



# How Does Trade Affect Regional Disparities?

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**Summary.** — Although the relationships between rising trade, economic growth, and international disparities have been well studied, those between trade and intranational disparities remain under-explored. In this paper, we present a theoretical formulation and empirical evaluation based on eight major world economies, finding that the link between trade and regional disparities is evidenced most strongly when sectoral shifts in trade composition are considered. As primary sector goods trade loses importance in the composition of total trade, regional disparities are likely to increase. This effect may have a greater negative impact on developing countries because the initial magnitude of intranational disparities tends to be greater in the developing world and its share of agricultural trade has historically been higher.

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## 1. INTRODUCTION

The relationship between trade and economic growth has spawned a large theoretical and empirical body of literature. Free trade is generally acknowledged to increase economic performance and national welfare in all but a handful of cases (Fischer, 2003; Pugel & Lindert, 2000; Sachs & Warner, 1995). Nevertheless, despite the existence of a relatively broad consensus among economists (see, however, Rodrik, 2003), there exist wide areas of debate about the general implications of trade. Perhaps one of the most obvious examples is the relation between trade and regional disparities. While both topics have received ample treatment in recent years, and while mainstream trade theory holds basic and fundamental implications for income inequalities *per se*, the relation between trade and spatial income disparities within trading countries has remained under-explored.

What is more, those few scholars who have addressed the issue in one way or another have tended to disagree. Within the new economic

geography school, discussion over how falling transport costs affect the wealth of different regions is central to the entire approach (see Krugman, 1991). Nevertheless, the differences in outcomes precipitated by relatively minor adjustments about the role of trade are considerable (contrast Krugman & Livas Elizondo, 1996 with Paluzie, 2001). And outside new economic geography, the traditional Heckscher–Ohlin (H–O) based models of trade might well lead, on the one hand, to declining disparities as trade evolves, if capital and investment look for the areas with the lowest cost base and if labor migrates to higher salary zones. Another

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possible outcome, on the other hand, is rising disparities, since the owners of abundant factors in trading countries will profit and scarce resource owners experience falling returns, at least in the medium term. The admittedly scant empirical research into the issue reflects these disagreements. Within the European Union, European integration is deemed to have contributed to a reduction of international disparities, while intranational disparities have, in contrast, widened (Esteban, 1994; Puga, 2002). For the United States, Silva and Leichenko (2004) report that increases in trade seem to be associated with a growth of inter and intrastate inequality, but that this outcome is far from being straightforward. Poorer rural areas and states generally benefit from cheaper exports, but are particularly hurt by cheaper imports. Richer urban areas and states, in contrast, benefit overall from cheaper exports and cheaper imports are associated with a rise in employment, but not in earnings (Leichenko & Silva, 2004; Silva & Leichenko, 2004). Empirical studies of the opening of the Mexican economy to trade have come out with similar results. For example, Hanson's (1992) study showed how a shift away from import substitution in Mexico precipitated a dispersion of manufacturing industry from Mexico city, conditions in principle conducive to a reduction in regional disparities. Yet the outcome has been the concentration of the country's most dynamic manufacturing industry along the US border (Hanson, 1996 or 1998) and greater divergence since the opening of the country to trade (Rodríguez-Pose & Sánchez-Reaza, 2005; Sánchez-Reaza & Rodríguez-Pose, 2002).

It is into these seeming conundrums that this paper is pitched. As globalization has been associated with a significant increase in trade across the world, understanding the interaction between trade and regional disparities has become particularly important, in order to be able to assess and address development problems in many areas of the world. Following an exposition of the major theoretical strands dealing with trade and their territorial implications, we focus in Sections 3 and 4 on the trends under discussion for eight major world economies—increasing trade flows in Section 3, and the evolution of intranational regional disparities in Section 4. In Section 5, we go on to examine the relationship between these two phenomena. We find evidence that changes in the composition of trade tend to precede changes in regional wealth. Specifically, as trade in primary sector

goods has declined as a proportion of total trade, regional disparities have tended to increase concurrently or soon afterwards in the majority of our case countries. We go on to discuss the possible implications of this link between changes in trade composition and regional disparities for developed and developing economies. Section 6 concludes.

## 2. THE SPATIAL IMPLICATIONS OF TRADE THEORIES

Trade theorists have never been particularly concerned with the evolution of regional disparities within countries.<sup>1</sup> Other factors such as the impact of trade on overall economic performance or the diffusion (or lack) of welfare provision have taken precedence over regional disparities. However, trade theories are by no means spatially neutral and implications for changes in the location of economic activity within countries can be, and have been, extracted from them.

This is, for example, the case of the New Economic Geography approach. In "*Trade Policy and the Third World Metropolis*," Krugman and Livas Elizondo (1996) explore the relationship between trade and regional disparities by outlining two sets of forces acting upon agglomerations in autarky. The first set refers to repellent forces created by urban diseconomies such as crime, congestion, pollution, and, importantly, high land costs in major cities. These forces act to repel industry from major conurbations and, by extension, to reduce regional disparities by spreading industry across more regions in the country.<sup>2</sup> On the other hand, they also outline two centripetal forces that attract firms, industries and workers together and form the basis of major (third world) conurbations. The first is forward linkages—the attraction of proximity to markets, be they other firms for input suppliers or the population in the cities for final goods producers. The second is backward linkages—the attraction of proximity to supplies of inputs and factors, such as labor, that are abundant in the cities. Moreover, these centripetal forces are self-reinforcing, ensuring that as a city grows, its attraction also increases as markets of suppliers and consumers swell even further, giving rise to the large metropolises that are so dominant in the third world.

However, when countries open to trade (or switch from import-substituting models of

development toward more export orientated approaches, as was the case of Mexico and other Latin American economies from the 1980s onward), the situation changes. As progressively more supplies are sourced from abroad, and more output is sold abroad, the attraction of forward and backward linkages is gradually diluted. Since it is costly to locate in urban areas due to continuing urban diseconomies of scale, the opening of trade therefore may result in a dispersal of manufacturing industry across the country, and, by extension, a reduction in regional disparities. From a different perspective, *Storper, Chen, and de Paolis (2002)* reach similar results. When analyzing the impact of growing trade in the European Union, they find that locational concentration appears not to have increased, with a rise in output in locationally spread sectors and a decline in concentrated industries (2002, p. 93).<sup>3</sup> Similarly, dispersion is higher where there are fewer external benefits to agglomeration, such as information. Hence, under a new economic geography framework, increases in manufacturing trade could well be associated with a decline in regional disparities.

Starting from a similar new economic geography approach, however, *Paluzie (2001)* reaches different conclusions about the implications of trade for regional disparities. While her assumptions are very similar to those of Krugman and Livas (two regions, two sectors, and an emphasis on the impact of trade policies on manufacturing location), Paluzie predicts that as trade in manufacturing increases, regional disparities will also generally rise. The main difference between Paluzie's conclusions with respect to those of Krugman and Livas lies in Paluzie's development of the agricultural sector and rural markets. She assumes that agriculture itself is tied to the land, by recognizing the immobility of agricultural inputs in comparison to those of manufacturing. And secondly, she substitutes the centrifugal force of high land costs and rents for the pull of the market potential of the dispersed agricultural population. In addition, in the short run, labor is relatively immobile. The result is that when the country opens to trade, imports and exports to and from the major cities expand the hinterland of these conurbations. No longer are firms and industries subject to the maximum size constraint imposed by the limited demand of domestic rural markets—they can sustain growth, and agglomeration, by servicing foreign demand, and making use of cheaper for-

eign inputs. The incentive to agglomerate therefore increases alongside the increased market potential that cities have access to through the opening of export and import markets (*Bliss, 1988; Edwards, 1993; Feder, 1983; Pack, 1988; Zhang & Zhang, 2003*). Similarly, rises in specialization across regions (*Combes & Lafourcade, 2002*), and the presence of heterogeneous households and imperfect labor mobility (*Kónya, 2001*) are likely to foster regional inequality. As a result, opening to manufacturing trade tends to increase the incentives for firms, and workers, to concentrate in large cities, thereby increasing regional disparities.<sup>4</sup>

The different territorial implications of new economic geography school approaches are therefore sourced from differences in the assumptions surrounding the agricultural sector. Paluzie finds that an increase in manufacturing trade would exacerbate regional disparities in a world where agriculture and agricultural workers were relatively immobile in relation to manufacturing. Although H-O approaches make no particular prediction about the evolution of regional disparities, some territorial implications can be extracted if we borrow some of Paluzie's assumptions. If agriculture is again tied to the land, while manufacturing is more mobile and subject to agglomerative forces, and assuming that the labor force is immobile and the cost of land remains stable, the distribution of these sectors is likely to be very uneven across a country from the outset. Moreover, trade in manufacturing in the H-O model benefits manufacturing workers, at least in the medium term, because their labor becomes relatively scarce and therefore more expensive. Since manufacturing workers are more concentrated than agricultural workers under our assumptions, this leads to an increase in regional disparities. It is the unequally distributed manufacturing sector that benefits, while the regional disparity-reducing effect of a geographically dispersed agricultural sector is progressively undermined, which may lead to rising regional income differentials. Conversely, if agricultural trade develops at the expense of manufacturing trade, then it is the agricultural workers who benefit, while manufacturing workers become relatively poorer. As trade favors agricultural workers and the owners of land, and they are more equally geographically distributed than manufacturing workers, the increase in income they enjoy acts to reduce regional income disparities. Concurrently, the contraction of the

manufacturing sector, which is concentrated in richer regions, brings these more prosperous regions closer to the regional income average—again reducing regional disparities. With the augmentation of some simple assumptions surrounding the agricultural sector, therefore, the H–O model predicts a rise in regional income disparities as the ratio of manufacturing to agricultural trade rises, in line with Paluzie's assumptions (albeit through very different lines of reasoning).

Nevertheless, these arguments can be critiqued by noting that those agricultural *suppliers* that participate in international trade may very well not transmit the gains from trade to agricultural *workers*. Similarly, urban manufacturing firms may absorb the gains from trade and not raise wages as trade increases. This would sever the link between trade liberalization and wages, instead of establishing a link between trade and profits. In monopsonistic labor markets, which characterize export sectors in the third world in particular, this critique is especially pertinent. For example, in the context of Vietnam, Litchfield, MuCulloch, and Winters (2003) find that for the country as a whole a one standard deviation increase in rice output increases the chance of individuals in the output-increasing region escaping poverty by 75%, but in the Mekong Delta, where large export orientated firms dominate the industrial composition, the same increase in output increases the chance of escaping poverty by only 5%.

Against this, however, four counter-claims can be levied. First, if it is the case that suppliers begin to enjoy higher profits, this may be expected to attract other profit-seeking firms, which may set in motion a degree of labor competition that can inflate wages. Admittedly, local firms may find barriers to entry too restrictive, but MNCs are less likely to have difficulty in overcoming investment barriers to profitable markets, rendering them potentially more mobile and therefore more potent catalysts for labor competition (see Görg & Strobl, 2003; Lane, 1998). What is more, while MNCs may be quick to enter a profitable market, there is less evidence to suggest that they are quick to abandon markets that have slowed or stagnated, contrary to popular belief (Barry & Bradley, 1997; Görg & Strobl, 2003; Mudambi, 1998). This suggests that MNCs may not only be more capable competitors than local firms, but also more durable conduits of labor competition.

Second, even if local markets are characterized by a single large firm and a number of much smaller, perhaps individual, agricultural suppliers, if export prices rise and the large firm consequently directs more output abroad, relative local scarcity may result as a secondary effect. This cross-price substitution effect may leave a greater proportion of the local market available to local producers, allowing them to increase their own revenues by filling the gap that increasing MNC exports leaves behind, and re-establishing the link between international trade and local wages. Third, Litchfield *et al.* (2003) themselves point out the equivalence between, on the one hand, wages and earnings in a situation of multiple single suppliers, and, on the other, *hours worked* in a situation of a large dominant supplier. What the industrial configuration precludes on the one hand by stunting wage growth, it may make up on the other by increasing the hours available to work. Fourth, again in the context of Vietnam, Hertel, Ivanic, Preckel, Cranfield, and Martin (2003) emphasize the fact that, while large firms may absorb the gains from trade in an expanding sector, they can also be relatively less mobile than individual workers in a contracting sector. This is especially the case of landowners whose land capital is difficult to be sold. The relative immobility of landowners in Vietnam has meant that as manufacturing has expanded, it is this group that has been left to absorb the majority of losses in the agricultural sector, contributing to a decline in income inequalities.

We proceed, then, with the assumption that an increase in exports in a particular sector can contribute to an increase in the regional wealth associated with this sector. If agricultural labor is tied to the land, then these gains may benefit manufacturing workers at their expense, while, in contrast, if the assumption of the lack of mobility of labor is relaxed, the outcome could be significantly different. A rise in manufacturing trade would indeed, in the first instance, benefit manufacturing workers, but would at the same time entice agricultural workers to move to manufacturing areas and become employed in manufacturing. Given relatively low barriers to entry, this would in the medium term generate a relative drop in manufacturing wages. At the same time, congestion in urban manufacturing areas, and lower land and labor costs in rural areas, is likely to lure manufacturing firms into more distant locations, contributing to a factor–price equaliza-

tion process, whose ultimate outcome is likely to be a reduction in regional disparities.

Admittedly, the theoretical literature on trade offers only patchy and inconsistent inferences about the impact of trade on regional disparities. There are some common denominators, however. Most importantly, both the new economic geography school and our extended H–O model emphasize the effect of trade *composition* on regional disparities, rather than trade *per se*.<sup>5</sup> From this point onward, it seems to be the assumptions that surround the relationship between trade in agriculture and trade in manufacturing that may hold a greater sway over the evolution of regional disparities. If agricultural production and workers are assumed to be less mobile than those of manufacturing, then Paluzie (2001) and the H–O model we have discussed first might predict rising disparities as manufacturing trade increases. On the other hand, if the lack of mobility assumptions in the primary sector are relaxed, new economic geography models à la Krugman and Livas Elizondo (1996) and some H–O analyses could result in falling disparities as manufacturing trade develops.

Of course, there are some important caveats to all of these arguments. We are focusing on only a relatively narrow range of economic mechanisms that operate in a complex real world environment. Hence, both the new economic geography school and the H–O model tend to abstract from important factors such as the availability of information, including information about prices, which has its own particular geography and may well be country-specific. The relative size of the agricultural and manufacturing sectors is also likely to be important. Hertel *et al.* (2003) compare the poverty-reducing potential of trade liberalization between Chile, a developing country with a relatively small agricultural sector, and Malawi, whose agricultural sector is much more important. They find that the poverty-reducing effects of agricultural liberalization are out-weighed by labor in-movement to the agricultural sector in Chile, while in Malawi, the gains are substantial enough to survive the diluting effect of sectoral labor migration. The arguments also implicitly operate within a two-country analytical framework, which does not take account of the strategic aspects of trade that result from three-or-more-country interaction. Finally, the importance of domestic transport costs should not be underestimated. As Krugman (1991) has argued, the level of

transport costs mediates the influence of agglomerative pressures in complex, non-linear ways. If transport costs are very low, then it is unreasonable to expect significant urban concentration in spite of increasing manufacturing trade, for example.

Nevertheless, the salience of the issue of factor mobility is confirmed by long-standing debates within development economics. Most prominently, the Lewis model (Lewis, 1954) posits that high economic growth trajectories depend upon relatively free movements of labor across sectors, so that in-coming labor from the “subsistence” sector can respond to high wages in the “capitalist” sector, thus supporting domestic saving and growth. We can infer, then, that the Lewis model suggests that if trade is stimulated, the potential gains this may introduce depend upon intersectoral labor transfer. This discussion has also highlighted the centrality of factor mobility to the likely impact of trade liberalization. While Lewis himself went further, however, and was happy to assume such mobility, our research in the following sections questions this assumption.

The following two sections of this paper set out the trends under discussion—increasing trade flows (and their composition) in Section 3 and rising regional disparities in Section 4. Section 5 then examines how these trends interact, and the implications for developed and developing countries.

### 3. INCREASING TRADE FLOWS

By any number of measures, the increase in trade flows over the last three decades has been dramatic and pervasive. Trade in manufacturing, in services, both exports and imports and merchandise trade, as well as foreign direct investment, have all shown remarkable acceleration since at least the start of the 1980s. Importantly, trade has not only increased, but also begun to account for an increasing proportion of production. Increasing trade has led to a dilution of the traditional three-centered pattern of international trade, drawing increasingly far-flung countries into the mainstream trading community. This can be seen especially clearly in the case of the emerging East Asian Economies in the mid to late 1990s. But a similar reorientation to the world economy has occurred across Latin America as import-substituting models of development were abandoned in favor of more export-orientated

ones over the period. Hence, Argentina, Brazil, Chile, Mexico, and Peru have all entered into far closer trading relationships than before the 1980s, when import substitution prevailed. Moreover, both China and India have explicitly attempted to open their economies since 1978 and 1991, respectively—with all the implications that the opening of such huge countries entails. Alongside this, the transition of Eastern Europe and the demise of the former USSR have also contributed to rising trade flows. And, within Europe, on-going economic and social integration has propelled trade both between the European partners and outside the European region.

Taken together it is no surprise that these developments have caused trade to rise dramatically in recent years. Figure 1 shows the rise in global trade as a percentage of world GDP. From 1970 to 2001, the percentage of world output that was traded between countries rose from 27% to just under 60%, with the biggest increase taking place during the 1990s.

Figure 2 shows the proportion of output traded by the eight countries that form the basis of this paper. These countries accounted collectively for 36% of world exports and 41% of world imports of merchandise in 2004, rendering them reasonably representative of global experiences (World Trade Organization data, 2005). Their joint average level of trade as a percentage of GDP in 2000 was very close to the world average (World Development Indicators, 2000). Nevertheless, the selection is also intended to capture a degree of diversity, spanning democratic and non-democratic, rich and poor, North and South countries. From Figure 2, we can discern a consistent increase in output

traded across the period. The average proportion of output traded in our sample rose from 23.5% in 1975 to 47% in 2000—once again a doubling over the period. Some of our chosen countries might be expected to show smaller trade shares than the world in general, simply because they are relatively large economies with large internal markets. In the case of the United States, for example, only one quarter of its output is traded externally because so many of its needs are met within its national boundaries. In any case, our sample of countries mirrors the world trend toward increasing trade flows. In the cases of China, Mexico, and Spain, the growth of trade as a percentage of national GDP well exceeds the world average. In other cases, such as Brazil, India, Italy, Germany, or the United States, the expansion of trade is more moderate, although key political decisions such as the single European Market contributed to boost trade in the 1990s in the cases of Germany and Italy, while economic reform in 1991 had a similar effect for India.

Not only has the volume of trade increased, but its composition has also shifted—a feature that takes on considerable significance in the light of the theoretical discussion in Section 2. Figure 3 shows the growth in agricultural and manufacturing trade in the world economy since 1970. Although both sectors started from different positions, agricultural trade expanded alongside manufacturing trade for most of the period. This despite the on-going trade liberalization of manufactures while agricultural products remained largely protected. By the mid-1990s, however, agricultural trade could not keep pace with manufacturing, partially as a result of the sectorally biased nature of

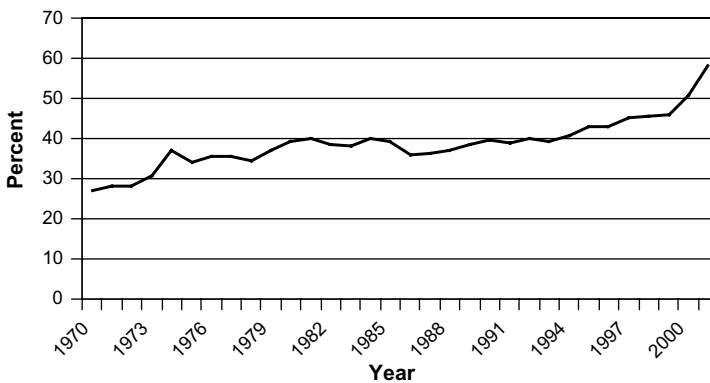


Figure 1. Global trade as a percentage of world output. Source: Own development, using World Bank, World Development Indicators data.

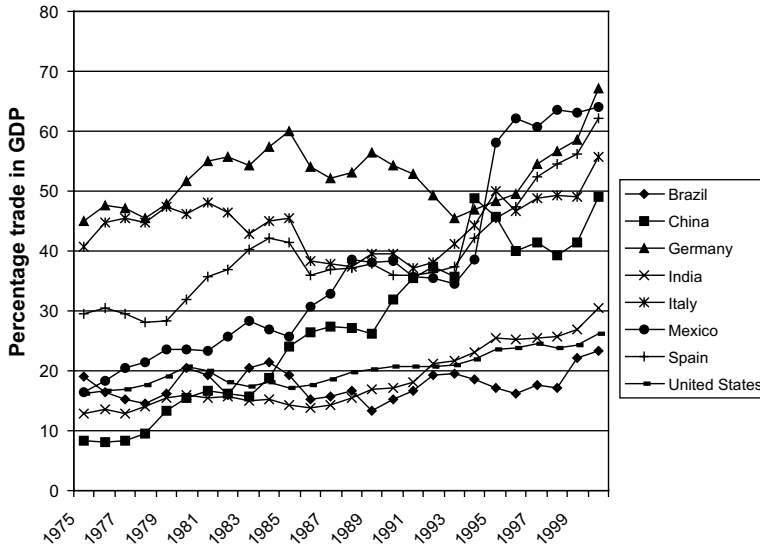


Figure 2. Trade as a percentage of GDP in the sample countries. Source: Own development, using World Bank, World Development Indicators data.

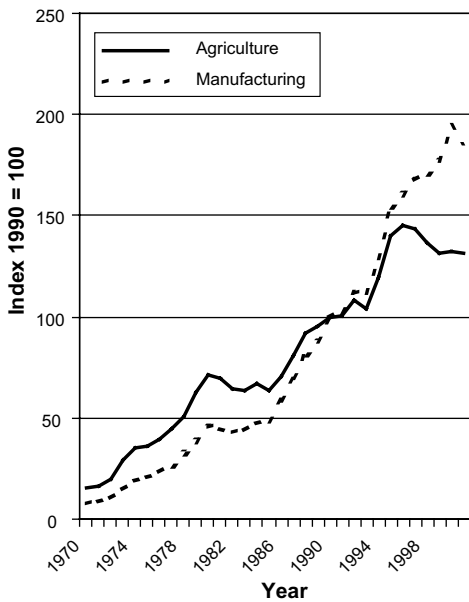


Figure 3. Evolution of world trade in agricultural and manufacturing products. Source: Own development, using World Trade Organization (2001) data.

trade liberalization initiatives. According to Jank, Fuchsloch, and Kutas (2003), in the case of tariffs that are weighted by trade volumes,

when both Brazil and the US export their agricultural products they are likely to face double the level of protectionism on average than when attempting to export their industrial goods (see also Gibson, Wainio, Whitley, & Bohman, 2001). In the developed world, this protectionism is the result of peculiarly well-organized agricultural interest groups, alongside the perceived strategic importance of food sources. In the developing world, the fact that many agricultural exporters actually only export a narrow range of products means that the domestic agricultural sector is no more capable of meeting domestic demand than in the developed world. Concerns over food security are coupled with a degree of aversion to food dependence on countries with food surpluses, especially if these surpluses belong to developed countries with over-production policies, which already hold the upper hand in trade negotiations. Hence, “[D]espite the achievements of [recent liberalization initiatives], agriculture continues to be the most protected sector in the world economy” (Jank et al., 2003, p. 11).

The relative weight of agricultural trade has therefore been progressively undermined by the rising importance of trade in manufacturing, and later, in services. Figure 4 shows the evolution of the ratio of agricultural to manufacturing exports for each of our eight chosen

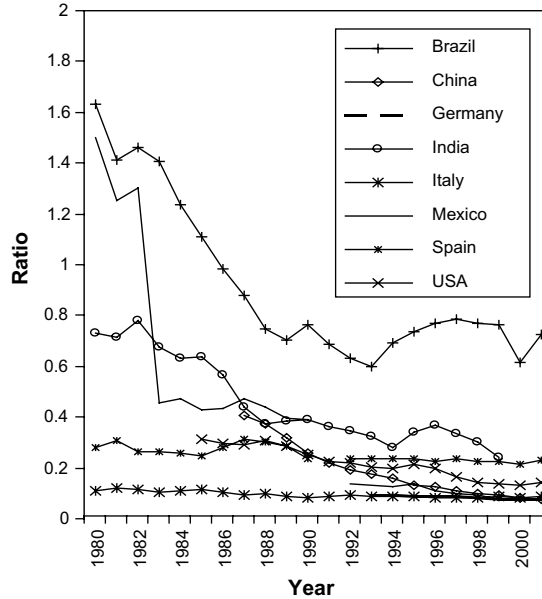


Figure 4. Agricultural to manufacturing export ratios for our eight case countries. Source: Own development, using Comtrade, United Nations Statistics Division data.

countries.<sup>6</sup> As is readily apparent, the proportion of agriculture to manufacturing has fallen steadily since 1980 on average. For example, Brazil's ratio fell from 1.6 in 1980 to below parity in 1985 and stood at just over 0.7 in 2001 (Figure 4). This means that for every unit of manufactures exported from Brazil, under half the value of agricultural products were exported in 2001 as in 1980. China experienced a similar decline, from 0.75 in 1980 to over 0.4 in 1987 to just 0.08 in 2001. The most spectacular change, however, has taken place in Mexico, where the agricultural to manufacturing trade ratio fell from 1.49 in 1980 to 0.07 in 2001. On a less pronounced scale, the developed countries in the sample underwent similar changes, although for them, the ratio of agricultural to manufacturing exports was already so small as to make further reductions less likely. Hence, during 1980–2001, Italy saw its ratio of agricultural to manufacturing exports fall from 0.11 to 0.085, and Spain also experienced a steady decline, from 0.28 to 0.23. Indeed, in every case, our chosen countries exhibited some reduction of the ratio of their agricultural to manufacturing export values as manufacturing trade experienced liberalization, while agricultural products remained highly protected (see Pugel & Lindert, 2000).

To summarize the above discussion, two major points of interest can be drawn out that will be useful for our analysis in Section 5. The first is that trade in general increased dramatically since 1980, and that this increase was sourced from a variety of areas of the world, with few exceptions. Relative to production, trade doubled since 1970 and, without considering production, the absolute value of trade increased 14-fold since 1950. The second notable feature of the trends outlined is that agricultural trade did not increase to the extent that manufacturing trade did. This may largely be a result of the biased trade liberalization initiatives that the WTO (formerly GATT) has implemented over the period. Again, this is a pervasive trend on the evidence of our case countries, and has led to a lessening of the relative importance of agricultural exports.

#### 4. THE INCREASE IN REGIONAL DISPARITIES

While the trend toward increasing trade flows is well known, the trend toward increasing regional disparities is less well documented, and yet almost equally as pervasive. Regional disparities in most countries are either stable or



increasing with remarkably few exceptions (Rodríguez-Pose & Gill, 2004a). Table 1 documents this phenomenon for our case countries. The evolution of the variance of the natural logarithm of regional GDP per capita is charted for each of them.

Several important factors emerge from the results of Table 1. First is the different dimension of regional disparities in developing and in developed countries. Regional disparities are considerably larger in the four developing countries included in our sample. In the United States and especially in Western Germany, in contrast, intraregional differences in wealth are much less noteworthy. Italy and Spain belong to an intermediate category. Nevertheless, internal imbalances in Italy in 2000—the developed country with the highest intranational wealth gap among our cases—are close to 50% lower than those found in India, and less than half those of Brazil or China.

The second factor worth highlighting is the general tendency toward increases in the variation between regional GDPs within countries. Regional disparities have risen in all our case countries since 1980, with the exception of Brazil and Germany. The strength of the trend varies substantially, with India, the United States, and Mexico displaying the greatest rates of divergence, with disparities increasing by 40.8%, 15.4%, and 14.9%, respectively, over the period during 1980–2000. At the other ex-

treme, China shows the weakest increase—only a 0.6% change—largely resulting from a strong decline in disparities during the 1980s, when its variance of regional GDPs fell from 0.578 to 0.483. The trend was completely reversed in the following decade.

The only exceptions to the general rule of rising disparities are Brazil and Germany. In Germany the reduction of regional inequalities during the 1990s represents a reversal of its moderately divergent trend during 1980–90 and can be almost entirely attributed to German reunification. Reunification led to a sharp drop in disparities between the Länder of the former Federal Republic of Germany during 1990–91. Since then, regional disparities among western regions of the country have followed a rising trend (see Figure 5). Brazil, despite the notorious power of its state governments (Rodden, 2003; Rodríguez-Pose & Gill, 2004b), is a more genuine case of reduction in regional disparities. Its internal differences in 1980 made Brazil the most unequal country in the world. A sharp decline in regional disparities followed during 1980–82 and since then the evolution of disparities has fluctuated erratically, with a tendency to increase until 1994, followed by a decline in the last five years of the century.

The timing of increases in regional disparities also varies between developed and developing countries. The greatest increase in Germany, Italy, and the United States took place during

Table 1. *Variance of the log of regional GDP per capita*

	Year			% Change		
	1980	1990	2000	1980–90	1990–2000	1980–2000
<i>Developing countries</i>						
China	0.578	0.483	0.581 <sup>a</sup>	–16.31	20.20	0.60
India	0.273 <sup>b</sup>	0.312	0.385 <sup>a</sup>	14.00	23.52	40.81
Mexico	0.376	0.388	0.432 <sup>a</sup>	3.28	11.18	14.82
Brazil	0.601	0.556	0.553 <sup>a</sup>	–7.56	–0.46	–7.98
<i>Developed countries</i>						
United States	0.143 <sup>c</sup>	0.175	0.165	22.19	–6.03	14.83
Germany	0.094	0.096	0.088 <sup>d</sup>	2.03	–8.43	–6.57
Italy	0.265	0.269	0.268	1.48	–0.23	1.25
Spain	0.207	0.199	0.219 <sup>d</sup>	–3.87	9.82	5.58

The analysis is conducted for only the 14 most populous states in India, for the Länder of the former Federal Republic of Germany and Berlin West in Germany, for the 48 contiguous continental states in the United States, excluding Alaska, Hawaii and the District of Columbia, and without the North African enclaves of Ceuta and Melilla in the case of Spain.

<sup>a</sup> 1999.

<sup>b</sup> 1981.

<sup>c</sup> 1977.

<sup>d</sup> 2001.

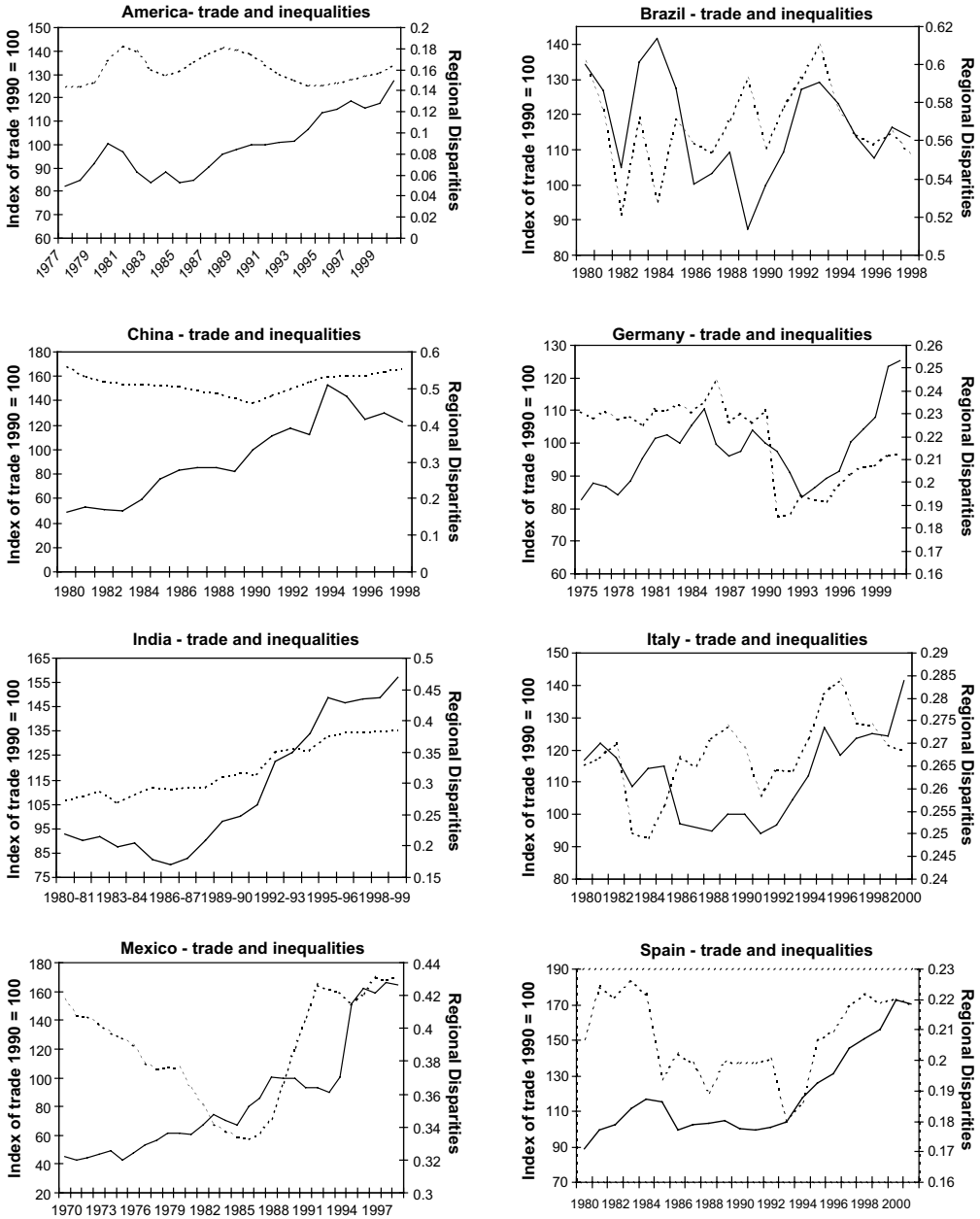


Figure 5. Changes in trade as a percentage of GDP and in regional disparities.

the 1980s, with the 1990s displaying moderate declines in all three countries. Spain is the only exception among the developed countries in the sample, as regional disparities increased considerably in the 1990s. Among the four developing

countries included in our sample, however, the trend has been toward an acceleration of the growth of regional disparities in the 1990s with respect to the 1980s, coinciding also with a greater openness of these countries to trade.

In Brazil the trend has been toward a deceleration of the regional convergence process.

One further observation relating to Table 1 is worth noting. While trade as a percentage of GDP increased for all our eight case countries without showing a marked pattern between developed and developing countries (see Figure 2), it is the sectoral trade ratio charted in Figure 4 that seems to exhibit some temporal coincidence with rising regional disparities. Specifically, all four developing countries in Figure 4, as well as the United States, experienced sharp declines in their agricultural to manufacturing export ratios, in part because their agricultural exports were more significant initially. It is our intention in this paper to explore the link between changes in agriculture to manufacturing export ratios and the evolution of regional disparities more closely.

In short, this section has established a common and general trend toward divergence, or at least a discontinuity of convergence, across our case countries. Numerous factors may affect the evolution of regional disparities, including the global trend toward devolution (Rodríguez-Pose & Gill, 2003), factor trading and nationally based policies. It is our aim in the next section to establish whether trade and trade composition also play some part in determining spatial disparities.

## 5. A RELATIONSHIP BETWEEN TRADE AND REGIONAL DISPARITIES?

### (a) *Trade and regional disparities*

In this section, we examine to what extent there is a link between trade and regional disparities and attempt to establish the direction of that relationship. Firstly, we analyze the relationship between the volume of trade a country conducts and its level of spatial disparities. Following this, we examine the relationship between the composition of trade and regional disparities, run some basic tests concerning the robustness of our findings, and finally discuss these results at the end of the section. Figure 5 documents the correlation between the evolution of the coefficient of variation of the natural logarithm of regional GDP per capita and that of the percentage of output traded for our eight case countries. The dashed line represents the evolution of regional disparities, whose scale is depicted on the right-*y*-axis. The continuous line represents a trade index

where 1990 trade levels are set to 100. The scale is represented on the left-*y*-axis.

While, at first sight, there seems to be some evidence of a relationship between trade and regional disparities in a few of the cases—such as in Italy, India, and perhaps Brazil—the majority of countries display no such correlation. In the United States, disparities vary only slightly, while trade increases throughout the period, and in China disparities fall and then increase as trade increases. Mexico and Spain follow a similar pattern to China, with falling and then rising disparities as trade increases. And in Germany, there is little sign of any association between the increase in trade from 1975 to 1989 and the evolution of regional disparities, although after the exogenous shocks resulting from reunification during the late 1980s and early 1990s some positive correlation between the two variables is evident. In general, then, there seems to be no consistent evidence of a relationship between trade and regional disparities, and no agreement, where a relationship is suggested, over its direction. This lack of overall relationship was confirmed by preliminary multivariate analyses that showed no relationship between both indicators in any of the eight sample countries.

In terms of the theoretical discussion of Section 2, the lack of a consistent relationship between regional disparities and trade should come as no surprise. All the theories and ideas that were discussed had the common feature of emphasizing the sectoral composition of trade as a determinant of regional disparities. Most theories that link trade and territorial inequality assume two sectors and make predictions, either implicitly or explicitly, based on relative trade shares between manufacturing and agricultural imports and exports. As seen in Section 3, even as recently as 2001, agriculture played an important part in the export mixes of our case countries. The ratio of agricultural to manufacturing exports stood, on average, at over 0.2. Clearly, the importance of recognizing the differences between these two sectors has not diminished. It is vital, therefore, to test not only the evolution of trade flows, but also the evolution of the composition of trade. Only when these two factors are taken together is the theory given a fair chance.

### (b) *Trade composition and regional disparities*

The question we now address is whether or not trade composition has any effect on

regional disparities and here we turn to developing a simple model that seeks to examine the relationship between trade and disparities. The first point to note is that trade composition cannot have an effect on regional disparities if there is no trade. Hence, in order to answer our question, we have to take into account the degree to which a country is involved in trade: the influence of trade composition is *contingent* upon the importance of trade itself. If there is little involvement, then trade composition cannot be expected to be important to domestic economics, and therefore have an influence on determining regional disparities. In order to assess the impact of trade composition on regional disparities, an index of trade composition, *weighted* by the degree to which a country trades, is proposed.

For our measure of trade composition, we focus on the ratio of primary to secondary sector exports. Exports are more useful than imports for our purposes, since all the theories and ideas discussed in Section 2 are essentially supply-side arguments and it is exports that are sourced from domestic industry. We define primary (or agricultural) and secondary (or manufacturing) traded commodities using the criteria set up in endnote 6. By dividing the change in the share of primary exports by the change in the share of secondary exports and weighting the result by the percentage of GDP traded by each of our case countries during the period taken into consideration, a simple index of the agricultural to manufacturing export ratio is obtained. This trade composition index captures the basic aspects of the models and ideas discussed in Section 2, and by plotting the change in the index against regional disparities we obtain some notion of how relevant—and in what ways—the evolution of the size and the composition of trade is for determining regional disparities.

The index is constructed in the following way<sup>7</sup>:

$$TCI_{t-0} = \left[ 1 - \frac{AE_t/ME_t}{AE_0/ME_0} \right] \cdot \left[ \frac{[(T_0/GDP_0) \cdot 100] + [(T_t/GDP_t) \cdot 100]}{2} \right],$$

where  $TCI$  is the trade composition index,  $AE$  denotes agricultural exports,  $ME$  denotes manufacturing exports,  $T$  represents total trade,  $GDP$  the total GDP of a country, and 0 and  $t$  represent the beginning and the end of the period of analysis, respectively.

The index utilizes export data, rather than imports, because export industries are the ones that will largely determine domestic employment and wage patterns, which in turn contribute to determine the degree of regional disparities that we are seeking to predict. The first half of the index captures the changing export composition in each of the eight countries included in the analysis. If the agricultural to manufacturing export ratio increases, the index falls, since this term will be negative. If, on the other hand, there is a decline in the ratio of agricultural exports to manufacturing exports, then the index rises. The second half of the index represents the average proportion of GDP traded during the period of analysis. The higher the level of trade, the greater the dimension of the index in absolute numbers.

Taking three fictitious examples, imagine first that country  $A$  conducts equal amounts of trade in manufacturing and agriculture so that during 1995–2000, this ratio remains the same. Imagine further that country  $A$  experiences a large increase in the amount of trade conducted over the period. The fact that the ratio between manufacturing and agricultural trade has remained constant renders the first term in our index equal to zero. Given this, no amount of change in the degree of trade undertaken by country  $A$  during 1995–2000 will impact upon the index: the trade undertaken is balanced between sectors, and therefore the index predicts that there will be no regional disparity effects, as per our theoretical discussion. Now consider country  $B$ , which increases its manufacturing share in trade during 1995–2000 significantly, from equality with agriculture in 1995 to complete dominance in 2000. The first term in the index will now be equal to 1. Assume further, however, that the actual amount of trade that country  $B$  conducts during 1995–2000 is very small in both years. This means that the second term in the index will be close to zero, so that the index will again yield a low result. This means that our predictor of the inequality-increasing effect of a rise in the importance of manufacturing over agricultural trade will be low, not because manufacturing trade is not expected to lead to higher disparities, but because very little trade *per se* is undertaken, despite the preponderance of manufacturing. Finally, country  $C$  experiences a similar increase in the importance of manufacturing trade relative to agricultural trade across the period, but country  $C$  is consistently involved in a large amount of trade. In this case, both the first and second

terms of the index will be high, and the index will therefore yield a result close to one, indicating that because trade is important and because manufacturing has come to dominate, the index predicts an increase in regional disparities. Charting the accuracy with which the index predicts actual regional disparities will subsequently concern us, and if we do discover that there is some correlation, this might support our hypothesis that trade composition, contingent upon the importance of trade, affects regional inequalities.

An immediate critique of the index, however, is the embodied assumption that trade *per se* does not determine disparities. The index only allows trade to have an effect if the ratio between agricultural and manufacturing trade alters, as country *A*'s case illustrates. In their study of China, Zhang and Zhang (2003) found that after domestic capital, trade was the single most important determinant of regional disparities during 1986–98 out of various factors including foreign capital inflows, education, and geographic location. Two points should be noted in response to this, however. Firstly, Zhang and Zhang (2003) did not consider the composition of trade in reaching this conclusion, and it may be the case that trade composition actually underpins some of the effects they have attributed to trade itself. Secondly, though, it is certainly not our intention to explain the entire variation of regional incomes with our simple composition index. It may certainly be the case that trade *per se* also has a determining aspect—all we are hoping to find is a correlation between our index and regional disparities, not an exhaustive causal relation.

Related to this, we certainly do not wish to deny the salience of other potentially important determinants of regional disparities. Henderson and Wang (2005) underline the importance of city formation trajectories, savings rates, the relative size of rural and urban sectors, human capital, migration costs, and wealth and ability distributions in their discussion of urbanization, and there can be little doubt over their collective importance to regional disparities. Similarly, Arbache, Dickerson, and Green (2003) emphasize education and technological change, and Rodríguez-Pose and Gill (2003, 2004a) have examined the importance of governmental structures and devolution. While these are important factors affecting the evolution of disparities, we would emphasize that regional economic disparities remain relatively

poorly understood, and that the investigation and establishment of the *range of* factors that determine their magnitude remains crucially important.

The results of the comparison between the trade composition index and actual regional disparities for three to four year periods are plotted for each of our case countries in Figure 6. We are looking for three things.

First, if there is no correlation between regional disparities and the index, then trade composition may not have an influence in determining spatial disparities (null hypothesis). Secondly, if there is a negative correlation between the evolution of the trade composition index and that of regional disparities, this would indicate that as the agricultural to manufacturing export ratio fell, regional disparities also tended to fall (hypothesis one). This finding would be consistent with Krugman and Livas Elizondo's (1996) and some H–O arguments, as generally poorer agricultural areas would benefit more from the relative expansion of agricultural trade. And third, if there is a positive relationship—disparities rise as the trade composition index rises—this would mean that a fall in agricultural relative to manufacturing exports is associated with a rise in regional disparities (hypothesis two). This could be taken as a support for both Paluzie's (2001) ideas and some of the simple extensions of the H–O theory set out in Section 2. This relationship is charted in Figure 6, where the change in regional disparities is represented by a dashed line (with values plotted on the right hand side of *y*-axis), and the trade composition index by a solid line in each of the following graphs (with values plotted on the left hand side of *y*-axis).<sup>8</sup>

The inspection of the graphs in Figure 6 suggests a consistent relationship between regional disparities and the trade composition index. In most cases, changes in the index (solid line) match and frequently precede changes in the evolution of regional disparities (dashed line). That is the case, for example, in India, Italy, and Spain, where regional disparities seem to follow the pattern traced out by the index across numerous pits and troughs. In Brazil and China, the index initially increases and then falls, and regional disparities mirror this trend after a certain lag. In the United States, after an early period where there is no clear connection, a falling index is accompanied by falling disparities during the late 1980s, and then rising disparities accompany a rising index thereafter. And in Mexico, since the opening of

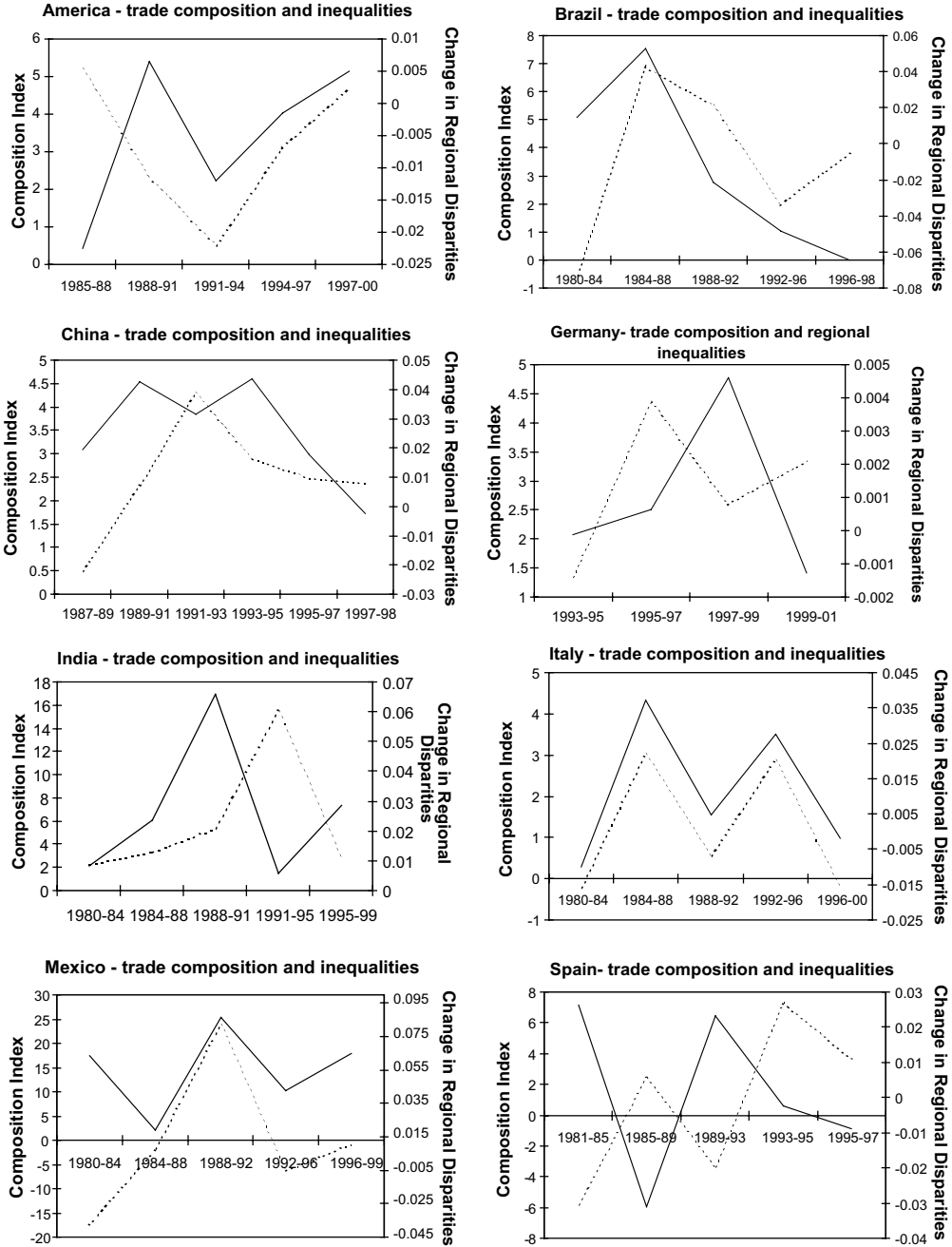


Figure 6. The link between changes in the trade composition index and the evolution of regional disparities.

the country to trade in the mid-1980s, the evolution of regional disparities follows a similar pattern to that of the index. Germany displays

the weakest association between changes in the trade composition index and the evolution of regional disparities, with the index seemingly fol-

lowing trends in disparities, which runs counter to the causality that seems to emerge from other countries. Overall, it could be said that the graphs in Figure 6 are highly suggestive of our second hypothesis. Increases in trade, combined with a progressive shift from trade in agriculture, fisheries, and raw materials to trade in manufacturing seem to precede a rise in regional disparities. Preliminary statistical analyses using ARIMA time series analyses seem to confirm this evidence for our case studies, with changes in the trade index having an impact on the evolution of regional disparities in Italy after one year, in India after two, in Spain after one year, but only after 1985, in Brazil during 1985–98, in Mexico from 1985, and in the United States from 1990 onward after one year. Germany is, once again, the only exception, as no statistical association is evidenced.

A reasonable objection to this sort of analysis is that of omitted variable bias, that is, both changes in the composition of trade and regional disparities may be driven by other factors, such as changes in GDP, especially given the seemingly cyclical nature of some of the fluctuations. However, having run comparisons of both the trade composition index to GDP (see Appendix 1) and regional disparities to GDP (Appendix 2) for each country, such relation seems much less evident than that between changes in the composition of trade and regional disparities. Only in the Mexican case was there a possibility that changes in GDP were driving both changes in the sectoral composition of trade and the evolution of regional disparities. In the cases of Brazil, Germany, India, Italy, Spain, and the United States, there was no consistent relationship between GDP and either of the variables, and in China, the changes in the index and regional disparities appeared correlated but changes in the index came before the GDP changes.

Another potential critique is that not only changes in the composition of trade may have an influence on regional disparities, but also that the evolution of regional disparities may have an impact on changes in trade composition. This refers to the lagging of the two variable series in Figure 6. In some countries, such as Italy and Mexico, there appears to be a close association without a significant lag, while in other countries, such as Spain and India, there is a clear delay in the reaction of inequalities to trade composition. Aside from the case of Germany, which does not support our hypothesis

that inequalities follow trade composition (and also is charted over the shortest time period), these two situations represent two separate relations between the two variables charted. How can we account for this?

A simple answer would concern the grouping of the various years in the analysis. For the purposes of consistency, we have tried to use a uniform system of averaging across years, as the data allowed. So, for example, Brazil, Italy, Mexico, and India all begin in 1980 and use four year increments. But there is nothing to suggest that the temporal relation between inequality and trade composition is synchronous across these countries; so in some instances we may have separated the action and reaction of the two variables, while in other cases we may have united the two trends. Having tried various ways of grouping the data between years, it is clear that some degree of averaging is necessary in order to smooth the trends in both variables and abstract from short-run fluctuations. It is unfortunate, however, that in order to do so, some of the lags between trade composition and inequalities may have been obscured.

Nevertheless, at a theoretical level, the question of which factors determine the length of the lag between trade composition and inequality is an important one. The degree to which the export sector is connected to the wider economy by ties such as investment sensitivity, inflationary pressure, government actions and reactions, and information transmission may hold some clues. Similarly, the structural characteristics of economies experiencing changes in export composition, such as the ease of hiring and firing, the strength of trade union movements, and the ease of finding new employment may also play a role. Moreover, a further determinant may be to do with the ease of international labor movement *between* countries. Although our analysis has treated countries in isolation (which is intended to reflect the fact that labor is by far the least mobile factor of production), Jank *et al.* (2003) cite the fact that farmers are becoming increasingly sensitive to international differences in wages both in the developed and the developing words, and migrating in response. If this is the case, then not only can we expect to see a shorter lag between exogenous changes and inequality, but also the magnitude of changes in inequality may themselves be curtailed in the long run as workers escape the worst of their consequences.

As a result of this analysis, from [Figure 6](#) a relationship between trade composition and regional disparities can be inferred. In six out of eight of our case countries, there appeared to be a positive relationship. In Mexico, the seventh, there was not only an evidence of correlation but also of the fact that the evolution of trade and regional disparities may also be associated to changes in GDP. The only country that yielded no support for our second hypothesis was Germany. It can therefore be concluded that the ratio of agricultural to manufacturing exports is to some extent negatively related to regional disparities. The remainder of this section goes on to discuss what the implications of these results may be for developed and developing countries.

### (c) *Implications of the results*

What are the implications of the finding that the general rise in trade, coupled with a fall in the proportion of agricultural goods in the composition of that trade, is connected to a rise in regional disparities in developing and developed countries? Our findings suggest that the recent expansion of manufacturing trade, in many cases at the expense of trade in agriculture and other primary sector goods, is likely to benefit manufacturing workers and areas and that these benefits may not find their way to the more dispersed agricultural populations. In terms of the Lewis model, therefore, while development of the capitalist core may benefit urban areas hosting manufacturing industry, economic growth might well leave behind a large proportion of the population located in subsistence sectors. As manufacturing areas frequently coincide with large urban concentrations and with relatively well-off territories, the increase in manufacturing trade relative to agricultural trade seems likely to benefit rich regions at the expense of less prosperous ones, thus increasing regional disparities ([Leichenko & Silva, 2004](#)). While this does not seem to be a surprising result, it does highlight the fact that the consistency with which mobility assumptions are used should be called into question: the temporal coincidence of the evolution of regional disparities and manufacturing trade that we have highlighted does little to support a model that posits intersectoral labor mobility as an assumption.

Of course, as stated, other factors, such as the existence of nodal infrastructure systems, may have contributed to the rise of disparities as

trade increases. Transport costs can be expected to increase outwards from transport hubs, reflecting the declining density and efficiency of transport networks in more remote locations (see [Button, 1993](#); [Overman & Winters, 2005](#)), and whether the goods transported are final or intermediate ([Alonso-Villar, 2005](#)). [Redding and Venables \(2000\)](#) find that more than 70% of the variation in cross-country per capita income depends on factors such as distance to hubs, accessibility to ports, and openness. Hence, with the opening to trade, core areas with better transport infrastructure endowments are likely to remain the easiest and cheapest locations from which to service national and international markets, as well as the cheapest destinations for imported inputs from trading countries. Similarly, high communication costs may also exacerbate the isolation of the benefits from increased manufacturing trade in manufacturing areas. From the perspective of policy implications, then, our findings highlight the importance of technological development alongside trade liberalization, if trade benefits are not to contribute to the rise of disparities. If labor mobility is restricted between sectors, as our findings imply, and the rise of regional disparities is regarded as a problem, then strategies that “level the playing field” between rural and urban locations must be encouraged, including re-skilling and re-educating rural populations to allow them to compete with manufacturing areas. We echo here [Arbache et al.’s \(2003\)](#) concern to improve technology in developing countries, and to raise the educational level of dispersed communities, if trade liberalization is to have poverty-ameliorating effects.

These recommendations take on more importance when we note that the evidence of rising intranational disparities associated with growth in manufacturing trade is likely to have graver consequences for developing than for developed countries. This is not to say that the growth of disparities depends upon its level, but simply that at higher levels of inequality, the negative impact of a similar increase in disparities, in terms of worsening livelihoods, is likely to be greater. This is most easily conceptualized in terms of poverty, defined by the World Bank as the inability to purchase a basket of goods with more than 2,100 calories and some basic non-food expenditures ([Litchfield et al., 2003](#)). For a country with a high number of people already very close to the poverty line and large rural populations, an increase in re-



gional disparities is likely to raise the number of those in poverty by far more than in a country where fewer people are already close to this situation. The developed countries included in our sample are characterized by very low (the United States and the western Länder of Germany) or moderate (Italy and Spain) territorial disparities. Most of their international trade is also in manufacturing goods, with a minimal volume of trade in primary products and goods in relative terms. Hence, any increase in trade is unlikely to accompany reductions in their meager agricultural to manufacturing trade ratios, and therefore any resulting increases in regional disparities are expected to be small. In developed countries, industry—as a consequence of its greater maturity—is also less concentrated in and around primal cities and core areas and more evenly spread across the country than in the developing world.<sup>9</sup> This is the case because infrastructure development has been bolstered by sustained industrial activity and the attendant savings, capital, and investment that this facilitates. With infrastructure development, the cost of locating outside major cities falls, while the costs of agglomeration continue to encourage the dispersal of economic activity. The range of areas that may benefit from an expansion of trade in manufacturing goods is thus larger than in most developing countries. Finally, given the relatively small dimension of regional disparities in developed countries, a moderate increase of territorial disparities as a result of increases in trade is unlikely to cause economic and/or social unrest and to jeopardize the existing political systems.

The stakes for most developing countries are much higher. First, regional disparities within these countries are far greater, and are already at the root of political (as in the case of the Zapatista movement in Mexico) and social (as in the case of the North East of Brazil) discontent. The margin for an increase in intranational disparities is therefore much tighter. Second, the relative volume of agricultural and other primary sector trade in countries such as Brazil or India is still significant, and the margin for a decline in this sort of trade is still important. Finally, there is a greater concentration of manufacturing activity in and around primal cities in most developing than in developed countries. Given the dimension of trade-distorting farm support measures, tariffs on farm goods and agricultural-export tariffs and the lack of agreement in WTO rounds over reform on agricultural subsidies, the scope

for worldwide growth in agricultural trade is limited. This means that at least in the short-term countries such as Brazil or India, with a greater reliance on trade in agricultural or mineral goods, have a greater potential to see regional disparities grow, with grave economic, social, and political consequences.

## 6. CONCLUSION

This paper set out to explore the link between trade and regional disparities. On the empirical side, there is some evidence of a relationship between the two when trade composition is accounted for. Hence, in six, and possibly seven, of the eight case countries that formed the subject of our investigations, there was evidence that changes in trade composition preceded changes in regional disparities, given that trade itself was significant. Specifically, as agricultural exports became less important than manufacturing exports, regional disparities seemed to increase, whereas when agricultural exports became more important, disparities tended to decline.

This evidence fits into the global picture of trade, trade composition, and regional disparities well. The volume of trade as a proportion of production has increased dramatically since the 1970s, implying that trade composition has been taking on more significance in the determination of regional disparities. Concurrently, trade composition itself has evolved, seeing agricultural exports fall in importance relative to manufacturing exports. These trends have contributed to a rise of regional disparities within countries—a fact that is congruent with the findings of this paper. It is our contention that, while numerous factors determine both the degree to which countries trade and the level of spatial income disparities within them, the changes in trade volume and composition witnessed over the past 30 years have contributed in some part to the rise in regional disparities witnessed over the same period.

Developing countries face greater challenges as a result of this link between changes in the composition of trade and the rise of regional disparities. Because of the greater dimension of their regional disparities, their larger reliance on primary sector trade, and the protection of agricultural markets across the world, any increase in manufacturing trade will ultimately exacerbate the problem of internal disparities and put economic, social and political systems under further strain.

## NOTES

1. Here and throughout the paper, “regional disparities” refers to the difference between average regional GDP per capita within a country, measured by the evolution of the standard deviation of regional GDP per capita within a given country.
2. The assumption that manufacturing industry pays higher wages than agricultural industry is necessary here, an assertion that is clearly substantiated in developing country contexts where the wage differential engenders huge migration flows to urban areas, where most industry is located. Unskilled fulltime nominal urban wages are about 41% higher than farm wages in the Third World, although this ratio is reduced when the cost of living is accounted for (Hatton & Williamson, 1991; Squire, 1981). Moreover, evidence from the United States also confirms the assumption. In 2000 in Washington State, average agricultural earnings stood at \$20,229 while earnings for all private sector employees were \$37,070—over 80% higher (Wallace, 2002). Seasonal variability in working hours was cited as the major cause of this discrepancy.
3. Although they also acknowledge that “if agglomeration is principally relevant at the regional or metropolitan scale, then it could well be possible that nations could retain roughly similar shares of world trade in a given industry, while simultaneously experiencing significant locational concentration within the national territory” (Storper *et al.*, 2002, p. 74).
4. Assuming again that manufacturing yields higher returns to factor owners than agriculture does.
5. To what extent the two are separable is a moot point. If it is the case that countries with high resource endowments engage in both more trade and more *agricultural* trade relative to manufacturing trade, for example, then the arguments here and the ones that follow are complicated. However, anecdotal evidence suggests otherwise. For example, although Singapore and Japan trade extensively in manufacturing and tertiary services, so too do Canada and Australia, countries with far higher resource endowments.
6. We use throughout the paper the United Nations’ Standard Industrial Trade Classifications (SITCs), which work on a similar, numeric-nested, principle to standard industrial classifications, in order to define agricultural and manufacturing exports. Primary sector (or agricultural) exports are defined as the sum of SITCs 1—food and live animals; 2—beverages and tobacco; and 3—mineral fuels, lubricants and related materials. Secondary sector (or manufacturing) exports are made up of SITCs 6—manufactured goods classified chiefly by material; 7—machinery and transport equipment; and 8—miscellaneous manufactured articles. The missing SITCs that do not enter into the calculations cover products that are difficult to fit into the conceptual model of primary and secondary industries, as well as those that could only be classed under tertiary or quaternary activities. See <http://unstats.un.org/unsd/comtrade>.
7. The index does not account for trade in services.
8. Data from the early 1980s for China were unavailable, and in the German case, the period after reunification and its immediate aftermath forms the subject of analysis.
9. Traditional manufacturing industries in developed countries are, in many cases, more evenly spread than in developing countries. Among the reasons that would explain this phenomenon, we find the better overall endowment of infrastructure and of human resources in the developed world, as well as the greater amount of time they have had to flee the negative externalities associated with primal cities, such as congestion or high land costs.

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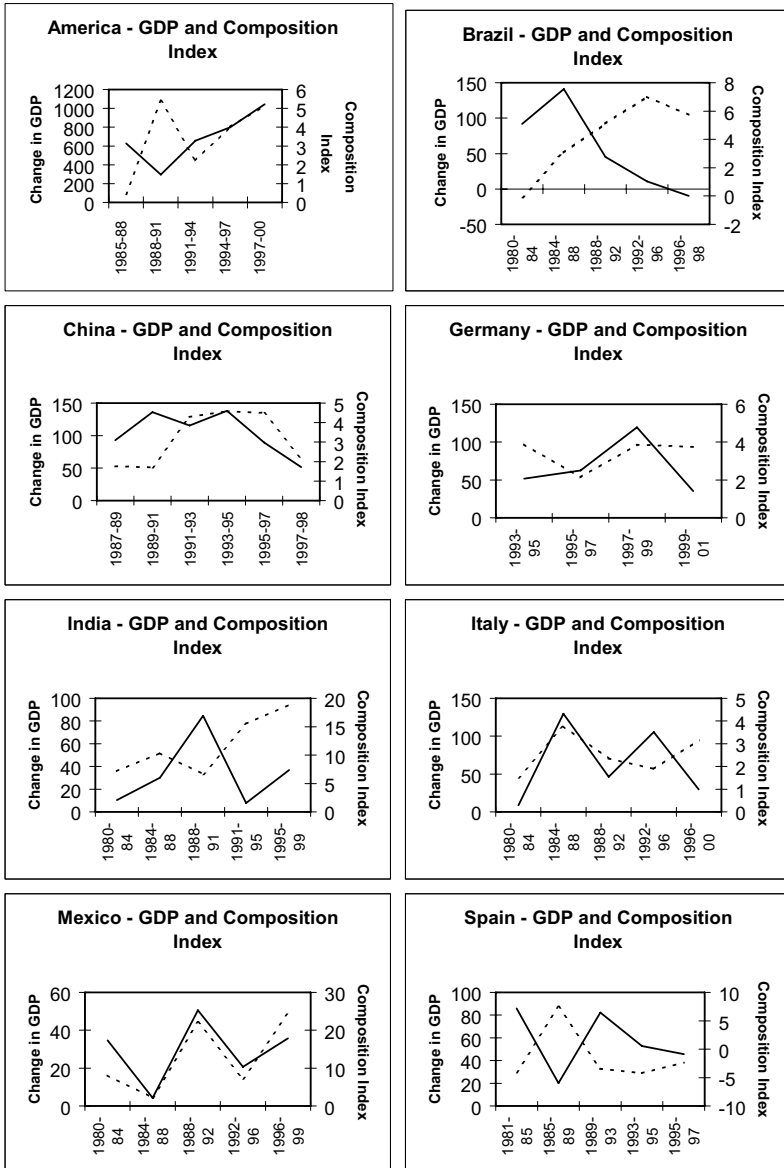
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APPENDIX 1

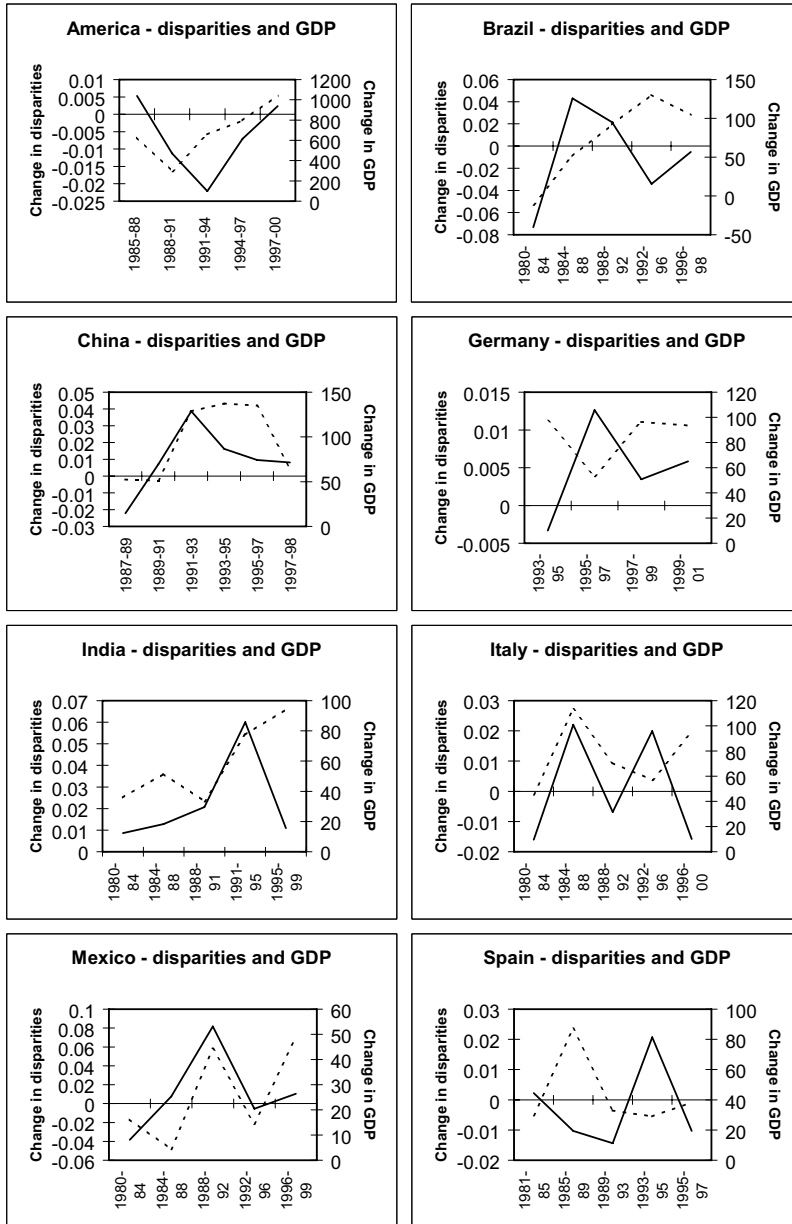
The relationship between changes in trade composition (solid) and changes in GDP (dashed).



GDP figures all in million 1995 US \$ (constant). Source: Own elaboration with World Bank GDP and Trade Composition Index (various sources, see text) data.

APPENDIX 2

The relationship between the evolution of regional disparities (solid) and changes in GDP (dashed).



GDP figures all in million 1995 US \$ (constant). Source: Own elaboration with World Bank GDP and Trade Composition Index (various sources, see text) data.