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Exploring the Long Term Effects of Educational Policies on the Income Redistribution Processes

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ABSTRACT

Public finance of post-compulsory education modifies substantially the supply of educational qualifications. Such modification has crucial implications for the long-term income distribution processes: in a context of sustained increases of demand for educational qualifications (brought about by various factors, among which the incorporation of new technologies and international competition may be emphasized), growth in supply reduces the increasing trend of the educational wage premium, contributing, thus, to control the enlargement of primary income inequality. This long-term effect combines with the rest of redistributive effects generated by educational policies and, more specifically, by public finance.

In this paper the mentioned long-term effects are tackled, both from a methodological perspective and from a comparative analysis applied to developed countries. The *Luxembourg Income* Study (LIS) databases, together with the *European Community Household Panel* (ECHP) database (for Spain) were used in the empirical work.

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1. Presentation: the effects of educational policies on the process of redistribution of income.

The most frequently used perspective, until now, in the analysis of the distributive incidence of public expenditure on education is that which De Wulf (1981) calls 'on whose behalf are expenditures made', in which the incidence is considered, in the short-term, of public expenditure on education on families, assuming a set of restrictions such as the non-generation of externalities, the equality of levels of efficiency with which services are provided, and the absence of variations in relative prices. The results obtained from this perspective are very similar in different environments: public spending on higher education has a regressive incidence, whereas public spending on primary and secondary education have a slightly progressive or neutral effect. An example, with reference to Spain, of the results obtained with this type of short-term analysis appears in Table 1 (see also Calero, 2002).

Table 1. Indices of concentration of public expenditure on education and its components and Kakwani indices of progressivity (G [x_d] = 0,3339). Spain, 1994.

	Concentration index	Kakwani index
PUBLIC EXPENDITURE ON EDUCATION	0,0091	0,3248
Public expenditure on primary education	-0,064	0,3979
Public expenditure on academic secondary education	-0,021	0,3549
Public expenditure on vocational secondary education	-0,13	0,4639
Public expenditure on higher education	0,2462	0,0877
Public expenditure on public institutions	-0,025	0,3589
Public expenditure on private institutions	0,1571	0,1768
Public expenditure on grants*	0,057	0,2769

Source: ECHP-95.

* The indices of concentration and of Kakwani of expenditure on grants were calculated taking disposable income as a reference, although it would be more appropriate to take initial income

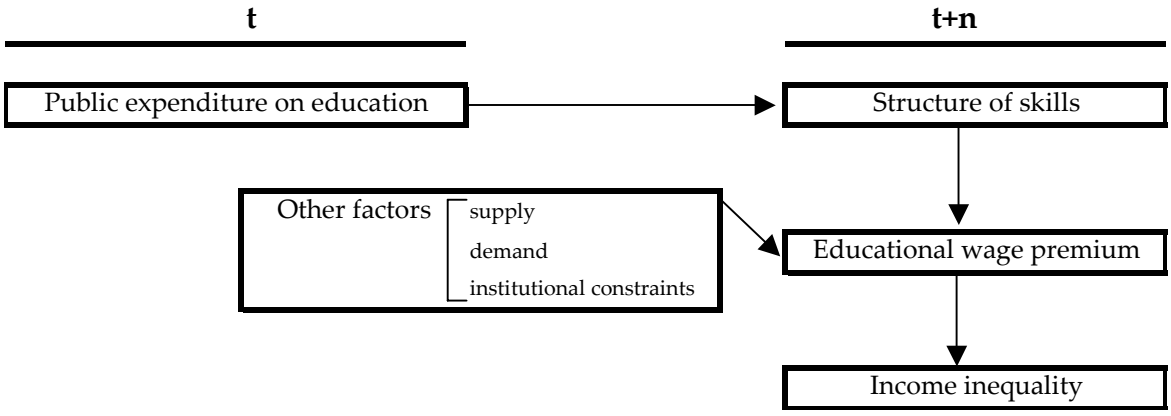
as a reference. The decision to do so was taken with the object of making comparison with the other types of expenditure easier.

The perspective mentioned constitutes a first approach to the phenomenon of incidence. Nevertheless a widening of the scope of the analysis must necessarily be done through the consideration of dynamic effects and, in particular, the effects that education generates, in the long-term, on price relations (wages). Change in the structure of skills is one of the most important determinants of the educational wage premium, and this change is in its turn determined by the participation of the public sector in the financing of education in previous years. The central objective of this study consists in exploring these causal relations, that can be systematised as in Model 1, in which the dynamic character of the study is explicitly stated, as well as the fact already mentioned that the structure of skills interacts in a complex manner with other factors in the process of the determination of the educational wage premium.

One of the points in the study where most theoretical difficulties appear is precisely in the isolation of the effect of changes in the structure of skills on the wage premium. The expected effect of increases in educational levels in the active population is a reduction of the premium; however various factors act simultaneously to push the premium upwards. The net result of these counterbalancing effects depends on the empirical situation analysed.

The contents of the remainder of this paper are organised in the following manner: in Section 2 a theoretical review of the determinants of the educational wage premium is carried out; in Section 3 a comparative analysis of the educational wage premium with reference to various developed countries is presented (using data from the *Luxembourg Income Study* – LIS from now on). In Section 4 the contribution of the supply of education in the setting of the wage premium is explored, and the paper is completed with some conclusions in Section 5.

Model 1. Causal relations analysed in the study



2. The educational wage premium and its determinants

The educational wage premium is determined by the interaction of a set of factors that are dealt with, in this section, grouped into three areas: firstly, those related to the supply of labour, secondly, those related to demand, and finally, those related to the institutions that control the labour market.

a) Determinants related to the supply:

- The structure of skills, the result of the previous production of the education system. The empirical evidence indicates that large increases in the production of people qualified at a post-compulsory level tend to reduce, or if there is any, contain growth of, the premium. Nevertheless, Kiley's (1999) theoretical development, which is presented later in this section, casts doubt on the existence of an indirectly proportional relation between increases in the number of skilled workers and growth of the educational wage premium.

- The age structure. The entrance onto the labour market of diminishing groups of young workers causes lower growth of the experience premium and, if a

correlation between age and skills exists, may also produce variations in the educational premium.[1]

In recent decades there have been great changes, in developed countries in general, in the structure of skills in the active population as well as in its composition by ages. The figures for Spain, one of the countries that has undergone these modifications most intensely, are presented as an example. As far as the structure of skills is concerned, as can be seen in Graph 1, there has been a steep decline in the participation of the groups with lower levels of education and a sharp increase in that of groups with post-compulsory qualifications. Active persons (males) with a primary level of education or below were 76.2% of the total in 1980; only twenty years later this group came to represent 23.1% of the total.

The age composition of the male active population, the evolution of which in Spain appears in Graph 2, also alters substantially in the period being considered: the lowest age group reduces its participation considerably (partly due to a previous descent in the birth rate, partly due to the increase in the rate of post-compulsory schooling); a considerable increase can also be observed of the participation of the groups between 25 and 44 years old, due to the sharp increase in the birth rate that occurred during the decade of the sixties.

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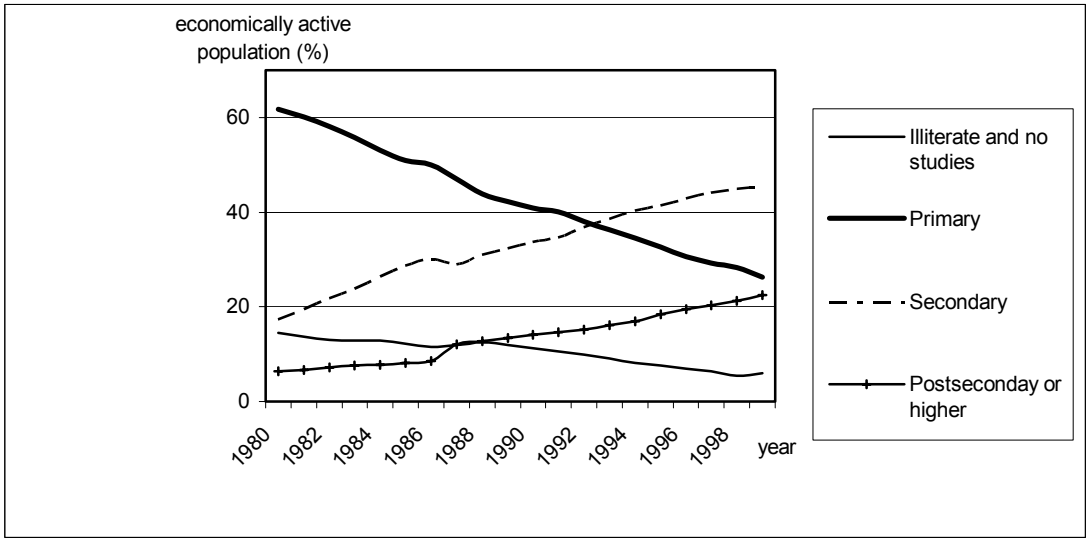
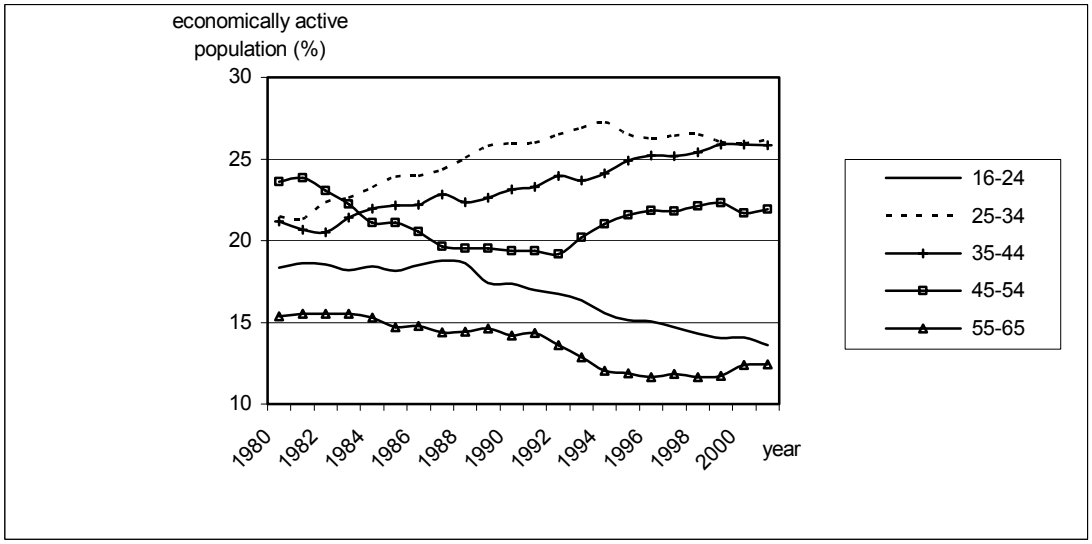
[1] Katz et al. (1995) describe the empirical relation existing between changes in the supply (by age) and changes in the experience wage premium, although they point out that this relation is not as strong as the equivalent corresponding to the educational wage premium.

Graph 1. Structure of skills of the active population in Spain (males). 1980-1999.



Source: Active Population Survey - Spain- (IV quarter of each year).

Graph 2. Age structure of the active population in Spain (males). 1980-2001.



Source: Active Population Survey - Spain- (IV quarter of each year).

b) Determinants related with demand:

- Technological change biased in favour of qualifications. Companies tend to demand more skilled workers (and to pay them more) due to the fact that the introduction of new techniques makes them more productive. An objection that has been put forward with regard to this determinant consists in the fact that in the United States the educational premium (and consequently wage inequality) increased sharply in the decade of the eighties, precisely in periods of deceleration in productivity (see Gottschalk and Smeeding, 1997). However, there was simultaneously a deceleration of the entrance of newly qualified workers in the eighties. As can be seen, the joint action of different determinants makes analysis more difficult.

- Changes in the industrial structure. Deindustrialisation reduces the relative demand for low-skilled workers, so increasing the educational wage premium.

- Intensification of international trade. This intensification, and as a consequence, the increase in international competition, that has a negative effect (in the developed countries) especially in areas of production where a lower proportion of skilled workers are employed, has been used as an explanation of the intensification of wage inequalities and, more precisely, the educational wage premium.

c) Determinants related with institutions controlling the market:

The establishment of institutional controls on market forces, based on the centralisation of collective bargaining, on the syndication or on the fixing of minimum salaries, hinders growth of the premium, in as far as it protects the lowest salaries from falls. The countries with the greatest institutional controls, such as France, Germany or the Scandinavian countries, maintained low levels of wage inequality during the eighties, a period in which in other countries with less restrictions (characteristically the United

States) there were accelerated increases in inequality and of the educational wage premium[2]. Nevertheless, as Gottschalk y Smeeding (1997) point out, these greater institutional controls do not provide an explanation of the lower growth, that also occurs in these countries, of inequality in the upper part of income distribution, or of the lower increases in inequality *within* the groups with higher levels of education.

The authors of the most detailed review of the determinants of the wage premium, the above-mentioned Gottschalk and Smeeding (1997), reached the conclusion that technological change biased in favour of skills is the determining factor when it comes to explaining the trend towards increases in the educational wage premium. The following paragraph describes their position precisely:

> 'Technological change remains one of the only factors that will result in a ubiquitous increase in the proportion of collage educated workers employers are willing to hire in spite of the large increase in the college premium. Deindustrialization, increases in international trade, and declines in unionization and the real minimum wage are all consistent with the decline in the relative wages of less skilled workers but all these theories predict that firms would choose less skill intensive production methods, not more skill intensive methods, as we in fact observe. Only technological change is consistent with rising skill intensity in the face of rising skill prices'. (Gottschalk and Smeeding, 1997: 650).

This section finishes, as was stated, with a presentation of the theoretical approach developed by Kiley (1999) to the relation between growth in the supply of skills and the educational wage premium, an approach the implications of which are opposed to the standard explanation. According to Kiley, increases in the supply of skills bring with them an increase in the demand for skilled work, as they generate additional technological progress appropriate for the qualifications of the workforce. Kiley makes the process of technological development endogenous; in this way, when the complementary factor (the skilled workforce) grows, more advanced technologies are

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[2] As will be seen in Section 3, this process continues to be appreciable in a slightly later period that approaches the middle of the nineties.

developed. This process affects the educational wage premium: 'The endogenous increase in skill-biased technology works against the increased equality of wages for skilled and unskilled workers that arises when the supply of skilled labour rises and technology is exogenous' (Kiley, 1999: 720).

3. A comparative analysis of the evolution of the wage premium

The objective of this analysis is twofold: on the one hand, on a merely descriptive level, to compare the situations and evolution of various countries in which common trends can be found (in general, a trend towards growth) and the specific characteristics of certain cases; and on the other hand, with the intention to explain, the analysis of the causal relations established between one of the determinants of the premium and its value. This is presented in Section 4.

The analysis has been carried out using data from thirteen developed countries (twelve O.E.C.D countries and Israel), contained in the LIS databases. LIS includes databases from another thirteen countries, but it was not possible to include these in the analysis for various reasons[3]. For each country two points in time for the observation have been chosen, the first preferably in the middle of the decade of the eighties, the second preferably in the middle of the nineties (in the case of Spain, data from the ECHP-96 have also been worked with, as the last survey included in LIS is EPF90). The period considered is far from homogeneous[4] with regard to its location in time and its

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[3] In the majority of cases, this was due to difficulties with the education variable: its absence or the impossibility of comparing the levels among the databases for the same country at different moments in time. In other cases there were only data for one year for a certain country.

[4] The countries and years dealt with are the following: Australia (1981-1989), Belgium (1985-1997), Canada (1991-1997), Denmark (1987-1997), France (1984-1994), Finland (1987-1995), Germany (1989-1994), Israel (1986-1997), Italy (1986-1995), Norway (1986-1995), United Kingdom (1986-1995), United States (1986-1997) and Spain (1980-1995). In the case of the second

duration; this last inconvenience is resolved, nevertheless, through the use of accumulative annual growth rates.

With the object of making the results comparable, the education levels considered have been reduced to three: primary education or below, completed secondary, and completed higher education. The diversity of the educational typologies presented on the database of LIS[5] prevents greater desegregation.

The calculation of the educational premium, for each country and year, was carried out using homogeneous populations. The group of workers selected is male heads of household, from 25 to 60 years old and full-time wage-earners, during all of the year analysed[6]. The age limits fixed allow the main part of the active population that has completed its studies to be included, avoiding, however, ages in which early-retirement has a greater incidence. The exclusion of the self-employed from the sample is justified by the impossibility of separating earned-income and income from capital in this group; the exclusion of women attempts to avoid the effects of sharp changes, in the period studied, in the patterns of women's access to work.

The incomes considered are annual[7] and in the majority of cases are gross incomes; only in the case of Belgium, France, Italy and Spain are incomes net of direct taxes and

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observation referring to Germany (1994), the data used correspond only to the *lander* of the old Federal Republic, in order to allow comparison with the data for 1989.

5 LIS conserves the levels of education corresponding to each of the original surveys, in such a way that in some cases the typology is very detailed, in others it is reduced to three levels and in others the level of education appears as a continuous variable, in years.

6 Controls have been introduced (different in each case) with the purpose of avoiding the observations for part-time work and unemployment in any period of the year.

7 The most recommendable information for the analysis of the evolution of wages is the wage *per hour*. However, this information is gathered in a very small number of the surveys that make

social contributions worked with (this does not introduce significant differences in the results as in each country the aggregate of income, the evolution of which is analysed, is comparable). With the purpose of avoiding the effect of the trimming of the observations from high-income households, done at origin in some surveys in order to permit anonymity, a homogeneous trimming of 1% was done to the observations of high-incomes from all the databases. This trimming also makes it possible to avoid the effect of a very low number of observations that introduce very significant distortions in the results (see Cowell et al., 1999).

The calculation of the wage premium has been done from the calculation of private rates of return from education and, more precisely, from Mincer equations by levels of education; this multivariate procedure includes the advantage, in relation to a univariate procedure, of controlling the effect of the other determinant of the premium related with the supply, the composition of the population according to age. To simplify the calculation process correction of bias from auto-selection has not been introduced in the Mincer equations (see Heckman, 1979), which, in the case of the analysis applied to Spain, altered the results very slightly, because of the fact of applying the correction to male heads of households.

The wage premiums presented here are those corresponding to the higher education level in relation to the secondary level. Their calculation is derived from the difference between the effect of the higher education level in the corresponding Mincer equations[8], and the effect of the secondary level of education. Table 2 shows the values of the premium at the two points in time considered, as well as its accumulative annual rate of growth. The first general noteworthy comment is focused on the trend towards

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up the LIS, for which reason it was decided to use the annual wage, combined with the controls mentioned in the previous note.

8 The effect of each level of education is obtained from the expression exp (b) -1, in which b is the coefficient associated with each level (see Halvorsen and Palmquist, 1980 and also Caparrós et al., 2001).

growth of the premium in most of the countries; this trend was verified, for a slightly previous period (more focused on the decade of the eighties) in the meta-analysis of Gottschalk and Smeeding (1997) and also for the eighties, by Katz et al. (1995)[9]. There are, nevertheless, important differences in the level as well as the evolution of the premium: in five cases (Canada, Finland, Norway, Germany and Israel) the premium goes down, while at the other extreme, in countries such as Belgium, Italy, the United States and Spain, rapid growth can be observed.

Table 2. Higher education wage premium and its accumulative annual growth (wage-earners, males, 25-60 years old, heads of households).

	Higher education premium		Accumulative annual growth rate
	t = 1	t = n	
Australia	0,322	0,333	0,406
Belgium	0,317	0,408	2,112
Canada	0,234	0,226	-0,575
Denmark	0,272	0,291	0,683
France	0,474	0,523	0,986
Finland	0,544	0,468	-1,866
Germany	0,601	0,529	-2,531
Israel	0,646	0,600	-0,667
Italy	0,218	0,278	2,734
Norway	0,249	0,237	-0,562
United Kingdom	0,357	0,371	0,431
United States	0,632	0,739	1,432
Spain	0,517	0,685	1,897

Source: LIS databases; for Spain, 1995: ECHP-96.

4. The participation of the supply of education in setting the wage premium

[9] This last study reviews the cases of the United States, United Kingdom, France and Japan, showing how, after the seventies in which the educational and occupational premium was reduced, in the following decade the premium was raised considerably in the cases of the United States and the United Kingdom, moderately in Japan and very little in France.

In Table 3 the rates of growth of the participation of the higher education level appear for the thirteen countries analysed, during the corresponding period and in the active population. This indicator of change in the supply is put in relation to changes in the educational wage premium (that appear in Table 2) in Graph 3, where the expected negative relation[10] can be seen between the variables. The increases in the supply of skilled workers seem to limit the growth of the premium in a general context of sharp growth of demand for skilled workers. The establishment of this causal relation depends on the acceptance of two suppositions: on the one hand, similar technology in the various countries analysed and, on the other hand, that all the countries experience a similar increase in demand for skilled workers.

The estimation of the net real effect of change in the structure of skills demands a more complete analysis, in which it would be possible to completely isolate the effect from the rest of the variables that influence the formation of the premium (especially the effect on demand of technological change biased towards skills).

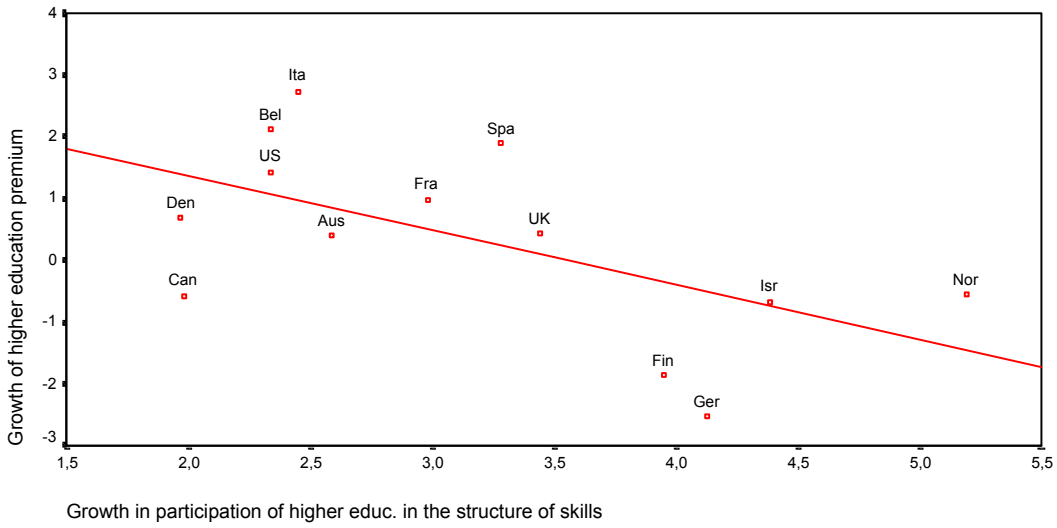
Table 3. Growth (accumulative annual rate) of the participation of the higher education level in the structure of skills of the active population, between the years considered in the analysis.

10 The straight line that appears in the graph corresponds to an adjustment through OLS, the limitations of which are evident given the number of cases, with $R^2 = 0,336$.

Australia	2,59
Belgium	2,34
Canada	1,98
Denmark	1,97
France	2,98
Finland	3,95
Germany	4,13
Israel	4,39
Italy	2,45
Norway	5,19
United Kingdom	3,44
United States	2,34
Spain	3,28

Source: LIS databases; for Spain, 1995: ECHP-95.

Graph 3. Relation between growth in the percentage participation of higher education in the structure of skills and growth of the educational premium corresponding to higher education.



Source: LIS databases; for Spain, 1995: ECHP-95.

5. Conclusions

The results achieved allow it to be concluded that, in the greater part of the countries analysed, the process continues of increasing the educational wage premium that, as

described in the literature, began in the eighties. It has also been seen that one of the determining factors in setting the premium, the increase in the supply of a skilled workforce, acts in the period considered to limit increases in the premium.

The actions of the public sector seem to have, in this way, counterbalancing effects in the short and the long-term: while in the short-term they increase inequality in the distribution of real disposable income, in the long-term they tend to compensate for inequalities generated autonomously in the processes of the formation of primary income.

The more detailed establishment of the causal relation between variations in the supply of skilled labour and variations in the wage premium would require the isolation of the other variables (of demand and of the institutional environment), which process we consider constitutes the advance necessary in this line of research.

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