controls are given by the vector of variables Z, and inequality index is denoted by I_{it}, the equation is

$$\begin{aligned} I_{it} - I_{it-1} &= \beta j \sum_j (P_{ijt} - P_{ij,t-1}) + \gamma_k \sum_k (Z_{ikt} - Zi_{k,t-1}) + \varepsilon_{it} = \\ &= \beta_j \sum_j R_{ijt} + \gamma_k \sum_k (Z_{ikt} - Z_{ik,t-1}) + \varepsilon_{it} \end{aligned} \quad (14)$$

where β_j gives the contemporaneous effect on inequality of a given policy change. Now since we are mostly interested in trade-related policy reforms, the reform variable will be

of only one or at most two kinds (both taken from FTW database).[31] The controls Z (derived from the model) would be level of income and labor market conditions as introduced in (A) and (B). One could also include size of social transfers which is often viewed as a proxy for labor market conditions (more redistributive policy is generally more pro-labor), or, for example, level of democracy.

A word about the estimation procedure. One might wish to allow policy reforms to affect inequality not only contemporaneously but through several time periods (introducing this as a lagged reform on the right-hand side). This, as discussed before, is redundant due to the way that our reform variable is coded, taking the value of 1 (liberalization), 0 (no change), and -1 (anti-liberalization) for all five years. Thus the lagged effect of reforms on inequality is already allowed for. Endogeneity is unlikely in levels, and particularly so in a first-difference formulation as here, since inter-occupational and inter-industry inequality cannot have much to do with decision to undertake trade reforms. We therefore do not use instruments. Furthermore, the use of first-differences implies that idiosyncratic country effects are included. The two policy reforms (trade reform and tariff reform) included in regressions highlight somewhat different aspects of reform and we prefer to use them both as dependent variables. Correlation between them two policy changes is, as we have seen, very weak and collinearity should not be a problem. Finally, in order to adjust for heteroskedasticity, all regressions are run with Huber-White standard errors.[32]

Table 7 gives the results of the regressions explaining inter-occupational inequality (education premium). We begin with a very parsimonious formulation where change in inter-occupational inequality (dgini_oww) is explained by trade and tariff

[31] These two reform variables range from –1 (anti-liberalization reforms) to 0 (no reform) to 1 (pro-openness reforms).

[32] Birdsall, Behrmann and Szakely (2003) have the same formulation as here but present also the first difference formulation of policy changes, or in other words the difference of differences formulation (with distributed lags over seven periods on the right-hand side). Their first difference in levels formulation (Table 2) is the same as our equation (14).

reforms and controlled for by the share of social cash transfers in GDP.[33] The latter variable proxies for pro-redistributive (or pro-labor) policies. None of the variables is found significant.

The situation however changes when we introduce two interaction terms, that is when we interact trade reforms with openness (trade/GDP ratio) and trade reforms with level of income (log of GDP per capita). Now, trade reform alone is, as expected, hugely pro-inequality, but that effect is reduced the richer and the more open the country. It is in poor and relatively closed economies that trade reforms will be most conducive to increasing inter-occupational wage inequality, or increasing skill premiums which is in contradiction with our expectation (see Table 1) that $d\pi>0$ should be greater in rich countries. For example, at the sample mean values of both lnGDP (9.13) and openness (0.67), the effects of the two interaction terms are about equal to the effect of trade reforms alone. If we then take all three of them together, the change in Gini_oww is even slightly negative, that is pro-openness reforms will be associated with a *decline* in measured inter-occupational inequality in richer and more open economies. But at low levels of income and/or openness to trade, reforms would be associated with increased inter-occupational inequality.

In formulations 3 and 4 we introduce two additional controls for labor market conditions: first, the number of ILO conventions which country is party to, and then the rate of unemployment. [34] With the first variable, the results remain unchanged, while the rate of unemployment contributes (albeit not significantly) to inter-occupational

[33] Social transfers include pensions, unemployment benefits, family benefits and social assistance (welfare). The data are from World Bank SIMA database.

[34] We have experimented with several other labor market variables (share of labor force covered by collective agreement, share of the unionized labor force, percentage of workers involved in strikes) but the sample size either becomes too small or the results are unchanged. The labor market variables come from

inequality in addition to making other variables more statistically significant. In formulation 5, we replace the share of social transfers in GDP by the change in the social transfers/GDP ratio: the results however remain the same, including adjusted R^2 that remains slightly above 0.3.

the World Bank Labor Market Data Base put together by Martin Rama and Rachel Artecona (see Rama and Artecona, 2002). The data have been kindly supplied by Martin Rama.

Table 7. Explaining inter-occupational inequality, 1984-1999
(dependent variable: annual change in Gini percentage points; all regressions run with robust standard errors)

	(1)	(2)	(3)	(4)	(5)
Rtrade	10.38 (0.15)	2684.4 (0.045)	2684.4 (0.046)	2693.4 (0.047)	2693.3 (0.047)
Rtariff	-0.37 (0.28)	-0.39 (0.27)	-0.34 (0.35)	-0.64 (0.09)	-0.55 (0.31)
Ssgdp	-4.49 (0.32)	-4.56 (0.34)	-4.52 (0.48)	-6.92 (0.21)	
Rtrade*openness		-122.7 (0.01)	-122.7 (0.01)	-126.1 (0.01)	-125.7 (0.01)
Rtrade*lnGDP per capita		-299.6 (0.048)	-299.6 (0.89)	-300.5 (0.05)	-300.5 (0.05)
ILOconv			0.002 (0.89)		
Rate of unemployment				0.17 (0.07)	0.13 (0.1)
Δ(ssgdp)					0.044 (0.99)
R^2 (adjusted)	0.21	0.32	0.32	0.34	0.33
Number of observations	177	163	158	156	155

Note: Levels of significance given in brackets. Coefficients significant at less than 5% level are shaded.

Table 8 presents the results for inter-industry inequality. The first, very bare, formulation shows that none of the variables is significant. In the second formulation where we introduce the same two interaction terms as before (trade reform and openness and trade reform and GDP), the effect of trade reform on inter-industry inequality becomes significant and negative. This is exactly what we postulated. The interaction between GDP per capita and trade reform has a positive sign however. At the median level of (log) GDP per capita of the countries included in the sample (9.75), the interaction effect is greater than the direct effect of reform. We would thus expect to observe, at the median level of income, an increase in observed inter-industry inequality even if pro-liberalization reforms alone tend to reduce inequality between the industries. More exactly, the turning point would occur at the level of income of Chile or Panama: for countries poorer than Chile and Panama, we would observe trade reforms to reduce inter-industry inequality, for richer countries than Chile and Panama, we would observe an increase in inter-industry wage inequality. For poor countries, this is exactly what we expected: the erosion of rents, and consequently a reduction of inter-industry differentials.[35] For rich countries it is the opposite of what we expected (see Table 1). [36]

In formulation (3), we replace percentage of workers covered by collective bargaining by percentage of workers involved in strikes. Both of these variables enter with the negative signs meaning that inter-industry differences are reduced if workers are better organized (through collective agreements) or are more active (through strikes). We also introduce change in social transfers/GDP ratio instead of its level. The new variable is not statistically significant, but now tariff reform is shown to be reducing inter-industry inequality as indeed we would expect. Overall, however, the results for inter-industry inequality are much less rebust to changes in specification that those for inter-

[35] This assumes that, prior to liberalization, the average wage in the protected sector was higher than in the unprotected. This is quite likely since the protected sector in poorer countries is not only benefittig from protection but is also likely to be, on average, more skilled. The same finding is obtained by Arbache, Dickerson and Green (2003) in the context of Brazil.

[36] One way to explain this is if the average wage in protected (low-skilled) sectors is less than in the unprotected (high-skilled) sectors. Then, indeed, liberalization by helping the high-skilled sectors will increase the difference between the two.

occupational inequality; in effect, rather small changes in variables included on the RHS (e.g. different labor market condition variables) render the coefficients on reform insignificant. The results reported in Table 8 must therefore be interpreted with caution.

Table 8. Explaining inter-industry inequality, 1976-1999
(dependent variable: annual change in Theil percentage points; all regressions run with robust standard errors)

	(1)	(2)	(3)
Rtrade	-0.22 (0.25)	-75.9 (0.00)	-0.74 (0.81)
Rtariff	-0.39 (0.11)	-0.03 (0.92)	-0.65 (0.04)
Ssgdp	0.14 (0.81)	0.12 (0.82)	
Δ(ssgdp)			-4.69 (0.30)
Percentage of workers covered by collective agreements		-0.001 (0.39)	
Percentage of workers involved in strikes			-3.41 (0.83)
Rtrade*openness		0.275 (0.48)	0.85 (0.65)
Rtrade*lnGDP per capita		8.79 (0.00)	0.03 (0.09)
Constant	0.07 (0.43)	0.16 (0.32)	0.11 (0.025)
R^2 (adjusted)	0.02	0.20	0.07
Number of observations	577	197	335

Note: Levels of significance given in brackets. Coefficients significant at less than 5% level are shaded.

Section V: Conclusions

The empirical results provide support to the hypothesis that trade reforms alone will tend to (i) increase inter-occupational wage inequality and skill premium, and (ii) to reduce wage inequality between industries, that is erode rents enjoyed through protection or unionization. Both of these results are obtained from a relatively simple model of wage formation where there is a wage-earners' gain from collective bargaining whether that bargaining is skill- or industry-based and some gains from protection are similarly transferred to workers.

But in both cases, the effect—pro-*in*equality in case of occupations and pro-equality in case of industries—is less at higher levels of income and (for occupations) higher initial level of openness. Lower increase in the premium in rich than in poor countries is not something we expected. We expected inter-occupational inequality to increase in the wake of reforms particularly strongly in rich countries that presumably enjoy comparative advantage in skilled labor and where unskilled labor tends to be protected. But the increase is much more muted in rich than in poor countries, even after we adjust for labor market conditions. The obverse of this finding is to explain why inter-occupational inequality seems to be particularly strongly increasing in poor countries that undertake trade reforms. This is a finding that has been recently made by several authors who looked at household measures of inequality and openness (Barro 2000, Ravallion 2001, p. 1811; Milanovic 2002) and which we confirm here. The result also tends to agree with the popular perception of the effects of reforms in developing countries. Yet this is a finding that runs contrary to a key assumption in the theory of international trade, namely that poor countries enjoy comparative advantage in unskilled activities and that this comparative advantage is "revealed" or "acted upon" once trade reforms begin. This is a puzzle that remains still unresolved.

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ANNEX 1.

The other data sources on reforms and their relationship with the *Free the World* data

We have considered two additional sources of data on economic reform: the Heritage Foundation index of reform, and World Bank CPIA (Country Policy and Institutional Assessment) index which is an internal, unpublished index put together by World Bank country economists in order to follow economic reforms in World Bank borrowers, and presumably, to influence Bank's lending strategy.

The *Heritage Foundation* index estimates how liberal are policies in four areas: trade, foreign investments, property rights, and regulation with higher scores indicating less liberal policies.[37] We use Heritage's own scores that grade *levels* of policies. Policies are graded from 1 (most liberal) to 5 (most restrictive). Liberalizing reformer in a particular area in year *t* is deemed to be a country whose score has decreased; the reverse of course holds for anti-liberalization reformers. The period covered is 1995-2002, and the number of countries included goes up from 99 in 1995 to 156 in 2002. The total number of independent observations is 1147 for each policy.

The World Bank CPIA index covers, in principle, all World Bank borrowers annually since 1977. However, the coverage is less thorough partly because of lack of information (e.g. the indexes for China and India are reported only after 1980) and partly because of unsettled political conditions in some countries (e.g. if there are civil wars or if countries do not have a relationship with the World Bank). The country coverage though steadily increases from 79 countries in 1977 to 118 countries in 2002. The value of the index varies from 1 (worst policies as judged by World Bank economists) to 6 (best policies). [38] The total number of independent observations is 2625 country/years. We deem a country to be a reformer in a given year if its index has increased by more than ½ a point (which is also about one-half of the standard deviation across the entire sample).

Results using* Heritage Foundation *index. Correlations between *levels* of policies are greater than between the changes in policies. Table A1 shows simple correlations between the four Heritage Index policy measures for the period 1985-2002. All the correlations are above 0.5 and are statistically significant. The strongest is between lack of protection rights and level of regulation. Here the problem is the short period of time covered In addition, although such strong correlations between policy levels do make sense, one may wonder to what an extent the authors of the index, based on subjective assessments, might have been able to keep the categories from "spilling" into each other. For example, high level of regulation is strictly speaking different from protection of property rights: one can imagine the situation where rights are well protected, while there are many rules and regulations to which property owners are subjected. It is unlikely though—short of having an "objective" measure—that somebody whose view (or the

[37] The data are available at www.heritage.org/index/2001.

[38] The CPIA data are not in the public domain. Prior to the mid-1990's, the scale was different. The data were however rescaled by Aart Kraay (who also kindly supplied them) so that the earlier scale corresponds to the current (1 to 6) one.

ideal) is that property rights include a de facto right to do with one's property ass one pleases would judge limits placed on his use of property as being qualitatively different from juridical protection of this property. Thus some correlation may be already in-built in the way the measures are defined.

Table A1. Simple correlation coefficients for different policy levels
(Heritage index, 1995-2002)

	Trade protection	Barriers to DFI	Lack of property rights protection
Barriers to DFI	0.514**		
Lack of property right	0.650**	0.635**	
Level of regulation	0.538**	0.556**	0.771**

Note: Does not include transition countries. Two (one) asterisk indicate that the coefficient is significant at 1(5) percent level.

Table A2 shows correlations between the changes (that is, reforms) in the same policies. Not surprisingly, these correlations are much lower than those between levels and are broadly similar to the correlations between policy changes that we retrieve from *Free the World* index. In theory the index could change by 5 points, going from the minimum of 0 to a maximum of 5, or doing the reverse. In practice, of course, the changes are much more limited: the median change over the 1995-2002 period is 0 for all policies, [39] and the mean change ranges from +0.03 for regulation (increased regulation) to –0.07 for trade protection. The reforms tend (not surprisingly) to go together as indicated by the positive sign of all the coefficients. The highest degree of correlation is between changes in protection of property rights and level of regulation.

Table A2. Simple correlation coefficients for different policy changes
(Heritage index, 1995-2002)

	Trade protection	Barriers to DFI	Lack of property rights protection
Barriers to DFI	-0.026		
Lack of property right	0.028	0.083*	
Level of regulation	0.012	0.049	0.158**

Note: Transition countries not included. Two (one) asterisk indicate that the coefficient is significant at 1(5) percent level.

[39] The full range is from –5 to +5.

Table A3 shows that over the 1995-2002 period episodes of liberalization and anti-liberalization were about equally represented. Trade was the policy area that was most frequently subject to change and level of regulation the least. Interestingly, property rights and regulation have, on average, moved more frequently away from liberal regimes than toward them.

Table A3. Percentage of years of reform
(out of total number of country/years, 1995-2000, Heritage index)

	Trade	DFIs	Property rights	Regulation
"Anti liberalization"	7.9	3.5	6.8	4.9
No change	83.0	92.5	90.2	92.9
Liberalization	9.1	4.0	3.0	2.2
Total	100	100	100	100
Number of independent observations (country/ years)	838	838	838	836

Note: Transition countries not included. The number of observations on policy changes (reform) is less than the number of observations on levels of different policies (like level of trade restrictiveness) because observations on contiguous years are missing.

Results using the* World Bank *index. The World Bank index ranges from 1 to 6 and assesses "appropriateness" (quality) of policies. The index represents an average of six (XX:) individual policy indexes and thus the values cover the entire range, that is the values are practically continuous (and not discrete as in the case of other indexes). The average value of the index is 3.4 with the standard deviation of 0.9. The problem however is that all policies are bundled together and we lack information about individual policies on trade or regulation etc. Here too (Table A4) we notice that liberalization reforms were, on average, more common than "anti-liberalizations."

Table A4. Percentage of years of reform
(out of total number of country/years, 1976-2002, World Bank data)

"Anti-liberalization"	4.3
No change	90.8
Liberalization	4.9
Number of independent observations (country/years)	3784

Note: Transition countries not included.

Comparison of the three reform sources. The three sources of reform data are frequently not in agreement as to whether certain policy changes do represent a pro-liberalization reform or not. In principle, this may be due to either the differences in information about the actual policy changes undertaken by a country (*Free the world* and Heritage both rely on reporting of reforms by different sources, newspapers, wire-services, international financial organizations and their coverage and interpretation of

reforms may vary), or to different judgment between the reform sources themselves on whether a given policy measure does represent liberalization or not. It is impossible to say which factor is responsible for the disaggreements in codings but it is clear that the disagreements are substantial.

Table A5 illustrates the difference in the codings of trade reforms between the FTW and Heritage index (for the period after 1995). When a given country/year is coded as trade liberalization according to one index, it is about as likely that the same country/year will be coded liberalization as anti-liberalization according to the other index. For example, according to FTW, Niger in 1997 and Morocco and Uganda in 1998 liberalized trade, but according to Heritage they did the reverse. Similarly, Jamaica in 1996 and 1997 and Panama in 1998 lowered trade protection according to the Heritage index, but they did the reverse according to Free the World index. If we were to focus only on the cases of trade reforms where both sources (FTW and Heritage) agree the sample size would be negligible (of course, in part because the number of overlapping country/years is not great).

Table A5. Trade reforms according to FTW and Heritage index, 1995-2000

	Free the World index			
Heritage index	Anti-liberalization	No change	Liberalization	Total
Anti-liberalization	3	23	3	29
No change	204	2580	228	3012
Liberalization	6	50	4	60
Total	213	2653	235	3101

The situation is not much different when we compare what constitutes overall reform. Thus according to FTW, Costa Rica in 1985, Ghana in 1989 and Paraguay in 1986 have had liberalization reforms in three out of four areas. This should classify them as strong reformers. Yet according to the World Bank assessment, the quality of their policies in these same years deteriorated.

In the empirical part, we shall use only FTW index of reforms. The Heritage index covers too short a period of time and thus provides us with relatively few observations. Moreover the period it covers (1995-2002) may not be representative and surely differs from that of the 1980's. The disadvantage of the World Bank index is that it does not address the issue of trade reforms alone and leaves out developed countries.

[*Excursus*: Our formulation (12) is a straightforward first-difference equation. Birdsall, Behrmann and Szekely (2003) have the same formulation[40] as here but present also the first difference formulation of policy changes, or in other words the difference of differences formulation (with distributed lags over seven periods on the RHS; see their Table 5). That formulation is only apparently very different from the one adopted here. In effect, Birdsall et al. equations can be, omitting their other controls and using Git for their difference in logs of wages, written as

$$Iit - Ii,t-1 = \beta 0 + \beta 1 j\sum_{j}(Rijt - Rij,t-1) + \beta 2 j\sum_{j}(Rijt-1 - Rij,t-2) +$$
$$.... + \beta 7 j\sum_{j}(Rij,t-6 - Rij,t-7) + eit$$

But it can be readily seen that after collecting the terms, (8) can be written as

$$I_{it} - I_{it-1} = \beta_0 + \delta_{1jt-\tau}\sum_{j}\sum_{t} R_{ij,t-t} + e_{it}$$

which differs from (14) only by the introduction of the lagged reforms on the right-hand side.]

ANNEX 3. Summary of data from Occupational Wages around the World (OWW) and University of Texas Inequality Project (UTIP)

Country	Mean Gini_OWW	Standard deviation of Gini_OWW	Number of observations
Algeria	0.149	0.031	8
Angola	0.379	0.120	3
Argentina	0.383	0.130	5
Australia	0.154	0.032	14
Austria	0.185	0.021	17
Azerbaijan	0.531	0.029	4
Banglades	0.276	0.054	9
Barbados	0.228	0.020	12
Belarus	0.123	0.006	5
Belgium	0.090	0.009	16
Belize	0.317	0.023	12
Benin	0.386	0.033	5
Bolivia	0.384	0.038	11
Botswana	0.230	0.003	2
Brazil	0.235	0.000	1
Bulgaria	0.161	0.000	1
Burkina F	0.331	0.140	8
Burundi	0.417	0.033	8
Cambodia	0.375	0.149	7
Cameroon	0.387	0.091	7
Canada	0.134	0.010	3
Cape Verd	0.243	0.000	2
Chad	0.541	0.055	4
Chile	0.350	0.005	3
China	0.151	0.037	10
Colombia	0.365	0.063	2
Zair, Con	0.440	0.000	1
Costa Ric	0.131	0.086	3
Cote d'Iv	0.365	0.085	4
Croatia	0.193	0.000	1
Cuba	0.162	0.012	6
Cyprus	0.255	0.014	16
Czech Rep	0.134	0.023	7
Denmark	0.122	0.020	10
Djibouti	0.332	0.000	1
Estonia	0.219	0.014	4
Ethiopia	0.353	0.000	1
Fiji	0.310	0.020	4
Finland	0.134	0.017	14
Gabon	0.377	0.056	5
Germany	0.211	0.010	17
Ghana	0.361	0.000	1
Honduras	0.364	0.032	9
Hong Kong	0.208	0.040	16
Hungary	0.222	0.038	6

Iceland	0.103	0.022	16
India	0.295	0.148	16
Iran,Isla	0.143	0.000	1
Ireland	0.191	0.001	2
Italy	0.150	0.023	12
Japan	0.205	0.025	16
Korea, Republic	0.198	0.080	10
Kyrgyz Republic	0.301	0.015	4
Latvia	0.256	0.018	3
Lithuania	0.233	0.000	1
Luxembour	0.156	0.000	1
Madagasca	0.164	0.054	2
Malawi	0.452	0.050	6
Mali	0.317	0.000	1
Mauritius	0.306	0.017	16
Mexico	0.062	0.060	8
Moldova	0.193	0.040	6
Mozambique	0.306	0.000	1
Netherlan	0.116	0.008	7
New Zealand	0.206	0.014	7
Nicaragua	0.368	0.026	6
Niger	0.375	0.000	1
Nigeria	0.362	0.057	6
Norway	0.101	0.028	17
Papua New Guinea	0.316	0.005	2
Peru	0.351	0.055	11
Philippines	0.088	0.042	11
Poland	0.173	0.045	2
Portugal	0.140	0.088	13
Puerto Ri	0.191	0.056	16
Romania	0.214	0.065	12
Russian F	0.297	0.117	8
Senegal	0.264	0.000	1
Seychelle	0.259	0.056	6
Sierra Le	0.310	0.033	8
Singapore	0.309	0.020	15
Slovak Re	0.149	0.015	5
Slovenia	0.208	0.016	4
South Afr	0.138	0.057	2
Sri Lanka	0.208	0.053	17
Sudan	0.292	0.154	6
Suriname	0.234	0.016	4
Swaziland	0.266	0.068	4
Sweden	0.138	0.054	10
Syrian Ar	0.074	0.005	4
Thailand	0.306	0.042	5
Togo	0.337	0.068	5
Trinidad	0.250	0.023	7
Tunisia	0.214	0.152	6
Turkey	0.180	0.049	4

Uganda	0.481	0.000	1
Ukraine	0.305	0.025	3
United Ki	0.166	0.017	14
United St	0.218	0.045	16
Uruguay	0.258	0.028	7
Venezuela	0.262	0.023	6
Yugoslavia	0.176	0.023	10
Zambia	0.326	0.057	7

Country	Mean UTIP Theil	Standard deviation of Theils	Number of observations
Albania	0.074	0.121	8
Algeria	0.014	0.016	15
Angola	0.312	0.104	2
Argentina	0.051	0.010	11
Armenia	0.213	0.135	5
Australia	0.011	0.004	23
Austria	0.035	0.085	25
Azerbaija	0.038	0.024	5
Bahamas,	0.099	0.019	3
Bahrain	0.404	0.000	1
Banglades	0.035	0.020	18
Barbados	0.058	0.017	23
Belgium	0.027	0.001	18
Belize	0.106	0.010	2
Benin	0.074	0.014	7
Bolivia	0.071	0.032	25
Bosnia an	0.030	0.012	2
Botswana	0.059	0.015	15
Brazil	0.078	0.010	5
Bulgaria	0.025	0.030	24
Burkina F	0.033	0.012	9
Burundi	0.074	0.030	13
Cameroon	0.151	0.091	20
Canada	0.020	0.004	25
Cape Verd	0.005	0.004	2
Central A	0.065	0.028	17
Chile	0.066	0.019	25
China	0.003	0.001	7
Colombia	0.039	0.006	25
Congo, Re	0.114	0.023	8
Costa Ric	0.040	0.019	15
Cote d'Iv	0.074	0.009	13
Croatia	0.021	0.010	11
Cuba	0.005	0.001	13
Cyprus	0.036	0.009	25
Czech Rep	0.008	0.005	9
Denmark	0.007	0.001	24
Dominican	0.079	0.014	11
Ecuador	0.049	0.026	25
Egypt, Ar	0.039	0.023	25
El Salvad	0.050	0.035	17
Equatoria	0.089	0.018	2
Ethiopia	0.030	0.008	9
Fiji	0.051	0.031	21
Finland	0.011	0.001	25
France	0.016	0.002	17
Gabon	0.119	0.041	7
Gambia, T	0.037	0.011	8

Germany	0.011	0.000	18
Ghana	0.128	0.036	16
Greece	0.038	0.013	25
Guatemala	0.106	0.083	21
Haiti	0.046	0.008	14
Honduras	0.071	0.032	16
Hong Kong	0.011	0.007	25
Hungary	0.019	0.019	25
Iceland	0.043	0.032	22
India	0.084	0.010	20
Indonesia	0.075	0.020	19
Iran,Isla	0.021	0.020	18
Iraq	0.024	0.012	15
Ireland	0.031	0.018	24
Israel	0.058	0.014	22
Italy	0.016	0.005	24
Jamaica	0.182	0.119	15
Japan	0.036	0.017	25
Jordan	0.078	0.023	23
Kenya	0.075	0.014	24
Korea, Re	0.025	0.006	25
Kuwait	0.247	0.125	23
Kyrgyz Re	0.085	0.024	6
Latvia	0.009	0.009	6
Lesotho	0.106	0.062	7
Libya	0.032	0.037	6
Lithuania	0.071	0.052	5
Luxembour	0.014	0.003	20
Macedonia	0.043	0.023	10
Madagasca	0.031	0.018	14
Malawi	0.113	0.050	21
Malaysia	0.031	0.007	25
Malta	0.011	0.004	22
Mauritani	0.185	0.058	2
Mauritius	0.075	0.025	25
Mexico	0.029	0.010	25
Moldova	0.032	0.036	9
Mongolia	0.442	0.401	6
Morocco	0.081	0.014	24
Mozambiqu	0.175	0.123	7
Namibia	0.031	0.000	1
Nepal	0.068	0.028	9
Netherlan	0.009	0.002	25
New Zeala	0.021	0.015	22
Nicaragua	0.021	0.006	11
Nigeria	0.039	0.019	14
Norway	0.009	0.001	24
Oman	0.112	0.012	6
Pakistan	0.054	0.012	18
Panama	0.067	0.022	23

Papua New	0.099	0.031	15
Paraguay	0.013	0.000	1
Peru	0.083	0.035	12
Philippin	0.065	0.015	23
Poland	0.016	0.020	25
Portugal	0.032	0.006	15
Puerto Ri	0.082	0.040	15
Qatar	0.404	0.091	8
Romania	0.010	0.005	5
Russian F	0.058	0.009	6
Rwanda	0.039	0.009	6
Saudi Ara	0.185	0.000	1
Senegal	0.043	0.030	23
Seychelle	0.008	0.004	11
Sierra Le	0.188	0.134	2
Singapore	0.043	0.013	25
Slovak Re	0.016	0.006	6
Slovenia	0.017	0.007	12
Somalia	0.057	0.026	6
South Afr	0.062	0.007	25
Spain	0.029	0.007	25
Sri Lanka	0.053	0.013	16
Suriname	0.057	0.022	19
Swaziland	0.099	0.046	20
Sweden	0.008	0.010	25
Syrian Ar	0.055	0.057	24
Taiwan, C	0.016	0.003	23
Tanzania	0.063	0.026	13
Thailand	0.095	0.035	13
Togo	0.105	0.053	10
Trinidad	0.158	0.088	19
Tunisia	0.090	0.052	13
Turkey	0.047	0.019	24
Uganda	0.174	0.103	6
Ukraine	0.035	0.026	9
United Ki	0.016	0.002	25
United St	0.031	0.013	25
Uruguay	0.048	0.015	23
Venezuela	0.048	0.026	22
Yemen, Re	0.067	0.090	12
Yugoslavi	0.085	0.029	5
Zambia	0.077	0.015	6
Zimbabwe	0.054	0.030	24