


INCOME AND HUMAN CAPITAL: THE CASE OF BUENOS AIRES IN THE MID-19TH CENTURY

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ABSTRACT

In this paper a contrast of the theory of human capital based on a sample corresponding to the city of Buenos Aires in 1852 is carried out. This is one of the rare cases in which the information necessary to construct income equations for the 19th century has been obtained. Among the conclusions of this analysis, the absence of a relationship between wages and literacy is noteworthy. On the other hand, for property owners a significant relationship between education and income is observed. These results are interpreted and compared with those obtained in studies referring to other regions for the same period.

Keywords: Human capital, Income equations, Buenos Aires 19th century

JEL Codes: J24, N36, I21

RESUMEN

En este trabajo se efectúa una contrastación de la teoría del capital humano utilizando para ello una muestra correspondiente a la ciudad de Buenos Aires en 1852. Este es uno de los raros casos en que para el siglo XIX se ha obtenido la información necesaria para construir ecuaciones de ingresos. Entre las conclusiones del análisis destaca la ausencia de relación entre salarios y alfabetización. En cambio, para los propietarios se observa una relación significativa entre educación y renta. Estos resultados son interpretados y comparados con los obtenidos en estudios referidos a otras regiones en la misma época.

Palabras clave: Capital humano, ecuación de ingresos, Buenos Aires siglo XIX

In recent years numerous studies have analyzed the returns on investment in education, as expressed by the rise in income received by individuals.¹ The scarcity of samples that collect levels of education and income at the same time makes it difficult to carry out this type of analysis for earlier periods. The data set used here is one of the rare cases in which such information is available. The sample comes from a questionnaire that more than a hundred members of the urban militia of Buenos Aires had to answer in January 1852, with the objective of reclassifying them as members of the active forces.² This was motivated by the need to reinforce the local troops that would soon have to face the allied army, under the leadership of Justo J. de Urquiza.³ The questionnaire not only included questions about matters of military relevance, such as age, state of health or ability to ride a horse, but also literacy, occupation, income (from wages, fees or rent), consumption of alcohol, skin colour and clothing.

This paper begins with a brief introduction to the economic, labour and educational situation in Buenos Aires, which will serve as background for the information provided in the sample. The representativeness of the sample with respect to the population of the city is then analyzed. After a brief formulation of the income equations, the role of literacy is estimated, and some possible interpretations of the obtained values are presented.

¹ In general, quite high yields have been obtained. Psacharopoulos (1985) obtained rates of 8 to 10% for developed countries and 12 to 18% for developing countries.

² The respondents were individuals from the militia of the parish of San Telmo and a few from the parish of Catedral al Sur. Many of them had previously avoided being called up on medical grounds. The questionnaires are in the General Archive of the Nation (Argentina), x 18-5-6.

³ The Battle of Caseros took place on February 3; the Buenos Aires forces were defeated, and Governor Juan Manuel de Rosas was overthrown.

Finally, the results are compared with those for other regions in the mid-19th century.

1. THE ECONOMY AND EDUCATION IN BUENOS AIRES

Since colonial times, the economy of Buenos Aires had been based firmly on foreign trade; the main activities included the smuggling of European goods and the export of silver, hides, salted meat, and wheat. As Spanish rule came to an end, imperial restrictions on trade began to loosen and after independence – in fact as of 1810 - free trade was officially adopted. The 1820s were a decade of economic growth, with a notable expansion of salting houses, which processed local products for export. Great Britain was by far the main beneficiary of this economic opening, its imports representing around half of the recorded total. In the following years this development continued, bringing an increase in construction and livestock activity. In the 1840s the wool trade also experienced major expansion, with exports also destined for European and American industries. After the overthrow of Rosas in 1852, growth continued - symbolized by the opening of the railway in 1857 - and characterized by important public works made possible by the large increase in state revenues; these included the renovation of the port and customs area. The levels reached by exports of agricultural and livestock products, which practically tripled between 1822 and 1857, provide an indication of the progress of the entire period.⁴ This situation, in turn, was reflected in the profitability of livestock, which reached an annual figure of up to 30% in the 1850s; a return that was undoubtedly transmitted to the rest of the economy, both in terms of the price of land and other factors.⁵

In terms of size, Buenos Aires had been a rather insignificant city in the Spanish Empire. However, from the end of the 18th century it experienced sustained growth with its population going from about 12,000 inhabitants in 1750, to about 45,000 in 1810, and more than 92,000 in 1855. At the end of the colonial period, the city had begun to receive a growing number of Spanish immigrants attracted by its work opportunities and high wages. This trend continued, and in 1855 more than 40% of its population was foreign, notably Italian (11%), Spanish (6%) and French (7%). There can be no doubt that this flood of immigrants was due to the high local wages. In 1854 a former finance minister described the rapid economic progress experienced by those arriving in Buenos Aires, while complaining that the high price of domestic service meant that even someone as important as

⁴ Lynch (1986), p. 625.

⁵ Vicuña Mackena (1936), pp. 121, 132. On the high returns on investments in journalistic, theatrical, and bookstore activities, see Hortelano (1936). Sabato (1989; pp. 156, 162) estimates that the annual return on investments in sheep farming was approximately 20-23%.

himself had to collaborate with the housework.⁶ When travelers compared Buenos Aires with other Latin American and European cities, they immediately noticed the high wages of Buenos Aires. In 1855, a Chilean observed that they were equivalent to the wages paid in California and commented on the high amounts paid to servants, carpenters and workers in slaughterhouses and salteries. He was also surprised that he had not seen any beggars or tramps during his stay and that everyone was well dressed. The same visitor also noted that the use of "*Don*", which in other places was reserved as a sign of social preeminence, was widespread.⁷

Elementary schooling in Buenos Aires in the middle of the century was limited to the private sector; Rosas had withdrawn all public financing from the school system in 1838. The educational offer consisted of a relatively large and dynamic group of private schools, mostly run by women. The level of income and the demand for education in Buenos Aires society made it possible for education to become relatively widespread; the rate of schooling in the middle of the century (for boys and girls aged between 7 and 13) was around 50%. This figure does not include those who were schooled at home, with the help of relatives or private tutors.

While the general literacy rate reached 55% in 1855, that of natives of the city was higher than that of the non-natives, and that of men above that of women. 64% of males born in Buenos Aires were able to read, while the rate for the same female group was 55%.⁸ The development of literacy in Buenos Aires is clear from the strong demand for publications in the city; according to Domingo Faustino Sarmiento, the practice of reading was very widespread and had been encouraged during the Rosas dictatorship because his opponents distributed a large number of anti-government newspapers and pamphlets, most of them published in Montevideo.⁹ The significant interest in newspapers around 1852 is confirmed by a Spanish publisher based in Buenos Aires; a subscription to his newspaper was so cheap that even the poorest were able to read it, hence its high number of readers from all walks of life. In the same year, this publisher imported 20,000 copies of cheap novels from Spain, which were sold in three months, particularly to national guards.¹⁰

⁶ Roxas y Patrón a Rosas (1/4/1854), in Raed (1980), p. 71.

⁷ Vicuña Mackena (1936), p. 83. On the high wages paid in Buenos Aires during the 1850s, see Sabato (1989), pp. 92-94, and Sáenz Quesada (1982), pp. 208-213.

⁸ On education in Buenos Aires, see Newland (1992).

⁹ Sarmiento (1948-1956), *iliv*, 44-45.

¹⁰ Hortelano (1936), pp. 215, 233.

2. THE RELIABILITY AND REPRESENTATIVITY OF THE SAMPLE

The set of interviews that makes up the sample can, in general, be said to reflect the economic structure of Buenos Aires correctly. One notices firstly the high number of individuals related with the production and trade of hides, salted meat and wool, such as ranchers, intermediaries, transporters and warehouse owners (*barraqueros*). Carpenters, bricklayers, shoemakers and saddlers are to be found among the trades; in the small industry sector we find soap, oil and candle manufacturers. The service sector, of importance to any city, includes merchants, bar owners (*pulperos*), shopkeepers and clerks.

Some initial observations should be made regarding the reliability of the data. Firstly, the veracity of the replies to some of the questions is dubious. For example, an affirmative answer to the question regarding the ability to ride a horse might imply a speedy departure to the battlefield as a member of the cavalry. Almost no one accepted or declared openly that he was a drunkard, much less that such drunkenness resulted in violent behavior. One of the few who admitted that he enjoyed a drink -Leandro Díaz- indicated in his statement that "he knows how to drink gin but he does not do it frequently, and that when he has done it, he has always ended up singing". Another question with possible bias regards the state of health of the individual; many preferred to describe themselves as being in bad health to avoid a rapid call up. Apart from these cases, the rest of the questions, such as those regarding age, occupation, literacy, skin colour and income level, do not appear to lend themselves to major distortions.

To assess the level of representativity of the respondents, they are first compared with the total population. Due to the fact that the sample included only natives of Buenos Aires, Hispanic Americans not from Buenos Aires, and Spaniards,¹¹ the comparison of the sample and census proportions (according to the 1855 city census) was limited to these specific groups.¹²

¹¹ Other foreigners – such as the British and French - could not be called up by agreement with their respective nations and, therefore, are not reflected here. About 25 respondents (the total is 125) were excluded as they did not present complete information.

¹² Excluding immigrants of other nationalities, women and children under 15, who are not reflected in the sample.

	<i>According to 1855 census¹³</i>	<i>According to sample</i>
Natives of Buenos Aires	58 %	66 %
Hispanic Americans not from Buenos Aires	21 %	11 %
Spaniards	21 %	- 23 %

Secondly, the composition of the sample by economic sector is analyzed and compared with the information in the 1855 census prepared by Lattes and Poczter.¹⁴

	<i>According to Lattes and Poczter</i>	<i>According to sample</i>
Primary	6 %	12 %
Secondary	29 %	21 %
Tertiary	64 %	67 %

¹³ The results of the 1855 city census were published in the Statistical Register of the State of Buenos Aires, 5 and 6 (*Registro Estadístico del Estado de Buenos Aires, 5 y 6*) (1855). Only those over fourteen years of age from the census were considered, as our sample refers to that group. The calculation of children under the age of fifteen was made using the proportions presented in Lattes and Poczter (1968), pp. 51-52. For the Spanish and Hispanic Americans not from Buenos Aires, this calculation was carried out based on the proportions given for the general category of "non-natives".

¹⁴ Lattes and Poczter (1968), pp. 67-68.

Finally, the literacy rates for the different groups are contrasted:

	<i>According to 1855 census¹⁵</i>	<i>According to sample</i>
Natives of Buenos Aires	64 %	77 %
Hispanic Americans not from Buenos Aires	52 %	54 %
Spaniards	64 %	69 %
<i>Total¹⁶</i>	62 %	73 %

These comparisons indicate that the sample does not appear to be significantly different from the universe it represents, although the literacy rate of natives of Buenos Aires was higher than the general rate, which could indicate a bias towards higher-income groups. Unfortunately, it was not possible to compare the number of property owners and non-owners, average wages and incomes, since general data for the entire city are not available. As far as average age is concerned, the figure for the sample is 35 years old, while it is 31 for the total male population between the ages of 14 and 60.¹⁷

3. THE THEORY OF HUMAN CAPITAL AND THE INCOME EQUATIONS

The usual starting point¹⁸ when analyzing the relationship between the income of individuals and their educational level is the estimation of an income equation as follows:

¹⁵ The literacy level in the 1855 census required correction; children under seven were removed from the ranks of the illiterate. The proportions presented in Lattes and Poczter (1968), pp. 51-52 were used to this end. For natives of Buenos Aires the figure corresponding to natives was used, and for the Spanish and Hispanic Americans not from Buenos Aires, the proportion for non-natives was employed.

¹⁶ Only from the specified groups.

¹⁷ Calculations based on Lattes and Poczter (1968), pp. 51-52.

¹⁸ Becker (1964).

$$\ln Y_i = a + b E_i + U_i, \quad [1]$$

where Y represents income, E measures the individual's education, normally in years of schooling, and U is the error term for unobserved variables.

In line with Mincer, measures of human capital acquired by individuals in the job market (on-the-job training) can be included in the equation.¹⁹ This is shown as:

$$\ln Y_i = \alpha + \beta E_i + \gamma_1 EXP_i + \gamma_2 EXP_i^2 + \varepsilon_i, \quad [2]$$

where EXP measures the individual's work experience, and a quadratic term is added to capture the concave shape generally observed in age-income profiles. The estimates obtained from parameter β are interpreted as measures of the economic return on investments in education, while γ_1 and γ_2 include compensation for work experience.

It can be argued that estimates of the return on education could be biased by the absence of measures of worker skill or social standing. So, for example, if the most intelligent individuals earn high incomes and also receive high levels of education, in equation [2], β will overestimate the return on investments in education. However, the estimates of Griliches and other authors indicate that such biases do not seem to be very important.²⁰

4. THE SAMPLE AND THE THEORY OF HUMAN CAPITAL

To estimate the economic return on literacy in Buenos Aires in 1852, a semi-logarithmic equation such as [2], with the values provided by the sample, is used. The variables are defined as follows: a) the level of the education of individuals (E_i) refers only to the ability to read and write; b) in the absence of direct measures of individuals' work experience, age and age squared have been included in the equations.

¹⁹ Mincer (1974).

²⁰ Griliches (1977). Rosen (1977) highlights the general reasons why E is an endogenous variable in the income equations and may be biased. The theory of human capital assumes that individuals choose the educational investment that maximizes their income (the present value of their future net income stream). Consequently, individuals self-select their place in the different educational categories and are not distributed randomly. Comparing the income earned by people with different educational investments does not provide an unbiased estimate of the return that any individual would have obtained from that investment. Griliches (1977) and Willis and Rosen (1979) have estimated biases not exceeding 10% of the estimated value of β .

The remunerations of those earning a salary and the self-employed (subsequently referred to globally as SSE) are based on their own statements, while it was necessary to estimate the annual income for property owners. To this end, it was assumed that they all worked, obtaining an annual return on their capital of between 15 and 20% which seems reasonable for the period under study.²¹

Table 1 shows Mincer's income equations for the Buenos Aires sample. In the first two columns, equations [1] are estimated, obtaining rates of return on literacy of between 47 and 52%, depending on whether the estimated income of property owners is 15 or 20% of their capital. Equations [2] are estimated in the third and fourth columns of the table, which include individuals' age as an approximation of their experience in the labour market. The returns on education do not vary, and we observe that incomes increase with age up to the age of 44-50. The values obtained for γ_1 and γ_2 are similar to those obtained in other studies but are not totally accurate. According to these estimates, the return on literacy in Buenos Aires appears to be very high.

TABLE 1
Income equations.

	<i>r= 15%</i>	<i>r=20%</i>	<i>r= 15%</i>	<i>r=20%</i>
Constant	7.90 (38)	7.96 (38)	7.12 (8.8)	6.84 (8)
Literacy	0.47 (1.9)	0.52 (2.1)	0.47 (1.9)	0.53 (2.2)
Age			0.03 (0.7)	0.05 (1.1)
Age ²			-0.0003 (-0.5)	-0.0005 (-0.8)
N	101	101	101	101
F	3.7	4.7	1.97	2.9
R ²	0.03	0.04	0.05	0.08

Note: Ordinary Least Square estimation. *t* statistics between brackets.

²¹ These assumptions about returns on capital are only relevant when we combine the income of the SSE group and property owners (Table A). When analyzing the two groups separately (Table B) we do not need to assume a rate of return on capital.

Since the sample is made up of two quite different groups of individuals (those who owned property and those who did not), it seems logical to investigate whether the income equations are homogeneous for these groups. Table 2 presents the equations separating property owners and the SSE group; it can be observed that they are not homogeneous. Literacy seems to offer a return of about 200% for property owners, while showing no statistically significant relationship with the income of the other group.

In the last columns of Table 2 income equations including dummy variables that measure whether individuals work in the primary or secondary sector and whether they are natives of Buenos Aires or of Spanish origin are estimated. The inclusion of these variables does not substantially modify the results. Return on literacy remains very high among property owners (178%) and zero in the case of the SSE group.

The coefficients of age and age squared are estimated with little accuracy for property owners. For the SSE group they correspond to an income profile that peaks around the age of 38-40.

Regarding differences by economic sectors, it is observed that, for property owners, average incomes of those involved in the secondary and tertiary sectors do not vary, while there is a difference of income of 174% in favour of the primary sector. This is clearly a consequence of the fact that the owners of large estates lived in the city while the owners of small farms and their managers and workers did not.

There is an income differential of 52% in the SSE group, in favour of the secondary sector. The fact that our equations only include a measure of individual literacy means these sectoral variables may reflect differences in skills or qualifications among workers in different economic sectors. If these coefficients are interpreted as indicative of differences in return on literacy, they would be reflecting a transitory situation that would lead to mobility between sectors. On the contrary, it is possible that they indicate a more permanent problem of segmentation of the labour market, with some form of barriers at the entrance of higher-income sectors. The size of the sample means that it is not possible to estimate separate equations for different economic sectors. However, the possible evidence provided by different income structures would not support the segmentation theory conclusively either.²²

²² Heckman and Holtz (1986).

TABLE 2
Income equations (II).

	Property owners	SSE	Property owners	SSE
Constant	0.06 (0.02)	7.33 (13)	3.06 (1)	7.94 (13)
Literacy	1.92 (3.2)	-0.018 (-0.1)	1.78 (2.9)	0.01 (0.06)
Age	0.28 (1.7)	0.063 (1.8)	0.13 (0.8)	0.06 (1.7)
Age ²	-0.003 (-1.4)	-0.0008 (-1.7)	-0.001 (-0.6)	-0.0008 (-1.8)
Primary sector			1.74 (3.1)	0.005 (0.01)
Secondary sector			0.0006 (0)	0.52 (3.1)
Native Buenos Aires			-0.21 (-0.3)	-0.71 (-2.3)
Spaniard			0.35 (0.5)	-0.60 (-1.8)
N	40	62	40	62
F	6.7	1.2	5.1	2.7
R ²	0.30	0.05	0.42	0.25

Note: Ordinary Least Square estimation. *t* statistics between brackets.

Finally, there is no relationship between origin (Buenos Aires or Spanish) of property owners and income; while in the case of non-native salaried workers, origin is associated with incomes 60 or 70% lower. Skin colour (white or olive-skinned) does not show any relationship with income and, consequently, is not included in the estimated equations.

Regarding the statistical adjustment of the equations, the F statistics in the tables indicate that those estimated for salaried workers do not have an acceptable specification. The variables included in the different specifications are not significant when considered together. In contrast, the income equations for property owners have a significance level of 1%.

Tables 3 and 4 present an in-depth analysis of the relationships between the income and age of the individuals in the sample. Table 3 shows the data for salaried workers. Wages increase until the age of 40, but dispersion is so high that the differences are not significant. Likewise, no clear

differences between the salaries of the literate and those of the illiterate are observed. The average monthly salary is around 400 pesos.

Table 4 presents the data for all property owners. Average capital of those able to read and write is around 80,000 pesos, while the corresponding figure for the small number of illiterate property owners is 4,000 pesos. Average capital increases after the age of 40 for property owners able to read and write. This fact can be interpreted as evidence of the productivity of literacy, reaching a maximum at that age. Alternatively, it might suggest that individuals inherited at a somewhat late age.

Although the sample used is small, the analysis reflected in these tables does provide some results; the most striking finding is that no economic return on literacy is observed among salaried workers.²³ There are two possible interpretations of this. Firstly, it could mean that, given the main type of work to be carried out in Buenos Aires at the time, literacy would not influence productivity and illiterate people could carry out the tasks without major difficulties. Tedesco reached this conclusion in his study of education and the economy in Argentina at the end of the 19th century;²⁴ the productive structure of the country did not require a large educated workforce, as it was based extensively on livestock with low levels of industry.

²³ Some peons with monthly salaries less than or equivalent to 300 pesos, a small sum for the time, were literate. Such was the case of Juan Márquez, a 40-year-old bread delivery man from Buenos Aires who earned 100 pesos, one of the lowest wages in the sample; Eduardo Larrosa, a clerk, had the same income.

²⁴ Tedesco (1982).

TABLE 3
Average wage (and standard deviation).

Age	Literate	Illiterate	All
Younger than 20	325.3	296	318.3
	(187)	(118)	(174)
20-29 years old	537.5	418.1	481.8
	(336)	(114)	(264)
30-39 years old	516.6	450	500
	(209)	(0)	(184)
40-40 years old	379.1	530	447.7
	(296)	(407)	(359)
50 and older	368.3	325	351
	(969)	(117)	(107)
All	398.46	400.31	399.1
	(251)	(243)	(245.5)

TABLE 4
Average capital (and standard deviation).

Age	Literate	Illiterate	All
20-29 years old	24,625	4,000	22,333
	(32,197)	(0)	(31,023)
30-39 years old	48,643	5,333,3	35,650
	(47,431)	(943)	(44,373)
40-40 years old	160,900	-	160,900
	(172,607)	-	(172,697)
50 and older	65,000	2,000	51,000
	(62,320)	(0)	(66,436)
All	81,297	4,000	69,092,1
	(119,098)	(1,633)	(112,869)

The second interpretation would be that, even admitting the positive effect of education on workers' skills in some activities, the abundance of literate workers in 1852 meant that their pay differential was cancelled as supply far exceeded demand. This idea is compatible with that of Sabato, who in her analysis of the Buenos Aires labour market in the second half

of the 19th century reached a conclusion similar to that of Tedesco;²⁵ very few jobs required specialization and the economy in general functioned with little demand for training. The conclusion, then, is that the observed demand for literacy would have been driven mainly by consumption motivations.

The results obtained for property owners are difficult to interpret in terms of human capital theory. If it is assumed that these individuals worked, and that the income they earned was correctly estimated, it could be concluded that literacy provided very positive returns for them. On the other hand, it is possible that the capital declared by these individuals came from inheritances, and that the observed relationship between education and wealth is due solely to the high probability that the wealthiest consume more education, for sociocultural reasons.²⁶

5. INTERNATIONAL COMPARISON AND CONCLUSIONS

The absence of a clear wage differentiation between literate and non-literate workers in Buenos Aires is no longer surprising when contrasted with evidence for other regions in the mid-19th century. According to some studies, the economies of the time, even those which were most highly developed and industrialized, had a relatively low demand for literacy, given that most posts did not require the ability to read and write. Furthermore, it is not impossible to imagine that, in cases where literacy was used, there were no possible substitutes.²⁷ What is more, the cost of education could be considerably greater than the expected benefits, especially for those from low social strata with little chance of upward social mobility. In England, for example, in the mid-19th century, literacy was not indispensable for a large proportion of workers; likewise, the Industrial Revolution, by increasing the possibilities of employment, meant that literacy levels in some professions even decreased as the opportunity cost of getting an education increased.²⁸ A study of the Lancashire textile industry indicates a low correlation between education and wages; the lack

²⁵ Sabato (1985).

²⁶ The specific cases of some individuals show that literacy was not a prerequisite for the possession of capital: Manuel Rodríguez, the owner of cars worth 6,000 pesos, was illiterate, as were several owners of butcher shops. A great difference, however, can be seen in the cases of very wealthy individuals, such as ranch owners and important merchants, who were all literate. The illiterate people who owned capital, in contrast, were transporters (owning of one or more carts), butchers, grocers and water carriers; that is, they had minimal capital.

²⁷ Mitch (1990).

²⁸ Schofield (1973); Nicholas (1992).

of difference is explained by the low contribution of education to labour productivity in this manufacturing sector.²⁹

For Massachusetts, New England, another developed region, Field questioned whether the type of industrialization which took place required large numbers of literate workers.³⁰ However, and according to a sample, in the textile industry of this state, literate employees received salaries which were 17% higher than those unable to read and write.³¹

The economic contribution of education in the 19th century is far from being a closed matter; it requires further study and improved quantitative information. What should probably no longer be accepted are simplistic claims of a clear and permanent correlation between literacy and productivity, such as those made around the year 1850 by the educational reformer Sarmiento, who claimed that education was the factor responsible for a country's increase in wealth, converting each individual into a productive centre or a workshop to create prosperity.³² On the other hand, it is no longer surprising that, in 1830, when the school inspector Saturnino Segurola asked a group of parents from the Buenos Aires town of Ranchos why they did not send their children to school, they replied that "they had not needed to read to have money." Segurola's subsequent report, referring to the event, seemed to confirm that although education was necessary to cultivate the spirit, it did not necessarily lead to higher income.³³

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²⁹ Sanderson (1974).

³⁰ Field (1976).

³¹ Although the difference is attributed more to racial and class discrimination than to increased productivity (Graff, 1987, 346).

³² Sarmiento (1948-1956), XII, 63.

³³ AHPBA DGE *Registro de Circulares* 1826-34, f. 139 (Note dated 12/8/1830).

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