The Distribution Sector and the Development Process: Are There Patterns? Yes.

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Using an increasing returns specification for distribution, an inverted-U pattern between the share of distribution in GDP and the level of development is shown to arise. A cross-section time series data set is constructed and merged with one used to analyze the service sector. In contrast to the rising pattern found for services, an average time series relation that exhibits an inverted-U pattern is established. The empirical results are robust, for example to choice of functional form and country and time period coverage. A similar pattern is found in the average cross-section (country) relation between distribution and development.

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I. Introduction

In this essay we bring together three separate strands of literature that have a bearing on the issue of whether or not there are patterns in the role of the distribution sector during the course of economic development. The first strand of literature extends the Kuznets (1966) tradition by searching for empirical regularities in the evolution of the share of services in GDP during the process of development. Both Chenery and Syrquin (1975, 176) and Syrquin and Chenery (1989, 21-26) use time-series data for a cross-section of countries to conclude that the share of services rises during the course of economic development, measured by per capita income. Kravis, Heston and Summers (1983) corroborate this finding for a given year (1975) when per capita GDP expenditures are converted into a common unit using exchange rates but find the share of services to be constant across per capita income levels when per capita GDP expenditures are converted at purchasing power parity rates. Panagariya (1988) develops a general equilibrium three sector model that explains how economies of scale in the industrial sector and constant returns in agriculture and services can generate both of these results.

Since services represent a rather heterogeneous category, including telecommunications and domestic service within its fold, the question immediately arises as to whether any of the services subcategories exhibits the same or a different pattern as the aggregate category. The distribution sector, defined as retail plus wholesale trade, is a well established subcategory of services that accounts for a substantial portion of GDP in most countries (13.5% is the average share over the 74 countries and time period, 1950-1983, in our data set). Should we expect the share of the distribution sector in GDP to exhibit the same rising pattern with the level of development as the share of services? By juxtaposing two strands of recent literature we shall argue, on the contrary, that one should expect an inverted-U pattern instead of a rising pattern for the share of the distribution sector as development proceeds.

One strand of recent literature focuses on the economic function of the distribution sector. In this second strand of literature, Betancourt and Gautschi(1988), relying on earlier work by Bucklin (1973), argue that the economic function of the retail sector is to provide consumers with a set of distribution services or implicit outputs together with the explicit items bought at retail. Betancourt (1993) adapts the analysis to encompass the wholesale sector. A key finding in this literature is the existence of economies of scale with respect to the provision of distribution services, Ofer (1973), Oi (1992) and Betancourt and Malanoski (1999). This finding contradicts directly one of the basic assumptions upon which Panagariya bases his explanation of the pattern for services.

Another strand of recent literature focuses on development as specialization and stresses the increasing returns associated with specialization. Ray (1998, Chs. 4, 5) provides an overview of various aspects of this literature. Romer (1987) is an early contributor to this third strand of literature in the context of endogenous growth models. Locay (1990) stresses that the association of development with specialization leads to an increase in the variety of products available. This increasing variety implies higher levels of assortment need to be provided by the distribution sector and it provides the link between the two recent strands of literature that allows us to explain how the inverted-U pattern emerges. The production of assortment is subject to increasing returns and by embedding this production in a simple economy wide model we generate a share for the distribution sector that increases in the early stages of development but eventually declines.

The previous arguments are elaborated in detail in the next section. Subsequently, in Section 2, we present empirical evidence showing that a replication of the Syrquin and Chenery analysis for the distribution sector generates an inverted-U pattern empirically rather than the rising share associated with services. More generally, the average time series relation in our data exhibits an inverted -U pattern. In Section 3 we summarize the results of an analysis of the sensitivity of this result to country coverage, yearly coverage, the use of balanced panels, different functional forms and inclusion of the lagged share of distribution in the regressions. In all cases our main finding is confirmed. One by-product of this finding is that country specific factors emerge as important determinants of variations in the share of distribution in GDP.

In Section 4 we confront the inverted-U pattern with cross-section data. This allows us to incorporate variables into the empirical analysis that are suggested by the theoretical discussion and are not available on a time series basis. Some may be viewed as country specific factors. Our main finding in this empirical analysis is that the share of the distribution sector also follows an inverted-U pattern with respect to the level of economic development when the latter is measured in terms of purchasing power parity rates. The only other factor that we found systematically related to the share of the distribution sector in this setting is the level of media penetration in a country.

Succinctly put, our empirical results show that there is a stable or robust inverted-U pattern in the role of the distribution sector in the process of economic development, which is a substantially different result than the one found for services. Moreover our theoretical discussion brings out two features that underlie the economic rationale behind this result. First, the increasing specialization associated with the development process; and, second, the nature of increasing returns in the distribution sector.

II. DISTRIBUTION, DEVELOPMENT AND THEIR INTERACTION.

The economic function of the distribution sector can be characterized as providing a set of distribution services, D, together with the explicit items or services that are purchased from a distributor, Q. These distribution services have been classified into five broad categories:[1] Accessibility of location, breadth and depth of assortment, assurance of product delivery at the desired time and in the desired form, information and ambiance. The provision of higher levels of each of these services entails higher costs for distributors, since each one of them can be viewed as an output.[2] Moreover, there is evidence that there are economies of scale or increasing returns in the provision of these distribution services.

Ofer (1973) found substantial economies of scale in all the Israeli retail sectors he considered. There is empirical evidence of a positive association between store size and transaction size, Oi (1992). By definition the total quantity bought by a consumer, Q, is equal to hq, or the number of transactions (h) times the average size of a transaction (q). If costs go up more rapidly with the number of transactions than with the average size of the transaction, this generates economies of scale as store size increases. If the provision of broader and deeper assortments, for example, is the reason for the larger store size, it becomes the source of scale economies. Recently, Betancourt and Malanoski (1999) found evidence of constant returns to scale with respect to output or turnover and increasing returns to scale with respect to the provision of distribution services for a sample of U.S. supermarkets.

Locay (1990), for example, shows that as development proceeds specialization increases and there is an increase in the variety of products available. Hence, the levels of assortment that have to be provided by the distribution sector increase. This view of development as increasing specialization is becoming widespread and has been incorporated in a variety of models. Thus, Rodriguez-Clare (1996) and Ciccone and Matsuyama (1996) argue in favor of development as increasing roundabout methods of production with specialized suppliers and develop models incorporating this view that can generate development traps. Bardhan (1996) adopts a similar view and shows how it can lead to persistent differences in wages between rich and poor nations.

We will proceed by first specifying a production function for assortment that is subject to increasing returns and then embedding this production function in a simple model of an economy. This will allow us to derive an explicit expression for the share of the distribution sector that can be used to show, in contrast to the case for services, how an inverted-U pattern would be expected to arise as development proceeds.

The production of assortment can be characterized as follows:

$$D = [(X_1)^a + ...+(X_n)^a]^{1/a} \qquad (1),$$

where X_i is the number of items of type i distributed by the sector. Distribution of each of these items can be thought of as produced with a fixed unit of capital and L_i units of labor. Labor will be assumed to be homogeneous so that each unit can produce B units of each type of item. a is a measure of the degree of substitution among the type of items, i.e., the higher the value the greater the substitutability, and $0 < a < 1$. Restricting a to be less than unity ensures diminishing returns to the addition of quantities of any particular item. No type of item is essential to the production of assortment.

This characterization borrows the assumptions on technology normally used in the specialization literature and applies it to the distribution sector, where they seem at least as appropriate as in their original application. For any given amount of labor allocated to the distribution sector, $L_D = S\ L_i$, and any given number of type of items, n, it will always be optimal (in the sense of maximizing the output of assortment) to allocate the same amount of labor,?, to the production of each type of item. This feature of the model allows a rewrite of (1) in reduced form as follows:

$D = n^{(1/a)}\ B?$ (2),

If we increase B or ?, given n, we have constant returns to scale, but if we increase n, given B and ?, we have increasing returns to scale.

An increase in the number of types increases the output of assortment by a greater amount the smaller is a, or the lower the degree of substitutability among the types of items in the assortment. In discussing assortment a distinction is often made between breadth and depth. Breadth is usually viewed in terms of different product lines whereas depth is usually viewed in terms of different varieties within a product line. It is plausible to argue that the degree of substitutability (a) would be higher when adding varieties within a product line than when adding product lines. In the early stages of development increases in n usually represent increases in product lines whereas in the later stages of development they usually represent increases in varieties within a product line. This argument strengthens our explanations below of how the inverted-U pattern arises.

Aggregate output in our economy (Y) will be given by a constant returns to scale production function of the following form:

$$Y = F(D, Q) \qquad (3),$$

where D is the output of assortment and Q is the output of other sectors. Both D and Q are essential inputs in the production of aggregate output, Y. Q is produced with a constant returns to scale technology. The share of distribution in aggregate output, S_D , can be written as follows:

$$S_D = F_D D/F \qquad (4).$$

If we adopt the view of development in the specialization literature, then higher levels of development, as indicated by higher levels of per capita income, also imply a higher level of specialization, as indicated by n, which increases assortment according to the increasing returns technology in (2). The evolution of (4) as D increases relative to Q generates an inverted-U. For any homogeneous of degree one production function the sign of $?S_D/?D$ is determined by the elasticity of substitution, s , between assortment and the output of other sectors. That is, $?S_D/?D = (s - 1)(1-S_D)$. But in general the elasticity of substitution decreases as the ratio of assortment to the output of other sectors (D/Q) increases; hence, it must become less than unity as it approaches zero. Intuitively, as additional resources are allocated to the production of higher levels of assortment, the ability of these resources to increase aggregate output by increasing assortment diminishes relative to their ability to increase aggregate output through the expansion of other sectors. Incidentally, this is not the only economic mechanism through which an inverted-U can arise.

Alternatively[3], one can think of increases in types, n, as lowering the price of assortment, which is captured by F_D in (4), relative to the price of the other sectors, since D is produced subject to increasing returns while Q is not. In the early stages of development, this lowering of the price of assortment generates increases in D sufficiently large that its share in aggregate output rises.

Eventually, however, the same lowering of price generates smaller increases in D and its share in aggregate output falls. This would be the case, for example, in a demand determined process where one would expect the responsiveness to a given change in price to decrease (in absolute value) as the level of the commodity demanded increases.

Reality is a far more complex tapestry that can be captured by these simple arguments. Notwithstanding, the factors leading to increases in the share of distribution in the early stages of development and to decreases in this share in the later stages of development will continue to exist in more complex characterizations. We turn now to the empirical evidence that arises by using the approach employed by Syrquin and Chenery (SC, 1989).

III. EMPIRICAL EVIDENCE: ‘A REPLICATION’.

Our analysis focuses exclusively on the wholesale and retail trade. Our dependent variable is the share of GDP of the distribution sector in current prices, S_D.[4] Our main independent variables were taken from SC (1989), i.e., real income per capita (Y) using exchange rates and population (N), which was measured in millions of persons. Net resource flow, measured as imports minus exports of goods and non-factor services, as a share of GDP (F) was calculated from the same source as our dependent variable. The sample period is the same as SC, 1950-1983, but the set of countries is somewhat smaller (74) due to the inability to obtain data on the dependent variable for a few countries. Thus, we have an unbalanced panel which is somewhat smaller than SC.

In the patterns spirit of SC and CS, we first estimate the following semi-log quadratic model.

$$S_D = \beta_0 + \beta_1(\ln Y) + \beta_2(\ln Y)^2 + \beta_3(\ln N) + \beta_4(\ln N)^2 + \beta_5 F + ?\ d_i T_i + u \qquad (5)$$

where T_i are four time dummy variables defined, following SC, as $T_1 = 1$ for year ≥ 1960; $T_2 = 1$ for year $\geq$ 1967; T_3 = 1 for year $\geq$ 1973, T_4 = 1 for year $\geq$ 1979.[5] Table 1 presents the results and it reproduces an equation from SC for comparison purposes. Several conclusions emerge from the first five rows of Table 1. First, there is an inverted-U pattern between per capita income and the share of distribution in GDP. This pattern holds whether or not one controls for size or net resource flows and with or without the SC time dummies. Second, there is no discernible pattern with respect to size. Third, net resource flows increase the share of distribution in GDP and this effect is not sensitive to the inclusion or exclusion of size or the SC time dummies. Finally, the SC time dummies are "statistically insignificant" individually, which can be seen from the table, and collectively.[6] Since these SC time dummies are also defined on a somewhat subjective basis, they are dropped from all subsequent analyses of the distribution sector.

In the next three rows of Table 1 we present the results of estimating three fixed effects equations for the distribution sector. The first one (6) introduces country dummies, the second one (7) introduces standard time dummies and the third one (8) introduces both into equation (1). Two results emerge from these equations and their comparison with equation (1). First, the time dummies are largely irrelevant to the analysis. F-tests accept the null hypothesis that the dummies in (7) do not add to the explanation in (1) or that the dummies in (8) do not add to the explanation in (6) at conventional significance levels. Even the magnitudes of the coefficients on income remain the same in (7) as they were in (1)! Second, and most important, the country dummies (6) have a substantial effect on the results both economically and statistically. Explanatory power increases by a factor of 10 as a result of introducing the country dummies.[7] While an inverted-U pattern between distribution and the level of development seems to emerge from these results, it is different from the previous one in that the share of distribution rises steeply and peaks late. More specifically, the turning point occurs at a higher level of development when country specific factors are controlled for in the analysis.[8]

The last two rows of Table 1 present the results of two comparable equations: the first one based on our data for the distribution sector and an identical one from the analysis in SC (1989, 107) for the services sector. Equation (9) is the same as (10) except the dependent variable in (10) is the share of services in GDP in current prices and (10) is based on the complete set of observations available to SC. In (10) there is no inverted-U pattern with respect to services in general and size and the SC time dummies do matter. In (9) there is an inverted-U pattern for the distribution sector, the SC dummies do not matter by and large, and size does not matter.

What is the interpretation of these comparisons? Simply put, the patterns for the distribution sector are different than the patterns for the services sector. In particular, the share of distribution does not rise monotonically with the level of per capita income converted using exchange rates. Instead, it increases at lower levels of development but eventually declines. Finally the specification in equation (6), using country dummies, emerges as the one most consistent with the data.

IV. SENSITIVITY ANALYSIS.[9]

Among the issues that arise with respect to the previous results is their sensitivity to the addition or subtraction of years or countries to the data and to the unbalanced nature of the panel. Hence, we constructed three different balanced panels: 12 countries with consecutive data over the 1950-1983 period; 33 countries with consecutive data over the 1960-78 period; and 27 countries over the 1958-83 period. Table A2 of the Appendix presents the results of estimating equations (1), (7) and (6) of Table 1 for these three different panels. In all three cases equation (6) outperforms equations (1) and (7) in terms of predictive performance, and by a wide margin. Net resource flow is also robust, i.e., it comes in positive and 'statistically significant'. Finally, the impact of GNP per capita on the share of distribution in equation (6) is also robust in terms of signs, statistical significance and generating an inverted-U pattern.

Next we considered the sensitivity of our results to the specification of the functional form of our independent variables and of our dependent variable. Our choice of a quadratic in the logs followed Syrquin and Chenery but there is no theoretical rationale for this choice. Hence, we reestimated models (1) and (6) in Table 1 with a straight quadratic (straight Y) in income and size and with an inverse quadratic (inverse Y) in income and size.[10] It is also well known that when the value of the dependent variable lies between 0 and 1, the disturbances can not be normally distributed. A common correction for this is to use a logistic transformation of the dependent variable. Table A3 of the Appendix presents these results in detail.

Once again the specification with country dummies is the most consistent with the data using the two new functional forms and both specifications of the dependent variables. Similarly, net resource flow has the same effect economically and statistically as in Section 2. A non-nested J- test, Greene (1993), favors the logarithmic quadratic specification over the inverse quadratic and is inconclusive when comparing the logarithmic quadratic specification with the straight quadratic. Both of these last two functional forms, however, generate an inverted-U pattern with respect to per capita income for both specifications of the dependent variable. Hence, the results in Section 2 are robust to these alternative specifications of functional form for the independent and dependent variables.

Finally, we reestimated equations (1)- (9) in Table 1 while adding the lagged share of distribution as an independent variable (these results are presented in Table A4 of the Appendix). The two specifications with country dummies continue to outperform the others and generate an inverted-U pattern with respect to per capita income while net resource flow retains its sign and remains ' statistically significant'.[11] Nevertheless the lagged share does have explanatory power over and above the variables considered earlier. Our interpretation is that there exist time series variations in the unbalanced panel that are not captured in the previous specifications. While investigation of these variations is best undertaken with lengthy time series in the context of a single country, we will pursue in the next section the issue of whether these time series variations captured by the lagged share affect the cross-section patterns.

Summing up, three robust empirical regularities emerge from our sensitivity analysis. Country specific factors are important in explaining the share of distribution in GDP; across a wide variety of countries and time periods the average time series share of the distribution sector increases initially with the level of development but eventually declines; and, the greater the excess of imports over exports relative to GDP the greater this share. The last result is induced almost mechanically by the nature of the distribution activity and how it shows up in the national income accounts. Thus, it is discussed further here.

Economic agents have several ways of making their products directly available to consumers in foreign countries. For instance, three important ones are: They can develop their own foreign distribution network; they can use importers in the foreign country that are merchant wholesalers; and, they can use exporters in their own country that are merchant wholesalers. Only if they use the last mechanism will their activity be counted as part of the distribution sector in the exporting country.

When exports increase the activity of the distribution sector will increase only in proportion to the fraction of the products that are exported through merchant wholesalers that are exporters.[12] By contrast an increase in imports will lead to an increase in the activity of the distribution sector in the importing country through the first two of the three channels mentioned above as well as through others, for example sales of foreign manufacturers directly to retailers in the importing country lead to an increase in the level of the distribution sector in the importing country. This inherent characteristic of the distribution sector, we believe, is the main reason for the positive and 'statistically significant' coefficient of F in these average time series regressions. A belief that is supported by the empirical analysis in the next section.

V. EMPIRICAL EVIDENCE: CROSS-SECTION DATA.

Our empirical results demonstrate the importance of country specific factors in determining the share of distribution across countries. This raises the question of whether or not there are any empirical regularities that explain these country specific factors. One possibility that must be considered is the level of development itself. The only variation in income captured in our previous empirical results for the preferred specification (that is, the models that include the country dummies) was variation within a country over time. Nonetheless since the same factors that determine the evolution of the share in equation (4) of Section 1 will be at work across countries, it is interesting to see if the relationship they generate holds in a cross-country setting despite the many other factors that exhibit substantial variation in this setting. Furthermore, the cross-section data will provide evidence against the possibility that the panel data results are 'spurious'.

Most if not all of the factors that can vary substantially across countries and that may affect the distribution sector have the characteristic that other sectors will also be affected and the net effect on the share of distribution must be determined empirically. For instance, this is true of information, urbanization, the opportunity cost of time, the cost of tradables as well as institutions. To explore these issues, we have taken for each country the average share of the distribution sector over the years for which it was available in the data used earlier. We also constructed similar averages for the variables used in our previous empirical analysis. This information is supplemented with data from other sources that can be used to measure the factors just mentioned. The result is a set of observations on 47 countries.

Since one dependent variable is the average share of the distribution sector in GDP for each country, it is a proportion and it also varies in reliability depending on the number of time series observations used to construct the average. One method of estimation that takes account of the second problem is weighted regression, using the square root of the number of observations on which the average share for each country is calculated as weights. An appropriate method of estimation that takes account of both of these features is a two step logit estimator, e.g., Greene (1993, 653-55).

In the first stage, one obtains consistent but inefficient estimates of the shares by applying OLS to the following logit model

$$\ln [S_{Di} /(1-S_{Di})]= ß' X_i + u_i, \qquad (6)$$

where S_{Di} is the observed average share for country i, $ß'$ is a vector of coefficients, X_i is a vector of corresponding independent variables. These estimates are used to construct weights as follows:

$$w_i =(n_i d_i (1-d_i))^{1/2}, \qquad (7)$$

where n_i is the number of time series observations used to calculate the average share in country i, and

d_i is the estimated share for country i from the first stage regression. These weights are used to estimate the following weighted regression in the second step,

$$\ln[S_{Di} /(1-S_{Di})]w_i = ß^{'}X_iw_i + e_i . \qquad (8)$$

The disturbances in equation (8) can now be assumed to be homoskedastic.

Our most important explanatory variable is, of course, the level of development (ICP). It was measured by an index of the level of GDP per capita in 1980 ICP $.[13] In light of our earlier results using GNP per capita converted at exchange rates and of the Kravis, Heston and Summers (1983) result on services cited in the introduction, we also estimated every specification with GNP per capita (AVGY) as an alternative measure of the level of development. Our analyses in Sections 2 and 3 suggested the introduction of average size (AVGN) and average net resource flow (AVGF) as explanatory variables.

The discussion at the beginning of this section suggested the inclusion of the following variables: The availability of information measured by an index of media penetration (MEDIA), which was constructed as a simple average of indexes of the number of radio's, television sets and newspapers per 100 persons in a country; Urbanization (URBAN) measured by the percentage of households in a country that resided in urban areas in 1965; The opportunity cost of time (WOMEN) measured by the rate of labor force participation of women in 1968; The relative price of nontradables (ERDI) measured in inverse form as the ratio of GDP in 1980 ICP $ to GDP in 1980$ converted using exchange rates; Finally, the security of transactions (RULEOFLAW) measured as an index of the extent to which the rule of law prevails in a country.

Table 2 presents the results in four panels of two different specifications. The first equation in each panel includes only the logarithm of income and its square as explanatory variables. The second equation in each panel includes, in addition, all the variables listed above. The first two panels contain the results of using the average share as the dependent variable using weighted least squares (WLS) and the two step logit estimator (TSLOGIT), respectively. The third and fourth panels of the table present the results of estimating the same equations by WLS using as a dependent variable the estimated coefficients of the dummies for each country from equation 6 in Table 1[14] and from the corresponding equation in Table A4 where the specification in (6) is augmented by the inclusion of the lagged share of distribution as an explanatory variable. The weights in both cases are the standard errors of the estimated coefficients.

An inverted -U pattern with respect to the level of development appears in both specifications for all four panels. By itself the level of development explains between 20 % and 36% of the variation in the (transformed) dependent variable in all four panels.[15] Adding the other explanatory variables weakens but does not eliminate the statistical significance of the inverted-U pattern.[16] Our search for empirical regularities yields two other results. First, media has a positive and statistically significant impact (at the 1% level) on the share of the distribution sector in all four panels. Second, no other variable generates statistically robust results. Interestingly, average net resource flow has a negative coefficient in all four panels, and it is even statistically significant at the 5% level in the fourth panel. The lack of robustness in this variable provides empirical support for the mechanical interpretation of the time series result
given at the end of Section 3.

Just as in Section 3, we considered alternative specifications of the functional form of the level of development: Namely, a quadratic in ICP and an inverse quadratic in ICP. We also considered the use of the log of GNP per capita (lnAVGY) instead of our index of GDP per capita at purchasing power parity rates for the logarithmic specification. A non-nested J-test favors the logarithmic quadratic specification reported here over each these three alternatives. Finally, the main impact of using the coefficients of the country dummies from the equation including the lagged share of the distribution sector as dependent variables is that both average size and average net resource flow become “statistically significant”. In the latter case, however, it has the wrong sign. Therefore it suggests that this mechanism is not a desirable way of capturing or controlling for time series dynamics in the first stage.

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FOOTNOTES

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1. See Betancourt and Gautschi (1988) for a detailed discussion of this classification or Oi (1992) for a detailed discussion of a similar one.

2. In addition, each one of these services can be viewed as a fixed input into the production

functions of consumers (in the case of retailers) or retailers (in the case of wholesalers). For an analysis of the implications of this interpretation see Betancourt and Gautschi (1992).

3. We want to thank an anonymous referee for this point.

4. The numerator in this ratio is the value added by the distribution sector. An Appendix, available upon request, has a complete description of variables and sources of data.

5. This equation replicates the basic equation in Syrquin and Chenery (1989, 11) with respect to the choice of explanatory variables and functional form.

6. An F-test of restrictions between equations 1 and 5 leads to a value of the test statistic of 1.22, which is well below the critical value for rejection of the null hypothesis that the coefficients of the dummies are zero at all standard significance levels.

7. An F-test of the null hypothesis that the country dummies are zero generates a value of 82.05 for the test statistic.

8. Incidentally, the analysis in the previous section predicts an inverted-U but it has no specific prediction for the level of per capita income at which the turning point occurs.

9. In order to conserve space, the tables underlying the results in this section are provided in an Appendix available upon request.

10. Anand and Kanbur (1993) have shown that the famous Kuznets inverted-U relationship between inequality and development disappears when a straight quadratic rather than a quadratic in the logs is applied to the same data.

11. An F-test of the null hypothesis that the country dummies do not add to the explanation of the share once the lagged value of the share is included rejects the null at the 1 % level of significance.

12. In the U.S. in 1987 the sales of importers who were merchant wholesalers were close to $225 billions of 1987 $. The sales of exporters who were merchant wholesalers, by contrast, were $ 80 billions of 1987 $. Both numbers come from the 1987 Census of Wholesale Trade (WC87-S-4, Table 7).

13. Sources and detailed definitions of all the variables are given in an Appendix available upon request.

14. In order to make the third and the fourth panels comparable the dependent variable in the third panel is constructed from the coefficients of the country dummies from estimating equation (6) from Table 1 with the same 1502 observations available to estimate (6) in Table A4, i.e., adjusting for the loss of observations due to the inclusion of the lagged share of distribution.

15. An F-test rejects the null hypothesis that both coefficients are zero at the 1% level in all four panels.

16. An F-test of the null hypothesis that the two coefficients of the income variable are jointly zero leads to a rejection of the null hypothesis at the 1% level in the first three panels and at the 5% level in the fourth panel.

TABLE 1.

The Distribution Sector and the Development Process: Initial Results[a]

Equation	ln Y	$(\ln Y)^2$	ln N	$(\ln N)^2$	F	T_1	T_2	T_3	T_4	R^2	N
D (1)	0.023	-0.20E-02	-0.43E-03	0.33E-03	0.087					.080	1609
	(2.40)	(3.08)	(0.14)	(0.62)	(6.41)						
D (2)	0.021	-0.20E-02								.056	1609
	(2.32)	(3.17)									
D (3)	0.024	-0.22E-02	-0.11E-02	0.38E-03						.057	1609
	(2.51)	(3.32)	(0.36)	(0.71)							
D (4)	0.019	-0.17E-02			0.084					.079	1609
	(2.08)	(2.79)			(6.31)						
D (5)	0.024	-0.21E-02	-0.48E-03	0.31E-03	0.085	0.57E-02	-0.18E-02	0.51E-02	-0.22E-02	.085	1609
	(2.52)	(3.21)	(0.15)	(0.58)	(6.19)	(1.63)	(0.58)	(1.61)	(0.61)		
D (6)[b]	0.094	-0.55E-02	0.71E-02	-0.13E-02	0.074					.815	1609
	(5.81)	(5.62)	(1.01)	(0.94)	(7.07)						
D (7)[c]	0.023	-0.20E-02	-0.48E-03	0.30E-03	0.084					.088	1609
	(2.46)	(3.15)	(0.15)	(0.56)	(6.08)						
D (8)[d]	0.119	-0.78E-02	-0.019	-0.16E-02	0.070					.819	1609
	(6.82)	(6.77)	(1.86)	(1.21)	(6.54)						
D (9)	0.025	-0.23E-02	-0.13E-02	0.37E-03		0.48E-02	-0.16E-02	0.62E-02	-0.36E-03	.063	1609
	(2.68)	(3.50)	(0.41)	(0.68)		(1.36)	(0.50)	(1.95)	(0.10)		
S (10)[e]	0.02	0.002	-0.019	0.001		-0.016	0.009	-0.006	0.013	.407	2311
	(1.49)	(2.03)	(4.77)	(0.98)		(2.20)	(2.03)	(1.41)	(2.67)		

a. D stands for the share of distribution in GDP as the dependent variable; S stands for the share of services in GDP as the dependent variable; constants were included in all regression but are not displayed here; t-ratios (absolute value) are in parentheses.

b. This equation is (1) with country dummies (not shown here) added to the right hand side.

c. This equation is (1) with time dummies (not shown here) added to the right hand side.

d. This equation is (1) with country and time dummies (not shown here) added to the right hand side.

e. This equation is taken from Syrquin and Chenery (1989, 102).

TABLE 2.

The Distribution Sector and Development: The Log of Per Capita Income at PPP Rates.[a]

Method	ln(ICP)	$(\ln(ICP))^2$	ERDI	MEDIA	URBAN	WOMEN	RULE OF LAW	AVGF	AVGN	R^2
WLS	0.074	-0.012								.203
	(3.20)	(3.31)								
WLS	0.065	-0.014	-0.23E-02	0.121	0.10E-03	-0.92E-03	-0.34E-02	-0.048	0.15E-05	.375
	(1.74)	(2.37)	(0.32)	(2.59)	(0.36)	(1.27)	(0.98)	(0.50)	(0.03)	
TSLOGIT	0.686	-0.113								.217
	(3.32)	(3.45)								
TSLOGIT	0.595	-0.124	-0.015	0.973	0.94E-03	-0.75E-02	-0.030	-0.446	0.653E-04	.379
	(2.16)	(2.61)	(0.29)	(2.69)	(0.39)	(1.51)	(1.03)	(0.55)	(0.16)	
WLS[b]	0.034	-0.008								.357
C-hat	(1.57)	(2.32)								
WLS[b]	0.021	-0.010	0.007	0.163	-0.59E-03	-0.99E-02	-0.004	-0.096	-0.16E-03	.581
C-hat	(0.76)	(1.92)	(1.26)	(3.73)	(0.19)	(1.67)	(1.09)	(1.14)	(0.468)	
WLS[c]	0.81E-02	-0.19E-02								.357
C-hat	(1.75)	(2.49)								
WLS[c]	0.35E-02	-0.18E-02	-0.19E-02	0.027	-0.16E-04	-0.19E-03	-0.61E-03	-0.038	-0.16E-04	.574
C-hat	(0.58)	(1.59)	(1.55)	(2.97)	(0.24)	(1.51)	(0.84)	(2.11)	(2.17)	

a. There are 47 observations (countries); Constants were included in all regressions but are not displayed here; t-ratios (absolute value) are in parentheses; R^2 based on transformed data; for definitions of right hand side variables see text.

b. dependent variable is based on estimates of country dummies from unbalanced panel with no lags (1502 observations).

c. dependent variable is based on country dummies from unbalanced panel with lagged share included (1502 observations).