SOCIAL EXCLUSION IN TERMS OF SCHOOL DROP-OUT IN US: A TIME SERIES ANALYSIS

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Abstract

The topic of this paper arose out of the need to contribute, by means of an analytical context, to the concept of social exclusion which can help to ground the understanding of deprivation firmly in traditions of social science analyses. Specifically, the aim of this work is to investigate the phenomenon of social exclusion in terms of school drop-out in the U.S. socio-economic system and, in particular, we study how this phenomenon can be influenced by economic growth rate, and by expenditure on public support to education in terms of public spending policies in the strict sense of the education and welfare policies to support families. Considering that our analysis is conducted on the long term, we believe that it may constitute a valid indication for the social policy maker about the change found. The analysis is also carried out on both the American national average overall, and the representative value of the three components of groups symbolic reference of population. Finally, we examine the phenomenon in question by using autoregressive models in order to highlight the systemic influence of the matter and understand the temporal condition of the variable school drop-out, by applying traditional ARMA models and comparing the same variable than four members representing the systemic determinants considered: economic growth rate, public spending, unemployment rate and children poverty rate, rate of variation of membership at different levels of education.

JEL classification: C32; I21; O51; Y10;

Keywords: social exclusion, school drop-out, multivariate analysis, ARMA model.

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1. Introduction and related literature

The purpose of this study is to examine the multidimensional process regarding the phenomenon of social exclusion by analyzing the school drop-out in the United States over a period ranging from 1970 to 2009. We observed that in the economic literature the school drop-out phenomenon is often seen primarily as a timing trend because it is a sort of social pathology rather dynamic. In this sense, the drop-out effect is somewhat variable and it is influenced by several factors. This paper is concerned with the study of the complex relationship between variables related to U.S. education and its drop-out phenomenon. The variables just mentioned are grouped into the following macro categories: public spending on education and welfare, economic growth, unemployment and poverty, and enrollment rates at different school levels. The analysis focuses initially on aggregate U.S., then moves on to study some specific population groups[1]. Indeed, research on the subject in analysis focus increasingly on entire population groups at risk of exclusion, considering the level of education, and the literacy in general, as an important indicator of that risk. After a first quantitative survey on the relationships between these different variables, we focused on identifying the mathematical algorithm most suited to give a whole description of school drop-out over time, paying attention to the American population groups condition on which we have set the U.S. population in the interval considered.

In countries such as United States in fact, is known where the ethnic composition of the resident population, it is interesting to study the phenomenon in question, to explore the possibilities and significant differences between population groups. This will not only demonstrate the relationship between this cause of school with social exclusion in general, but also to observe strong negative effects on economic variables that characterize the country. The lack of adequate literacy leads not only to the uncertain chances of finding employment opportunities, but also the phenomena of persistent unemployment and crime or induction, generalizing, to behavior deemed antisocial. The relationship between level of school attendance and delinquent activities was also demonstrated by Zhang and Messner (1996) on Chinese data. Literacy and, above all, the school is indeed seen as a means to access essential to civilization. The social capital of the students' families is a key component of the regular schooling paths, which form and influence the individuals' personal background (see among others Jenkins, 1995). The link between poverty and drop-out is persistent and observable in many countries. In the United States is clearly visible the most average level of poverty for Black and Hispanic populations, and it is equally clear the greater degree of early school drop-out for children belonging to these populations (Entwisle and Alexander, 1993), especially if born in families at risk of poverty. The authors outline as possible causes of drop-out at any school level, as well as the aforementioned economic conditions, including children belonging to ethnic groups and living in one-parent families. Of course, difficult literacy conditions in early stages of life induce a greater chance of abandonment during the later stages, and often lead to antisocial behaviour. As in the present work, we believe it is necessary to connect the different living conditions of macro categories of the American population, at least in part characterized by different socio-economic conditions, to the phenomenon of school drop-out and social exclusion, events which, as noted, tend to easily persist across generations and among special population groups.

The phenomenon of drop-outs showed a particular trend over time and is therefore useful to study its dynamics for a sufficiently long period in order to compare the effects of desirable public policies

[1] We have collected all data from the U.S. Census Bureau (2010) which considers in its analysis and surveys the population structure, as well as in total, divided into: white, black and Hispanic origin. These are at least three main ethnic groups, although further analysis encounter many others.

concerning education, but also public and private investments in theme of human capital, in considering also the series of changes in general behaviour of population and labour market. Today there is agreement in the scientific community about the negative effects of high rates of school dropouts, so that in some countries it was decided to introduce special policies to reintegrate into school life (see Kanamugire and Rutakamize, 2008), especially aimed at groups poor population, where there are more barriers to the standard schooling channels. In that regard, Weisman and Gottfredson (2001) analyze how the structure of special schooling, even with an extension of school hours (after-school) are also an effective contrast to crimes, especially in that part of the day not covered by lessons. The usefulness of these special courses, when organized effectively, is seen also in order to reduce the average probability of school drop-outs, with effects mainly related to children living in neighborhoods with no social organization.

Among the possible causes of drop-outs, those associated with the general economic situation are more explicit, particularly when there remains a critical set of conditions leading to a generalized economic slowdown, which undoubtedly represent a pretext and a fallback for those families in terms of economic difficulty to restrain children, for example to use them in work activities, rather than giving them the opportunity to study (for example, see Cameron, 2009, for the case of Indonesia). The effects on the drop-out of which we underline not only induce long-term negative consequences for both people involved, which as mentioned above are likely to remain excluded from society, and for the country in general, being able to count on in future a lower level of human capital available. In these cases, as seen in Cameron (2009), government intervention plays an essential role in reducing systemic damages. This can only happen if it means huge investments to support literacy and educational policies, of course, aimed at poor and vulnerable population groups. Even in Western countries dropping out of school is a social evil, to which all governments seek to remedy. Eckstein and Wolpin (1999) have formalized a model for understanding what motivates young people during the high school to decide to change their way of life not continuing the study. The various pressures considered to abandon studies ranged from the mere refusal of voluntary educational courses, personal incapacity, up opportunity for simultaneous work activities or alternative school. Eckstein and Wolpin's model was based on utility maximization of the single subject for a lifetime, choices based on education/work, in order to examine the causes of abandonment, but also the usefulness of restrictions on youth employment . The authors have demonstrated the effect on the rate of graduates, which is hardly affected by those alternative options and in general those who abandon their schooling during the years of High school, then graduates with less frequency and has less future expectations met.
The case of youth work during the school attendance covers a wide range of specific literature on the subject. Warren and Cataldi (2006) analyzed the historical trend of this phenomenon, in order to observe the changes of behavior of youth work, but also the differences between groups of population and genders in the United States. In this country, as we have noted, a high number of students working in school-age, well over half of those enrolled in various school levels. However, it was noted that in many cases, workers, especially those engaged more intensely (more than twenty hours per week), had not only more difficult to study, but also higher rates of drop-outs, and a strong preference to take crime. The phenomenon of work during the typical activities devoted to the study has increased over time, also due to a change in the types of jobs available, more flexible and suitable even for illiterate young people.

Another major cause of school drop-out is the desire to start a family before completing the course of study, or the birth of a child or the contraction of marriage. This practice is certainly not immune to social pressures and family, as well as from behavioral habits lasting. Even in that case there are

differences between groups of population, as in Astone and Upchurch (1994) for the United States. The authors observed that is more difficult for a girl, who is forced to decide to form a family, get a degree, but even in this situation have been observed particularly interesting, as a greater propensity for black people in forming families at a young age. The grouping difference is persistent since the Thirties, especially the fact that American girl of African origin tend to leave school even before the actual need due to the formation of the family. Nevertheless, it is possible to reduce school drop-out rates trying to stimulate young people involved in anomalous situations to return and finish their studies. As mentioned, the formation of a family and marriage are among the most observed cases of social exclusion in terms of education, and are studied (Teachman and Paasch, 1989) the effects that the return to studies may have in terms of effective and achievable results. In recent years, the number of American women who decide to continue their studies with college education increases, and therefore this occurrence raises the chances (by age and for more years of study) that these events happen - just as marriage or birth of a child - leading to the interruption of schooling. The negative effects in those terms were observed more for women than for men, with differences depending on the social group. Women are noted for their return to higher education (especially for black women than for white ones), In general, who resumed his studies chooses schooling rather short, especially courses based on practical knowledge and already acquired capabilities.

An interesting implication of these findings is to prove, as we try to outline, that those people who left school prematurely, before they have reached formally and substantially a minimum level of knowledge in terms of education and training and in relation to the entire society and the socio-economic membership, will meet difficulties in integrating into the dynamics of the most advanced contemporary civilization. We ask in particular whether in the specific context of the United States, featured by a historic multiethnic coexistence, it is possible to find significant differences in the process of school drop-out regarding the three predominant groups of population: Whites, Blacks and Hispanics.

The term social exclusion has its origins in René Lenoir (1974, 1989) referring to a state or situation, but it often refers to processes, to the mechanisms by which people are excluded, as consisting not only of the poor but of a wide variety of people, namely the social misfits. The term gained popularity in France during the 1980s (Silver, 1994), the period of economic crisis and restructuring, the crisis of the welfare state, and various social and political crises. The term exclusion was used to refer to various types of social disadvantage, related to the new social problems that arose: unemployment, ghettoization and fundamental changes in family life (Cannan, 1997). The meaning of the expression evolved and expanded in the following years more broadly to include both the process and all individuals and groups which are entirely or partly prevented from full participation in their society and in various aspects of socio-economic, cultural and community life in general.

The concept has two main defining characteristics. First, it is a multi-dimensional concept based on which people may be excluded, for example, from livelihoods, employment, earnings, property, housing, minimum consumption, education, the welfare state, citizenship, personal contacts or respect (Silver, 1994). But the concept focuses on the multi-dimensionality of deprivation, on the fact that individuals are often deprived of different things at the same time. It refers to exclusion (deprivation) in the socio-economic and political sphere. Second – less discussed in the literature but perhaps more relevant for the theoretical contribution of the concept – social exclusion implies a focus on the relations and processes that cause deprivation. People can be excluded by many different sorts of groups, often at the same time: landlords exclude people from access to land or housing; elite political

groups exclude others from legal rights; priests in India may exclude scheduled castes from access to temples; minorities may be excluded from expressing their identity; labour markets, and also some trade unions exclude people (non-members) from getting jobs; and so on. Exclusion happens at each level of society. Group formation is a fundamental characteristic of human society, and this is accompanied by the exclusion of others. The concept takes us beyond mere descriptions of deprivation, and focuses attention on social relations and the processes and institutions that underlie and are part and parcel of deprivation (de Haan, 1998, 2001).

Therefore, as stressed above, school drop-out means thousands of individual young people risking a tragic situation when thinking about their own future in that they are so frustrated or resigned, or unaware of the risk of degradation that could affect them. The causes of this phenomenon are numerous. Various studies have been undertaken into the causes of school leaving and they all show that the reasons for leaving education are very much specific to the individual and that there are a wide variety of determinants and a wide range of influential factors. Four groups of explanatory factors are obvious however: individual, family, school and society. The first group of explanatory factors concerns the characteristics of the students themselves. Individual characteristics are for example gender and ethnicity, and traits like motivation and cognitive skills. The second group is related to the family. These family characteristics, for example cultural and social capital or family composition, are very important in explaining early school leaving. The third group concerns school characteristics, for example, the proportion of minority groups in the school, the level of urbanization, the number of students in a classroom and the homogeneity of the school. The last and fourth explanatory factor is society, for example the economical situation of a country or region. General studies concluded that some factors have an influence on the probability of leaving school early and that a combination of factors mutually reinforce each other.

At-risk ethnic groups and people in general in certain contexts have often experienced negative outcomes with school itself. The attitudes and behavior of socially disadvantaged young people are frequently marked by a strong resistance to innovations and a lack of openness and flexibility. With this attitude, they tend to protect themselves from any unknown, and therefore threatening, experiences. The reasons could be a lack of control, a lack of manageability or of self-esteem, formed by negative social experiences. These factors also reduce the motivation to learn the methods and contents of a teaching process. Disaffection from learning and lack of interest in learning topics and teaching systems are some of the main causes of school drop-out.

Social exclusion has received a considerable amount of attention among social scientists discussing the attributes, differences and novelties of it with respect to more traditional concepts such as income poverty, multidimensional poverty and inequality. See, for example, Duffy (1995), Room (1995), Atkinson (1998a), Klasen (1998), Rowntree Foundation (1998), Mejer (2000), Sen (2000), Atkinson, Cantillon, Marlier and Nolan (2002), just to mention a few. In particular, they have repeatedly emphasized the crucial role of education and training systems, which are an integral part of the social dimension of civilization because they transmit values of solidarity, equal opportunities and social participation, while also producing positive effects on health, crime, the environment, democratization and general quality of life. All citizens need to acquire and continually update their knowledge, skills and competences through lifelong learning schemes, and the specific needs of those at risk of social exclusion need to be taken into account. This paper has a different focus with respect to these earlier contributions: we do not discuss in depth the concept itself and its characteristics, but our empirical contribution takes for granted the elements characterizing social exclusion that resulted from these

debates, and build on those proposing a measure of the phenomenon in the US experience of last fourty years. However we are not the first to propose a sort of measure of social exclusion. Several attempts have already been made by scholars in various sub-disciplines of the social sciences as in Burchardt, Le Grand and Piachaud (1999), Bradshaw *et al.* (2000), Whelan *et al.* (2001), Tsakloglou and Papadopoulos (2002), Chakravarty and D'Ambrosio (2003) and Poggi (2003). Our contribution is geared towards analyzing social exclusion in terms of school drop-out, also to compare the behaviour of different groups of population in U.S.. Then we explore the variation rate of school drop-out with last squares method considering school drop-out as the resulting variable of different explicative variables and ultimately we consider the variation rate of school drop-out as the regressive variable with utilization of ARMA models to know more. The most fundamental elements identifying the notion of social exclusion are multidimensional functioning failure, relativity and dynamic considerations. Social exclusion is a multi-dimensional concept which covers economic, social and political aspects: it deals with the failure to attain adequate levels of various functionings (Sen, 1985) that are deemed valuable in the society under analysis. Social exclusion is a relative concept in the sense that an individual can be socially excluded only in comparison with other members of a society: there is no 'absolute' social exclusion, and an individual can be declared socially excluded only with respect to the society it is considered to be a member of (Bossert, D'Ambrosio and Peragine, 2007). An additional relative feature is that social exclusion depends on the extent to which an individual is able to associate and identify with others. The relativity element of social exclusion makes the latter closely related to the concept of deprivation (Runciman, 1966). Moreover Sen (1976) and Yitzhaki (1979) obtained measures of deprivation with income as the relevant variable. In this paper we extend the framework established in the considered literature analyzing the U.S. variation rate of school drop-out.

The framework of the paper is organized as follows. We begin in section 2 providing an explanation of the methodology used. Section 3 contains a preliminary analysis in which we describe the results of the hypothesis test for US data covering the period from 1970 to 2009. Moreover, in section 4 is presented a multivariate regression model and in section 5 we expose the findings of the auto-regressive moving average applied. In section 6 we show some points of policy for deepening social exclusion and school drop-out dynamics in U.S.. Section 7 concludes.

2. Methodology applied for empirical analysis on school drop-out.

The first analysis refers to tests on differences between two sample proportions (Freund, 2003), thus we try to check if the probabilistic value is correct by three groups of people considered. The analytical expression used is as follows:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n} + \frac{\hat{p}_2(1-\hat{p}_2)}{n}}} \qquad (1)$$

where $\hat{p}_1 e\, \hat{p}_2$ represent two of the three groups of people considered. Hence we compare the result of statistical test with critical value resulting by the Gauss curve. Then we analyze the phenomenon of drop-out with a general multiple regression model (Mardia, 1980), where we consider p_i independent variables:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi} + \varepsilon_i \quad (2)$$

The least square parameter estimated are obtained by p_i normal equations. The residual can be written as follows:

$$\varepsilon_i = y_i - \left[\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi}\right] \quad (3)$$

The normal equations are

$$\sum_{i=1}^{n}\sum_{k=1}^{p} X_{ij} X_{ik} \hat{\beta}_k = \sum_{i=1}^{n} X_{ij}\, y_i\,, \qquad j = 1, \ldots, p \quad (4)$$

Note that for the normal equations depicted in (2) we consider as follows: $\beta = (\beta_1, \beta_2, \ldots, \beta_p)$.

In matrix notation, normal equations for k responses (usually $k = 1$) are written as:

$${}_p(X_n^T X)_p \hat{\beta}_k = {}_p X_n^T Y_k \quad (5)$$

with generalized inverse solution, subscripts showing matrix dimensions:

$${}_p\hat{\beta}_k = {}_p(X_n^T X)_p^{-} X_n^T Y_k \quad (6)$$

Once a regression model has been constructed, it may be important to confirm the goodness of fit of the model and the statistical significance of the estimated parameters. Commonly used checks of goodness of fit include the R^2, analyses of the pattern of residuals and hypothesis testing:

$$R^2 = 1 - \frac{\sigma_\varepsilon^2}{\sigma_y^2} \quad (7)$$

Moreover if the error term does not have a normal distribution the estimated parameters will not follow normal distributions and complicate inference. Our model consider drop-out (DOT) as dependent variable, in function by school enrollment rate (SENR), public school expenditure rate (SEXR), GDP real growth rate (GDP), unemployment rate (UNR), children poverty rate (CPR), living one parent rate (LPR). Here we show the concluding relation analyzed:

$$DOT = \beta_0 + \beta_1 SENR + \beta_2 SEXR + \beta_3 GDP + \beta_4 UNR + \beta_5 CPR + \beta_6 LPR \quad (8)$$

A third analysis applied regards autoregressive models, indeed having a dataset covering forty years

we can evaluate conditional school drop-out with the past. Hence the notation AR(p) refers to the autoregressive model of order p (Priestley, 1983; Yaffee, 2000). The AR(p) model is defined as

$$X_t = c + \sum_{i=1}^{p} \varphi_i X_{t-i} + \varepsilon_t \tag{9}$$

where $\varphi_1, \ldots, \varphi_p$ are the parameters of the model, c is a constant and ε_t is white noise. More generally, for an AR(p) model to be wide-sense stationary, the roots of the polynomial expression

$z^p - \sum_{i=1}^{p} \varphi_i z^{p-i}$ must lie within the unit circle, i.e., each root z_i must satisfy $|z_i| < 1$.

An AR(1) process is given by:

$$X_t = c + \varphi X_{t-1} + \varepsilon_t \tag{10}$$

where ε_t is a white noise process with zero mean and variance σ_ε^2. The process is wide-sense stationary if $|\varphi| < 1$ since it is obtained as the output of a stable filter whose input is white noise. Consequently, assuming $|\varphi| < 1$, the mean $E(X_t)$ is identical for all values of t. Denoting the mean by μ, we get

$$E(X_t) = E(c) + \varphi E(X_{t-1}) + E(\varepsilon_t) \Rightarrow \mu = c + \varphi\mu + 0 \tag{11}$$

and thus

$$\mu = \frac{c}{1-\varphi} \tag{12}$$

In particular, if $c = 0$, then the mean is 0. The variance can be equal to following

$$var(X_t) = E(X_t^2) - \mu^2 = \frac{\sigma_\varepsilon^2}{1-\varphi^2} \tag{13}$$

where σ_ε^2 is the variance of ε_t. The autocovariance is given by

$$B_n = E(X_{t+n}X_t) - \mu^2 = \frac{\sigma_\varepsilon^2}{1-\varphi^2}\varphi^{|n|} \tag{14}$$

It can be seen that the autocovariance function decays with a decay time (also called time constant) of $\tau = -1/\ln(\varphi)$. Ultimately autocorrelation function used is equal to:

$$R(s,t) = \frac{E[(X_t - \mu_t)(X_s - \mu_s)]}{\sigma_t \sigma_s} \tag{15}$$

3. Preliminary analysis inherent hypothesis test

Initially, drop out was analyzed with its index of synthesis and variability. Results were quite satisfactory, in fact we didn't find a high variability of the data and further analysis of symmetry of the distribution for each variable has identified a good symmetry of the data. In conclusion these preliminary results are well for the application of mathematical model useful to explain the phenomenon of school dropouts. Hence in a first analysis we consider the phenomenon of drop out as percentage of three types of groups: Whites, Blacks and Hispanics living in United States in a range time from 1970 to 2009.

That's why an initial analysis is done by taking percentage of dropouts based on race. The percentage of each race is detected using a synthetic value that is representative of temporal question. In methodology we shown formula (1) used to compare drop out races.
Below we show test results:

Whites-Hispanics	Whites-Blacks	Blacks-Hispanics
-0.6822	-0.3770	0.3088

Table 1: differences between two groups proportions.

Considering a margin of error enough high results are not satisfactory in any case. This result confirms no significant difference between races. Hence we continued analysis assuming a total rate equal to 1/3, then take in consideration that any race type is equally probable. Analysis results are following:

Whites	Blacks	Hispanics
-3.7705	-3.5102	-3.2658

Table 2: groups proportions.

In this case results were more than satisfactory, because we can consider a margin of error equal to 0.001 to obtain significant percentage in all three races type. This result confirms correct utilization of values for each groups of population.

4. Results from the multivariate regression model in analyzing school drop-out in U.S.

As stressed above, the phenomenon of school drop-out in U.S. is analyzed in a period ranging from 1970 to 2009 and it concerns the total percentage of drop-out and the percentage of drop-out based on different groups of population. In section 2 we present the method of least squares and we use the parameter $\hat{\beta}$ in (6) to compare the different groups of people. Before applying (6) we analyze school drop-out with other variables in a correlation matrix. The variables are:

- school enrollment, which refers to the annual variation of U.S. members in the following categories: pre-kindergarten through grade 8, grades 9 through 12, college, both in public and private institutions. The variation in the number of students enrolled in school is useful because we do not care the absolute number of students, but as they varies in number; this may represent a change in the behavior and performance of the school system;
- school expenditure, which refers to the annual variation of U.S. expenditure in the following categories: elementary and secondary schools, colleges and universities, both in public and private institutions. Public expenditure in education provides a representative picture of public commitment to facilitate and increase the average level of education. In fact more shrewd public investment means more quality, but also more opportunities, particularly for the lower classes, to use the school courses. In particular, targeted public support can mean the opportunity for the poorest children to attend school, without undermining the conditions for possible future development of their education;
- GDP real growth rate, whose changes represent a definite factor which influences the level of wealth of the population. This affects also both the ability to have the resources to attend classes, and the structural conditions on the behavior and expectations of the population in influencing the future.

For social exclusion we consider the following variables:

- unemployment rate, which refers to the annual variation of unemployment in the economic U.S. activities. The unemployment rate is an indicator of general economic conditions, provides us information, as the trend of GDP and poverty levels, of changes in average welfare in the U.S.. We know that the choices of school drop-out are conditioned by family, and therefore higher levels of unemployment imply, especially for at-risk groups, more difficulties in attending school. Unemployment has in turn influenced by school drop-out, by the lack of preparation for work, and by the absence of the knowledge of “social norms”, and it leads to the complex phenomenon known as social exclusion;
- children poverty rate, which refers to the annual variation of children below poverty line in U.S.; we use the rate of children poverty as it means difficult conditions for the family. This implies the foreclosure at least for the compulsory school level. We know that the early years of education is the basic condition for achieving the attainment of advanced studies. Of course we should not consider only the commitment of the children in possible work activities, that is not common practice in Western countries, but such a lack of necessary means to a good education. With this variable, we have not considered the effect of poor households without school-age children, focusing the investigation on the population of interest. The conditions of poverty, as well as other implications affect school performance, such as situations of already parents social exclusion, or belong to ethnic groups, and influence subsequently learning experiences, to renounce before the conclusion of studies. This is as a process of progressive “abandonment” of

the educational path, which may occur with a decrease in frequency, or a non-profitable attendance;

- children one-parent, which refers to the annual variation of children end to 18 years old living with one parent in U.S.; the choice of considering the number of children living with one parent is due to the fact that such households constitute one class at risk of social exclusion and, in the absence of adequate levels of welfare, of poverty too. It's possible to say that children living with one parent are more likely, as mentioned above, to abandon their studies prematurely.

Following we analyze school drop-out with the use of correlation matrix and we report in table 3 the results:

	total	Whites	Blacks	Hispanics	enrollment	expenditure	unemployment	GDP	children	living
Total	1	,974**	,883**	,708**	-,622**	-,251	,150	,243	-,014	,360*
Whites		1	,805**	,727**	-,621**	-,212	,110	,269	-,087	,366*
Blacks			1	,574**	-,567**	-,290	,174	,113	,130	,382*
Hispanics				1	-,328*	-,036	,193	,169	,097	,367*
enrollment					1	,424**	,225	-,349*	,142	,016
expenditure						1	-,117	,372*	-,419**	-,015
unemployment							1	-,416**	,613**	,394*
GDP								1	-,601**	-,212
children									1	,347*
living										1

Table 3: correlation matrix.

In table 3 we show the results of correlation matrix of total school drop-outs and drop-outs divided by three groups: Whites, Blacks and Hispanics with other variables presented above. There was a negative relationship between the type of total school drop-out and the school enrollment, the same relationship also exists between different types of groups with the variable of school enrollment. This correlation is significant at a level of 0.01 (which indicates a margin of error of 1%). The relationship between the total school drop-outs and total school expenditure is inverse but somewhat irrelevant, and it does not reach significance correlation in total case and in three types of groups analyzed. The relationship between total school drop-outs and unemployment rate is a direct one but is not significant at any level; there is low correlation in total case and with different groups. The same kind of relationship regards total school drop-outs with GDP real growth rate which is direct one but is insignificant at any level. The report of total school drop-outs with those children below poverty line is almost zero, specifically in the case of total school drop-outs and white people is negative, closing to zero, while in Hispanics and blacks people is positive but still close to zero. The analysis shows

indifference between the two last variables. Ultimately the relationship between total school drop-outs and those children living with one parent is a direct one and has a significance level of 0.05 (referring to a margin of error of 5%) in total case and in the three groups of population analyzed. Below there is a figure representing the annual variation of school drop-outs in the three groups considered, ranging from 1970 to 2009 in order to highlight different performances of school drop-out in U.S.[2].

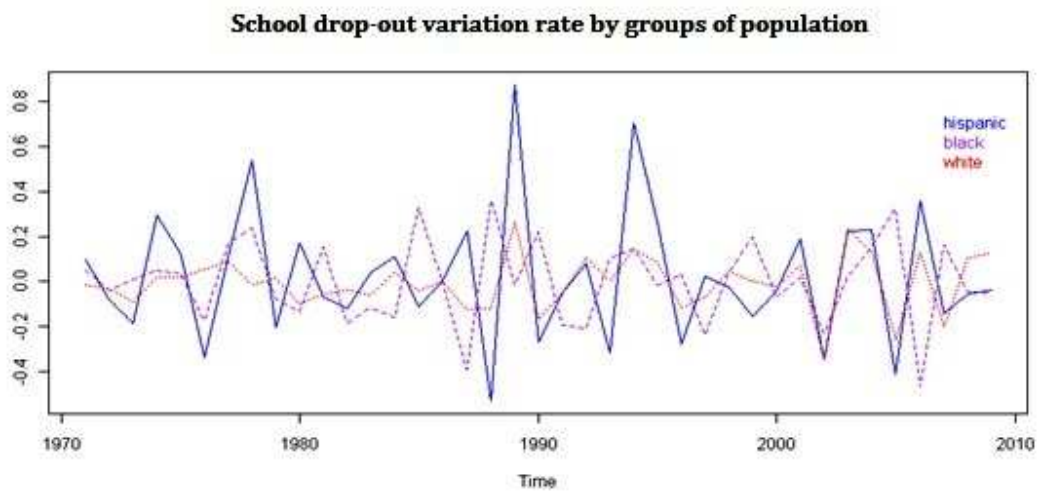

Figure 1: school drop-out variation rate by groups of population.

White group has an almost linear trend over time. Indeed, the variations between years are minimal. This result indicates a fairly linear phenomenon for white people. The black one has a less linear trend, in fact, we note spikes during the period considered which show some variability of school drop-out. Finally, Hispanic group's trend is highly variable in time, because from year to year we observe a noticeable variation of spikes also of 12 percentage points. Once that we have done a preliminary analysis on school drop-out and we now we apply a multivariate regression model by least squares method that is shown in (8) in section 2. In particular, we apply this method to the total school drop-out, and to the three types of groups. Following there are results:

[2] Note that the annual variation is used only to show variability in different groups of population, but in multivariate regression model we use percentage of school drop-out in every year.

	TOTAL	WHITES	HISPANICS	BLACKS
constant	4,93***	4,63***	7,482***	6,66***
	(0,297)	(0,263)	(0,807)	(0,557)
enrollment	-60,18**	-54,142**	-82,209 .	-103,075**
	(17,206)	(15,282)	(46,812)	(32,305)
expenditure	-6,41	-5,35	12,280	-5,133
	(9,016)	(8,008)	(24,531)	(16,929)
unemployment	1,83*	1,614*	2,335	1,960
	(0,864)	(0,767)	(2,351)	(1,623)
GDP	8,87	6,705	19,862	7,669
	(7,967)	(7,076)	(21,675)	(14,958)
children	-3,68	-5,008	3,621	0,193
	(3,429)	(3,046)	(9,330)	(6,439)
living	9,56*	9,501**	17,725 .	15,447*
	(3,497)	(3,106)	(9,513)	(6,565)
R2	0,597	0,609	0,309	0,507

Table 4: multivariate regression model by total, Whites, Hispanic and Blacks groups.

In table 4 we report the parameters estimated for each explanatory variable respect to the dependent one. Below each parameter estimated is given in brackets the standard error useful in assessing the significance of analysis. The first analysis we conduct deal with total school drop-out than other variables considered. The results are significant for the constant at maximum level (0% error), for school enrollment (with a margin of error of 0.001) and for unemployment rate and children living with one parent (with a margin error of 0.01). This result shows the influence of school drop-out for variables referring to education, but also for variables referring to social exclusion. The second analysis we carry out referring the Whites' group. Again, the results are significant for the constant with a null margin of error, for school enrollment and children living with one parent with a margin of error equal to 0.001, and finally the unemployment with margin of error of 0.01. Results of Hispanic people are quite different, because in this type of race we find the presence of spikes which confirm a high variability compared to other groups of people. The constant has always a significant value, but for the other variables considered we find significance only for school enrollment and children living with one parent with a margin of error of 0.05 that means a limit value for the correctness of a model. In conclusion, the Blacks present a maximum significance for the constant with a null margin of error, for school enrollment with a margin of error equal to 0.001 and one-parent living with an error of 0.01. For the other variables we do not find significant values in multivariate regression analysis. These results lead us to use other types of analytical models. In the next investigation, we apply ARMA models to the phenomenon of school drop-out.

5. Auto-regressive and moving average model for the study of school drop-out in U.S.

It is useful to compare values of the phenomenon of school drop-out with the past ones. In fact, having a large range of time we can evaluate the phenomenon exhaustively. Thus, we apply analytical expressions (10), (14) and (15), reported in section 2. Considering total school drop-out phenomenon, the first calculation is autocovariance analysis and after we provide total and partial autocorrelation function. Below we show the results:

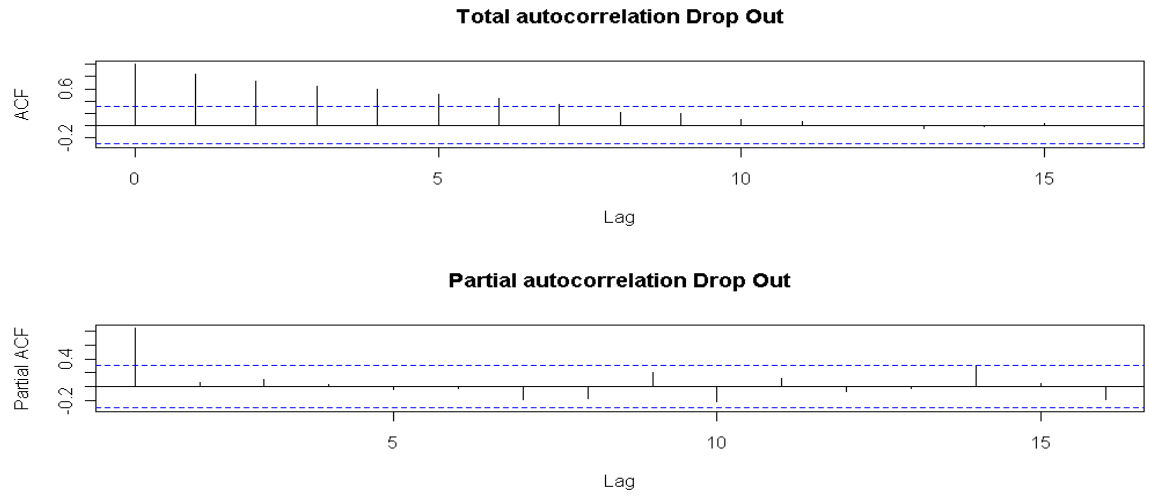

Figure 2: total and partial autocorrelation on total school drop-out.

In figure 2 we report correlogram of total and partial autocorrelations of total school drop-out phenomenon. For the three groups of population we do not report the results of correlogram because they are quite similar with correlogram of total school drop-out. The global correlogram is downward like “slowly” and it is remarkable that the correlogram decreases very slowly over time (considering the period consisting of 40 annual observations), while the partial correlogram has negative and positive coefficients (but always inside confidence limits, except the first one that is positive and greater than upper confidence limit). This type of correlogram indicates that the process under consideration is a first order autoregressive non-stationary. With the examination of correlogram we identify and estimate an auto-regressive integration moving average model (1,0,0). Then a model with a first-order autoregressive component. Following they are estimated parameters for this type of model: for total school drop-out and for the relative analysis of the three groups.

	TOTAL	WHITES	HISPANICS	BLACKS
constant	5,041***	4,658	7,466***	0,6730***
	(0,747)	(0,457)	(0,866)	(0,680)
lag 1	0,897***	0,798**	0,207	0,521**
	(0,092)	(0,117)	(0,182)	(0,187)
enrollment	-13,264	-18,091	-84,454	-62,120
	(17,539)	(18,947)	(52,806)	(42,212)
expenditure	-3,701	1,060	22,681	-4,231
	(7,258)	(7,820)	(26,959)	(18,971)
unemployment	0,36	0,747	2,635	0,012
	(0,54)	(0,589)	(2,364)	(1,580)
GDP	0,043	-0,195	14,042	2,095
	(5,303)	(5,700)	(22,127)	(14,300)
children	-0,253	-1,977	5,577	3,055
	(2,17)	(2,341)	(9,435)	(6,085)
living	-0,93	0,681	12,381	7,310
	(2,234)	(2,430)	(9,748)	(6,139)
R2	0,745	0,693	0,327	0,553

Table 5: AR(1) model in total, Whites, Hispanics and Blacks school drop-out.

In table 5 we report estimated parameters from (10) for an auto-regressive model of first order and its standard errors. In the first auto-regressive model we estimate total school drop-out. The results have shown a significant value for constant model with null margin of error. The latter being an auto-regressive model of first order we report the results that show a significance lag for this analysis. This results confirm the influence of school drop-out with previous values obtained. The same kind of results are observed for auto-regressive model which refer to Whites and Blacks. In these two groups we confirm the presence of influence of school drop-out over time. We notice no significance for Hispanic people. At the beginning of section 4 we present the high variability of this group than others, and this result confirms a conditioning of school drop-out for a longer period for Hispanic community than other groups of people analyzed.

7. Policy insights from social exclusion and school drop-out in U.S.

The U.S. poverty and social exclusion literature has paid much attention to problems of local communities, including the inner-city ghetto. This is highly compatible with the focus on area in some of exclusion literature centered on school drop-out. Social exclusion is of increasing interest because it has gained a primary role in official documents and in the political debate in Europe and, more recently, in Australia, Canada and the United States. After providing a conceptual foundation and giving some guidance as to the application of the concepts suggested here are of importance because of the public-policy relevance of the issue.

We believe that analyses of the social exclusion of American people, as well as other populations in the world, already delve far beyond income into other areas such as education (and school drop-out), health (and health insurance), housing and social environment, including their overlaps with income poverty. The U.S. is therefore already collecting and analyzing a great deal of data on different aspects of social exclusion in which people and above all children have the potential to be excluded and considering how these overlap with each other. Social exclusion has long been seen as a multi-dimensional concept. We wonder whether this is a good or a bad news for the use of 'exclusion' in the U.S. socio-economic system and we think that on the one hand it is bad because one cannot look to social exclusion as something that will drive completely new collection and analysis of data on various areas of people's lives, as it has arguably done in some European countries. On the other hand it is good, as the data are there and there is much analysis on which to build. Those signing-up to the 'intellectual' motivation for use of 'exclusion' would argue that the existing analyses and policies are no substitute for what could yet be attained. Those subscribing only to the 'political' reason might argue that a banner of exclusion would allow the existing work to penetrate yet further into the policy world. If social exclusion is to gain ground as a concept in the U.S. then those who seek to push it will have to think hard about the geographical definition of the society from which people can be excluded, and how this relates to the level at which anti-exclusion policy operates. In particular, we wonder if it is better to persist with a national characterization of social exclusion and, for the insights of our analysis, of school drop-out. For example, as in some European countries, large differences in state-level incidence of cash poverty among American people result from switching from a national to a state-level poverty line, when defined in conventional 'European' terms (Micklewright, 2002). Scholars such as Rainwater, Smeeding and Coder (2001) show the effect of moving from a line of half the national median income to one of half the state median. The average absolute difference in child poverty rates is 4.1 percentage points and the correlation between the two rates is 0.53. New Jersey and Arkansas, the richest and poorest states respectively with median incomes 25 percent above and 25 percent below the national figure, see their child poverty rates rise from 14 to 22 percent (New Jersey) and fall from 26 percent to 14 percent (Arkansas). Furthermore, there was a more than fourfold increase in permanent school exclusions between 1990 and 1997. Primary school exclusions have been rising faster from a low level. Sixty per cent of the excluded come from unemployed homes. Those in care are more likely to be excluded as are those in need of special needs education. Black children are far more likely to be excluded from school. Those who are excluded have lower aspirations, poor relationships with other pupils, parents and teachers. The Social Exclusion Unit[3] has led work on this and government has sought to encourage local authorities to develop facilities for those pupils with

[3] The former Social Exclusion Unit closed in 2006 and was transferred to the smaller Social Exclusion Task Force. The role of the task force is to coordinate the government's drive against social exclusion, ensuring that the cross-departmental approach delivers for those most in need. It champions the needs of the most disadvantaged members of society within government and the public service reform agenda.

behaviour difficulties and school based programmes to reduce exclusions. There are three reasons why welfare reform seems relevant to use of the concept of social exclusion. One is the state versus national focus just mentioned. The second is its emphasis on 'personal responsibility' and the third is the dynamic perspective to U.S. anti-exclusion policy that it demonstrates, emphasising the prevention of entry into social exclusion and the promotion of exits, rather than just paying benefits to the currently excluded and welfare reform's emphasis on inclusion into the school system and the labour market.

Debate of course grows fervent on whether welfare reform has been effective in achieving its goals (Ellwood, 2000). Welfare rolls have plummeted: the number of families on programs such as AFDC (Aid to Families with Dependent Children) and its successor, TANF (Temporary Assistance for Needy Families), has more than halved since 1993. Support for working families has sharply increased, and more disadvantaged parents, especially single parents, appear to be working. On the other hand, there were concerns from the outset over what would happen were the economy to go into recession, concerns that the last three-year period economic downturn have sharpened. There is evidence about the instability of jobs taken after exits from TANF, the plight of parents who cannot get work for whatever reason is clear, and the impact on child well-being as opposed to parental work status is questioned. However, this debate is not particularly relevant to the point at stake here, namely that U.S. policy makers and analysts are already well attuned to a policy emphasis on 'including' people into the labour market, the focus of much discussion of exclusion in Europe. It might argued that U.S. policy places more emphasis on 'pushing' than 'including', making the similarity less strong. However, European readers aware of the reduction in generosity of welfare benefits in the U.S. may be surprised like me by the extent of incentives now given through support to working families via such measures as the Earned Income Tax Credit (Ellwood, 2000; Micklewright, 2002). That could be useful for the fortunes of social exclusion as a concept in the U.S.. There is a natural child angle in this focus on area given the importance to child development of local services such as schools, and high inner city youth unemployment. Area effects on child well-being can even include the propensity to commit crime (Ludwig *et al.*, 1999). Whether this compatibility makes exclusion more or less useful in the U.S. as an organisational concept for addressing problems of community disadvantage is a matter for debate, with the arguments for and against similar to those relating to the analysis of social exclusion and school drop-out. It could be argued that in the past the U.S. has been very inclusive in some senses, notably due to the arrival of large numbers of immigrants from different cultures and the need to absorb them into a sort of all-encompassing society. The early development of widespread public education was a strongly inclusive policy (Lindert, 2001). More recently however, exclusion as an official measure for anti-social behaviour has become very clear in the extremely high levels of imprisonment, especially among young black men. In this case, social exclusion can be seen even as a 'solution' to the problem and second, if this complex phenomenon is seen as ensuing entirely from the actions of others maybe it will clash badly with American emphasis on personal responsibility[4]. Inevitably, for some people, 'social' may imply that society is to blame. Indeed, tolerance of inequality in American's perspective is generally higher than the European one and the lack of any relativity in the measurement of income poverty is just an additional manifestation of this (Evans, 1993; Micklewright, 2002). Another revelation is the less well-developed welfare state. The rhetoric of American politics on occasion seems to encourage the language of inclusion in discussion of distributional issues, as in the Bush administration's '*No child left behind act*'(2001) concerned with education and school drop-out, but the typical interpretations of equality of opportunity in the U.S. and access to the so called "American

[4] Not for nothing was the welfare reform legislation of the Clinton administration entitled '*The Personal Responsibility and Work Opportunity Reconciliation Act*' (1996).

dream" are probably not sympathetic to the entry of what is relevant for social exclusion. We suppose that the opposition in some segments of American society to a broad idea of human rights that embraces the economic, social and cultural profiles (so-called positive rights), subscribed to by most European countries, is not encouraging in this respect: what may be identified as 'European conceptions' are not always well-received in the U.S. culture.

Our first conclusion here relate both to the thought of social exclusion itself, including its application to school drop-out, and to the possible development of the concept in the U.S. mainly in the analysis of related education and well-being. In this sense, we wonder whether social exclusion suggest value-added over multi-dimensional poverty or deprivation. If it does, it is as a complement rather than as a substitute, and that is how it is used most of the time in Europe. The idea of poverty will persist to have a lot of resonance which exclusion may never have, as well as being something that is easier to identify and characterize. The appliance of these contents to educational failures needs more attention but the headings suggested by Atkinson (1998a) about dynamics, relativity and agency provide a good route forward. The same headings are useful for thinking about possible value-added in the U.S. social dimension. For example, the U.S. literature on child-well being is satisfactory on dynamics but less on relativity and, arguably, agency. Relativity seems to bother when someone seeks to promote the concept of exclusion in America and as part of this some serious thought will have to be given to the geographical American dimension. The problems in defining the concept could help it gain currency in the U.S., in the same way as it has been argued that they have in Europe, exclusion meaning "*all things to all people*" (Atkinson, 1998b), though one needs to be prepared for this kind of heterogeneity when approach this topic in particular and non entirely similar cultural contexts such as American and European. However United States is still a society with a great deal of genuine social mobility, as well as opportunities for those with the will and the know-how to access them. Therefore we ask whether education, and simultaneously combating early school leaving, can still be a strategy to reduce social exclusion.

In the last decades, several analysis (see for example Hobcraft, 1998) identified educational test scores during compulsory schooling as the most frequent and effective childhood predictor of adult outcomes. Research suggests that individuals who leave school with low levels of educational attainment are at a higher risk of experiencing social exclusion as adults, with those who lack basic literacy and numeracy skills at particular risk. Educational attainment is strongly related to unemployment and earnings across the developed world. In general unemployment rates decrease as the educational attainment of workers increases and Basic literacy and numeracy attainment have a particularly profound effect on labour market participation and unemployment (Bynner and Parsons, 1997; Moser, 1999). The labour market difficulties associated with poor basic skills emerge during the early stages of working life: poor literacy and numeracy skills were found to be of equal importance in explaining the higher levels of unemployment. However other work on basic skills has suggested that mathematical attainment is of particular importance in terms of maintaining employment in the modern economy (Bynner and Parsons, 1997). There are strong evidences that a lack of qualifications is associated with an increased risk of unemployment (Dolton and O'Neil, 1996). Individuals increasingly require some form of qualifications to access the modern labour market. In 1986, only 62 per cent of jobs required some form of qualifications but, by 1997 the proportion had risen to 69 per cent (Green *et al*., 1998). The importance of qualifications as an explanatory factor in unemployment is known to be increasing over time (Arulampamlam and Stewart, 1995). Finally, many studies suggests that the development of a quasi-market in education has created a powerful set of institutional processes and incentives which work against the goal of an inclusive education system (see among others West *et al*.,

1998; Noden *et al*. 1998). The dominant mode of analysis has focused on the concept of human capital. From this perspective education or schooling increases productivity as it equips individuals' with skills and knowledge. As productivity is reflected in earnings and rates of labour market participation, education offers an important means of social mobility, particularly for the poor. Widespread changes in the economy such as the emergence of high level service sector jobs have opened up important opportunities, to those with the necessary levels of education. The government certainly adopts this perspective (Sparkes, 1999). On the other side, nevertheless, opponents of the human capital model argue that little of the variation between individual's earnings and labour market participation is explained by education. The 'signalling' or 'screening' paradigm suggests that the process of education merely serves to identify individual ability or personal attributes. From this perspective the positive correlation between education and income arises because they are commonly founded in an individual's ability. Educational attainment merely allows individuals to signal their high level ability and low prospective training costs to employers. In its most extreme and ideal typical form, screening implies that qualifications provide valid information to employers about characteristics of the individual to which education does not contribute; education is in effect reduced to a process of assessment. Hence improvements in educational attainment, particularly among the less able will have no effect on the overall distribution of income and unemployment rates. Recent research in the US has rebutted the long-standing criticism of the use of education as a tool to reduce inequality. On the basis of studies of intra-family comparisons and 'natural experiments' in the U.S., Ashenfelter and Rouse (1999) outline "*the return to schooling is not caused by an omitted correlation between ability and schooling […] the school is a promising place to increase the skills and incomes of individuals*".

New economic theory provides compelling evidence of the importance of education and training as a strategy to reduce social exclusion. As Glennerster, Noden and Power (1998) explain "*The reason we cannot run nearer to full employment lies in the fact that there are pools of people who are not effectively part of the labour market […]. The Bank of England has to check and turn back the economic tide long before it can ever reach the poorest areas as the labour market tightens and inflation takes off. Macroeconomic policy is not independent of its micro roots*." However this role must not be overstated, in fact US evidence suggests that raising test scores may not have much impact on worker productivity. Empirical work by Murnane, Willett and Levey (1995) on test scores and earnings suggests that the magnitude of the relationship has grown in recent years yet the statistical relationship between the two remains modest. They found that the wage difference associated with a one standard deviation difference in mathematics test scores rose from 3 per cent in 1978 to 7.4 per cent in 1986 for men and from 8.5 per cent to 15.5 per cent for females. Another study found that only a limited amount of variance in productivity, as observed by supervisors, was associated with test score results. Analysis of the 1958 (Gregg and Machin, 1997; Feinstein, 1998a, 1998b) has identified low educational attainment as a key mechanism translating childhood disadvantage into poor social and economic outcomes at the ages of 23 and 33. This suggests that improving educational attainment may reduce the transmission of social exclusion over the life course. However, findings also suggest that education is only part of the story, as childhood deprivation is associated with significant reductions in adult earnings regardless of educational performance. The effectiveness of education as a means of overcoming social exclusion may be differentiated on the basis of an individual's previous experiences. These findings raise important conceptual questions about the role of education in the process of social exclusion. Procedures, which discriminate on the basis of address, age, gender and race, prevent individuals with the necessary education and skills from gaining positions in which they can utilise their human capital (Kleinman *et al*., 1998; Atkinson, 1998a).

8. Concluding remarks

In the previous sections we focus on studying the influence of certain variables which characterize some of the most important aspects of social exclusion related with the process of school drop-out. The quantitative analysis carried out takes into account the case of the U.S., where we focus the attention on the differences between the three dominant ethnic groups: Whites, Blacks and Hispanics. It is known that there are many causes which can induce the premature abandon of the regular educational path. There are issues affecting the early years of children's lives, such as birth in families below the poverty line, which undermine the early stages of educational path, creating serious problems to the "normal" continuation of the literacy and the general educational process. Other key determinants of hereditary nature may be formed from belonging to particular ethnic or religious groups, to be children of parents already in a position of social exclusion, or to born into families in difficulty, for example, formed by a single parent. The overriding reason why these causes affect the drop-out is that it makes difficult, if not impossible, studies in the early school years, and its consequences are also reflected in the subsequent stages, setting limits to achieve results at least considered sufficient. Nevertheless, we also noted that there are determinants which occur during the school years subsequent to the earliest, and some are peculiar, though not exclusive, of the U.S. socio-economic experience. The effects of a failure in achieving adequate levels of literacy are reflected in the difficulty of finding dignified and upstanding work and, ultimately, on entering fully into the social life of communities. This is due not only to a lack of economic resources but also to lack of knowledge about many "social rules" which the school provide especially next to habitual concepts, and the inability to perform optimally in certain social actions. Therefore, the school drop-out has a negative effect on working capacity, labour productivity, and also affect the conditions for social inclusion. However, as above mentioned, it is itself the condition of social exclusion, in all its forms, to have effects on rates of school drop-outs, in a sort of mutual cause/effect relationship. We have summarized in some representative variables concerning social exclusion the influence exerted on the drop-out, to observe the reciprocity and the differences, according to the above three American groups. The variables we have used covered the economic performances, the level of child poverty, the unemployment rate and the number of families with one parent. It has been also necessary to include data relating to spending on education, both public and private expenditure, as it is known that higher investment allow to a larger proportion of the population to benefit from the regular educational schemes. These variables are placed depending on the levels of U.S. school drop-out, which indicated that we are witnessing to a trend of decreasing levels of abandonment for all three groups from 1970 to today, with a more linear path for the white people, as the empirical evidence shows. The highest spikes in the path of reducing areas of social exclusion, i.e. a reduction of limits to the "regular" development of civilization, have been found among the Hispanic people, also slightly in the Blacks. The results of our analysis shows that among the variables used, those that have most influenced the prices quoted have been the unemployment rate and the number of children in families with one parent. Ultimately, the auto-regressive moving average models, used for a better understanding on how the phenomenon under investigation is influenced by the time variable, has led to a strong connection of our most important variable, the school drop-out, than its values temporally earlier. We noted that today, in the presence of a need, particularly felt by Western countries, to achieve high levels of human capital through education, the recent global economic slowdown reinforces some of the causes that induce the school drop-out, first among all the economic difficulties which may affect especially the weakest and least socially protected people.

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