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Women's Participation in the Labor Market and Children's Educational Progress in Senegal

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Abstract: This research aimed to better understand the impact of a mother's work on girls' and boys' school progression at the end of primary school in Senegal. The observed correlations between a child's educational success and the mother's labor market involvement may not indicate causation but could instead result from other shared factors influencing both variables (an endogeneity issue). To address this issue, we estimated a bivariate model with two equations, one explaining the mother's participation in the labor market and the other explaining the child's educational survival, applied to data from the Integrated Regional Survey on Employment and the Informal Sector (ERI-ESI-2018). We discovered that certain individual characteristics, such as age, education level, and marital status, as well as family characteristics, including household size and parents' social background, play significant roles in maintaining women's labor market activity. Furthermore, we concluded that mothers' participation in the labor market has a positive and significant effect (at 10%) on boys' success in primary school exit exams, while the impact on girls is negative and not statistically significant. When controlling for various factors, we found that children whose mothers possess higher levels of education are more likely to pass their primary school exams. The results highlight the significance of women's education, underscoring its role in not only integrating women into the labor market, but also in fostering their children's academic success. In terms of economic policy implications, the study suggests that state authorities should continue to invest more in improving women's literacy rates and in strengthening their academic and professional capacities, thereby enabling them to achieve advanced levels of education and higher qualifications.

Keywords: labor market; educational progression; instrumental variable; Senegal

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1. Introduction

Children's educational success has become a major social concern, giving rise to widespread mobilization (Hill et al., 2005; Tong et al., 2009; Kasiwa, 2018). Most of the works reviewed maintain that, in addition to the so-called disciplinary skills associated with the acquisition of knowledge in traditionally taught subjects (Tulk, 2013), the family remains the anchor point in the development of young people and their success at school (Belsky et al., 2005). However, the weakening of marital unions, the diversification of family structures, and the active participation of mothers in the labor market are all factors that increase the complexity of family organization and, incidentally, the parental role in children's education (Parent & Brousseau, 2008; Tulk, 2013). In this research, we were particularly interested in the effect of the mother's work on child rearing in a context

where women are increasingly engaged in the labor market and face serious difficulties in reconciling their professional role with their maternal obligations.

In the economic literature, the mother's participation in the labor market as a direct determinant of children's educational success has been little explored. However, according to Afridi et al. (2016), there are three main channels through which maternal employment affects children's education. Firstly, overall household income is likely to increase when the mother starts earning an income. This can lead to greater investment in children's human capital. Secondly, when the mother is involved in outside work, the children may be required to take on household chores and other domestic obligations, which can worsen their school performance. Thirdly, earning an income can give the mother the power to make decisions about the allocation of resources within the household. This high decision-making power of the woman positively affects the human capital of the children in the household.

All three channels may be at play, making the direction of the effect of women's participation in the labor market on children's human capital ambiguous. Indeed, if a woman's participation in the labor market is due to an exogenous shock putting the household in a precarious situation, this would have no effect on the children's human capital, among other things. Similarly, in the absence of a woman's high decision-making power within the household, an increase in household income due to her participation in the labor market may not be beneficial for improving children's human capital. This suggests that a greater weighting of working mothers' preferences in household decision-making could be a key factor in improving their children's educational attainment. The existing literature has shown that when a mother works, she generally has more influence over household decisions, which can encourage children to attend school. However, in some cultures, and in the patriarchal regimes that prevail in Africa, even if a woman works, she does not control her income, which reduces her impact on children's schooling.

In Senegal, more and more women are active in the job market. Between 2005 and 2020, the female labor force participation rate rose significantly, from 36.9% to 48.6% (ANSD, 2021). The employment rate also changed considerably over the same period. It rose from 25.5% in 2005 to 31.1% in 2020 (ANSD, 2021). However, although they are economically active, they operate mainly in the subsistence farming sector and in marginal activities of the informal economy, with low added value and insufficient economic profitability (BIT, 2007).

Senegal is characterized by a highly informal labor market, which may influence the effects of women's employment on children's schooling differently from countries where formal employment is more widespread. Gender norms play an important role in the division of domestic and professional labor, which could affect the effect of women's participation in the labor market on children's educational follow-up. The prevalence of extended families in Senegal could be a factor mitigating or amplifying the impact of women's employment on children's education. In certain situations, other family members (grandparents, aunts) can compensate for maternal absence and thus reduce the potential negative impact on school supervision. Conversely, in a context of heavy domestic burden for women, the lack of alternative childcare options could hamper their educational progress.

On the political level, Senegal has been pursuing a bold policy of universal enrollment for almost two decades, with significant results in terms of access to schooling and the reduction of inequalities between girls and boys in compulsory education cycles. An analysis of the academic progression[1] of primary school pupils shows that, for each primary level, the country recorded more than 94% of pupils progressing to the next level between 2016 and 2017 (ANSD & AFRISTAT, 2019). Analysis by gender shows that the proportion of girls moving on to the next grade is generally higher than that of boys, except for the last grades of primary, secondary 1, and secondary 2 schools. In fact, at these levels, boys are

more likely to succeed and move on to the next level (89.2% of girls and 86% of boys pass the primary level and move on to secondary level 1).

These statistics raise a central question: what is the potential effect of mothers' participation in the labor market on the school survival of pupils (girls and boys) at the end of primary school in Senegal?

Drawing on data from (ANSD & AFRISTAT, 2019)'s Integrated Regional Survey on Employment and the Informal Sector (ERI-ESI), the overall objective of this research was to examine the effect of mothers' labor market participation on children's education in Senegal. Specifically, it aimed to (i) identify the factors determining mothers' participation in the labor market and (ii) analyze the effect of mothers' participation in the labor market on the academic success of children (girls and boys) at the end of primary school. Table 1 below shows elementary school survival rates by area of residence and gender.

Table 1. Primary school survival rate according to the area of residence and the gender of the pupils.

Area of Residence	Percentage of Children Who Were in Their First Year in 2016 and Their Second Year in 2017 (%)	Percentage of Children Who Were in Their Second Year in 2016 and Their Third Year in 2017 (%)	Percentage of Children Who Were in Their Third Year in 2016 and Their Fourth Year in 2017 (%)	Percentage of Children Who Were in Their Fourth Year in 2016 and Their Fifth Year in 2017 (%)	Percentage of Children Who Were in Their Fifth Year in 2016 and Their Sixth Year in 2017 (%)	Percentage of Children Who Were in Their Seventh Year in 2016 and Their Seventh Year in 2017 (%)
Dakar	95.5	98.9	94.6	96.6	92.4	77.6
Other towns	95.8	97	94.9	96.3	96.3	92.7
Rural	96.5	96.9	95.3	96.3	95.6	91.4
Sex						
Boys	95.7	97.3	95	96	94.6	89.2
Girls	96.5	97.3	95	96.6	95.2	86
Senegal	96.1	97.3	95	96.3	94.9	87.5

Source: ANSD, ERI-ESI 2018.

This research responds to a question of international interest, and from this point of view, it is relevant to both scientific research and policy-making. As far as scientific research is concerned, we are unaware of any works in West Africa, particularly in Senegal, focusing on identifying the causal effect of mothers' participation in the labor market on their children's school performance. It is this gap that the present research sought to fill. From a policy point of view, this research contributes to inclusive growth and fits in perfectly with the achievement of sustainable development goals, notably quality education, decent work and economic growth, and gender equality.

This article is organized as follows. Section 2 presents the literature review, Section 3 details the research methodology and describes the data used, Section 4 provides the results and their economic interpretations, and Section 5 describes the conclusions.

2. Literature Review

The conflict between the roles of mother and worker is considered to stem from the separation of home and workplace, the nature of employment, and social norms regarding the roles of men and women (Mason & Palan, 1981; Rindfuss & Brewster, 1996). However, this conflict could be attenuated under certain circumstances. First, there are some jobs with characteristics that allow for the simultaneous fulfilment of worker and mother roles, thereby reducing the incompatibility between the two. For example, women occupied in agriculture, working at home or on a family farm, are largely able to combine their working and mothering roles. For women working outside the home, particularly in the modern sector, it is more difficult to combine parenting and worker roles.

Results from studies by Luke and Munshi (2011) focusing on plantations in southern India where women are permanently employed show that a relative increase in women's income has a positive impact on their children's education. Using data from the Young Lives Study (YLS) in India, Afridi et al. (2016) found that higher maternal labor market participation is associated with more time spent in school by children in their households. Moreover, they found that the impact was more pronounced in poorer households. In fact, almost half of the increase in time spent in school by students could be explained by an increase in the probability of a child attending school while the mother is at work. Moreover, this increase in school attendance translates into better educational outcomes for the students.

A study conducted in Canada showed that a woman's employment has a positive impact on her child's academic performance and well-being (Tulk et al., 2016). In fact, the more involved a mother is in her work, the more likely her child is to do well in school. However, changes in career direction, promotions, or irregular working hours could affect family life and cause anxiety for children. This would undoubtedly deprive them of valuable time that could have been spent playing together, reading, doing homework, and going on outings (Tulk et al., 2016). These findings are consistent with those of Marchant et al. (2001), who showed that the relationship between students and their parents and the support they receive from their parents contribute significantly to academic success. Cawley and Liu (2012), in a study conducted in the United States, found that working outside the home is associated with less time spent with children to provide cognitive stimulation, but the magnitude of the effect remains small. Mothers who worked outside the home spent only 12 min less per day with their children and 37 min less on direct child care than mothers who did not work outside the home.

Ruhm (2004) showed that maternal employment during the first three years of a child's life has a small negative effect on the estimated verbal ability of three-year-olds and a larger negative effect on reading and achievement of five- and six-year-olds. Nelen et al. (2013) found that there is no negative relationship between maternal working hours and child outcomes, as is often found for preschool-aged children. Instead, they found that children's sorting test scores were higher if their mother worked part-time (girls) or full-time (boys). At the same time, working may benefit children, for example, by increasing family income.

De Hoop et al. (2017) found that women's participation in the labor market increases household income and the demand for children's education and hobbies, which in turn reduces children's labor supply. This finding is in line with previous studies that showed that an increase in maternal income activity, which translates into higher investment in children's health, leads to an improvement in children's human capital (Haddad et al., 1997). Hill et al. (2005) estimated the impact of maternal employment on children's cognitive outcomes (measured for children aged 3 to 8). They found that estimating the true impact of women's labor market participation on children's development is complicated by selection bias and the endemic lack of data in most studies of such policies. To overcome these problems, researchers have resorted to the use of propensity score matching and multiple imputation. Hill et al. (2005) compared the results of four methods of maternal employment status: not working in the first three years after childbirth, working only after the first year, working part-time in the first year, and working full-time in the first year. The results highlighted the small and negative, but significant, effects of maternal labor market participation on children's cognitive outcomes in the case of full-time work in the first year after childbirth, compared to delaying work until the end of the first year after childbirth. Multiple imputations produced estimates for the different measures that differed markedly from a case-by-case approach. These researchers also found that the differences between the results of propensity score matching and regression modeling were often minimal.

Relatively few empirical studies have focused on the impact of mothers' labor market participation on their children's well-being in general and on children's human capital in particular, especially with respect to developing countries. The impact of women's participation in the labor market on children's survival at school in West Africa is highly dependent on the type of employment held by mothers. While stable, well-paid work for women improves school enrolment rates, informal and insecure work can lead to economic constraints that increase the risk of dropping out of school (Kpadonou, 2022).

Debela et al. (2019) used panel data estimated using the fixed effects model from a study conducted in Tanzania. They concluded that maternal employment has a non-linear effect on children's weight-for-age z-scores. Moore and Schmidt (2004) used the instrumental variables (IV) method and found that maternal employment has a negative effect in the first year of children's lives and a potentially positive and definite effect in the second year. The net effect over the first three or four years is significant. Diagne (2006) showed that in rural Senegal, economic constraints force children from families where the mother works to drop out of school early to contribute to the household income. The results of Evans and Acosta (2021) are in line with these findings, showing that an economically active mother improves her children's chances of survival at school, provided that her income is stable and sufficient to cover educational costs. Filmer and Schady (2009) showed that in households where women contribute to income, school enrolment rates are higher. At the same time, if the mother's employment is unstable or informal, the positive impact may be limited (Tsimpo & Wodon, 2016).

There is, therefore, no consensus in the literature on the impact of women's labor market participation on child well-being in general and on human capital in particular. The impact of women's employment on child well-being is usually captured by the socioeconomic status of the household, which, in turn, operates through a number of 'proximate determinants' of child health and education. In this context, child health and education outcomes depend on a combination of social, economic, biological, and environmental forces. Women's participation in the labor market contributes to household income, which generally provides access to more and better-quality food, housing, protection from repeated school absenteeism, and improved school performance.

3. Methodology and Data

To analyze student behavior, specific statistical methods are necessary to isolate the effects of particular explanatory variables. Impact evaluation models, especially the instrumental variable method, help correct for these effects. This study aimed to examine the impact of mothers' labor market participation on primary school completion rates in Senegal, with a focus on gender differences.

The observed correlations between a child's educational success and the mother's labor market involvement may not indicate causation but could instead result from other shared factors influencing both variables (an endogeneity issue). For example, an unobserved factor, such as the mother's talent, might simultaneously lead to her career advancement and her child's improved academic performance. Similarly, household tensions could both impact the mother's employment status—potentially leading to unemployment—and negatively affect the child's educational outcomes (Duée, 2005).

To address this issue, we estimated a bivariate model with two equations, one explaining the mother's participation in the labor market and the other explaining the child's educational survival. Note the following:

- y_1—the mother's participation in the labor market is captured here by the occupation of any job. This variable is the implementation of an unobserved variable:

$$y_1 = 1(y_1^* > 0) \quad (1)$$

- y_2—the school survival of the child (transition to a higher grade in two consecutive years). This variable is the fulfilment of unobserved variable y_2^*:

$$y_2 = 1(y_2^* > 0) \quad (2)$$

The model is, therefore, written as follows:

$$\begin{aligned} y_{1i}^* &= X_{1i}\alpha + \varepsilon_{1i} \\ y_{2i}^* &= X_{2i}\beta + \delta y_{1i} + \varepsilon_{2i} \end{aligned} \quad (3)$$

where X_{1i} and X_{2i} are the individual characteristics of the mothers and their pupils, respectively. The model incorporates explanatory variables linked to students' sociodemographic characteristics (such as gender and area of residence), maternal characteristics (including age, qualifications, education type, employment type, and social background), and household attributes (notably, area of residence).

For the model to be identified, it is preferable that at least one variable, called the instrument, be excluded. We, therefore, needed to find a variable that directly determined the mother's participation in the labor market but had no direct impact on the student's survival in school. Instruments used in the literature include capital income (Mayer, 1997) or unionization in the company where the parent works, which are thought to explain part of the household income without influencing children's educational success (Shea, 2000; Duée, 2005). Other instruments, such as grandparent characteristics (socioeconomic status or socio-professional category), have been used (Maurin, 2002; Duée, 2005). The assumption is that these variables have no direct effect on the child's education, but that their effect is taken into account by the various control variables describing the parents' level of education, father's and mother's qualifications, etc.

In this research, the existence of a trade union in the sector in which the mother is employed was used as an instrument for women's participation in the labor market. This approach is justified by the structuring role that trade unions have played in promoting gender equality and improving working conditions in several developing countries (ILO, 2018). In these countries, union action has helped to reduce structural barriers to women's economic participation, justifying the relevance of unionization as an instrument. The underlying assumption is that the presence of unions improves working conditions (better job security, more flexible working hours, higher wages), making women's participation in the labor market more attractive. In the Senegalese context, trade unions, although often dominated by men, have gradually integrated the gender issue into their demands, notably by promoting equal pay, fighting occupational discrimination, reorganizing working hours, and defending the rights of women workers in the informal sector (ILO, 2020).

We postulate that the existence of a union in a given sector can affect an individual's decision to work in that sector. If an individual is unionized, this can have a direct effect on the household environment through channels such as job stability, social benefits, and improved household income. Thus, we assume that the impact of the mother's unionization on the children's educational attainment is solely through its effects on the mother's employment conditions, job security, improved income, and legal recognition of the mother's work—thus satisfying the exclusion condition. This approach follows the logic of Card (1996) and Angrist and Krueger (2001), who recommended the use of aggregate variables to capture structural effects without introducing biases related to individual characteristics.

The instrumental variable method used here allowed us to deal with the endogeneity of the "mother's participation in the labor market" variable, which was our variable of interest. It should be noted that other variables in our model (control variables) may also be suspected of endogeneity. In the case of our research, we started from the strong assumption that the control variables used were exogenous, or that their possible endogeneity would not significantly bias the estimate of the effect of a mother's participation in the labor market on pupils' school results at the end of primary school.

The variables used in the different models are presented in Table 2 below.

Table 2. Summary description of the variables.

Number	Variables	Explanation	Categories
1	Y_1	Participation of women in the labor market	0 = Do not participate 1 = Participate
2	Y_2	Child's academic achievements	0 = Not promoted to the next grade 1 = Promoted to the next grade
3	x_1	Child's sex	0 = Boy 1 = Girl
4	x_2	Mother's age (ref.: 15–24 years)	0 = 15–24 years 1 = 25–34 years 2 = 35–64 years 3 = 65 years and over
5	x_3	Area of residence (ref.: Dakar)	0 = Dakar 1 = Other urban areas 2 = Rural
6	x_4	Mother's degree (ref.: no degree)	0 = No degree 1 = CFE 2 = BFEM 3 = CAP 4 = BEP 5 = BAC 6 = DEUG, DUT, BTS 7 = Undergraduate degree 8 = Master's, DESS, DEA, BSc in Engineering
7	x_5	Marital status (ref.: Single)	0 = Single 1 = Married 2 = Divorced 3 = Widow
8	x_6	Household size (ref.: 1–6 people)	0 = 1–6 people 1 = 7–10 people 2 = 11–15 people 3 = 16 and more
9	x_7	Type of apprenticeship (ref.: academic training)	0 = Academic training 1 = Simple (praticals with no theory) 2 = Dual (theory and practice)
10	x_8	Parents' social category (ref.: children of managers)	0 = Children of managers 1 = Children of the employees 2 = Children of a self-employed worker 3 = Children of another social category of parents

Table 2. *Cont.*

Number	Variables	Explanation	Categories
11	x_9	Mother's group job (ref.: highly qualified)	0 = Highly qualified 1 = Low-skilled worker 2 = Qualified employee 3 = Unqualified employment
12	x_{10}	Existence of a trade union in the sector in which the mother is employed (ref.: not unionized)	0 = Not unionized
			1 = Unionized

Source: authors' own construction.

The data used were extracted from the Integrated Regional Survey on Employment and the Informal Sector (ERI-ESI, 2017–2018), which covers two components: the first component collects data on the socioeconomic characteristics of the population (education, health, employment, demography, etc.), and the second component relates to the collection of data from the informal non-agricultural production units identified during the first component. We focused mainly on the first phase, during which two questionnaires were used: a household questionnaire used to collect information on all household members, the household, and the dwelling, and an employment questionnaire administered in each household to all individuals aged 10 and over. We performed a descriptive analysis of the data according to certain characteristics of the mothers (see Appendix B, Table A1).

4. Results and Discussion

In this section, we first present the results of the binary logit model used to identify the determinants of women's participation in the labor market. Secondly, using the instrumental variables method, we discuss the results of the impact of mothers' participation in the labor market on pupils' academic success at the end of primary school, distinguishing between boys and girls.

- **Determinants of women's participation in the labor market**

The determinants of women's participation in the labor market were obtained by estimating a binary logit model (Table 3). Estimates were made by applying White's correction to obtain unbiased parameters in the presence of heteroscedasticity. The probabilities associated with the Wald statistic were zero, indicating that the overall quality of the model was satisfactory. In other words, the variables selected contribute to explaining women's participation in the labor market. Moreover, the percentage of correct predictions is 77.34%. We estimated the odds ratios in order to obtain a precise estimate of the probability of participating in the labor market according to women's individual characteristics.

Table 3. Determinants of women's labor force participation.

	Women's Participation in the Labor Market	
Variables	**Odds Ratios**	**Robust Std. Err.**
	Age (ref.: 15–24 years)	
25–34 years	1.246 **	0.114
35–64 years	1.627 ***	0.159
65 years and over	0.647 *	0.144

Table 3. *Cont.*

	Women's Participation in the Labor Market	
Variables	**Odds Ratios**	**Robust Std. Err.**
Education level (ref.: no level)		
Primary	1.506 *	0.331
Secondary	1.194	0.326
Superior	1.856	1.242
Diploma (ref.: without diploma)		
CFEE	1.360 *	0.249
BFEM	1.931 ***	0.398
CAP	2.233 *	1.007
BEP	1.624	0.503
BAC	0.602	0.352
DEUG, DUT, BTS	1.435	1.345
License	1.407	1.093
Master's, DESS, DEA, degree in Engineering	3.422	3.685
Type of apprenticeship (ref.: theoretical training)		
Simple (practice without theory)	7.965 ***	0.938
Dual (theoretical and practical)	7.978 ***	1.307
Marital status (ref.: Single)		
Married	1.444 **	0.152
Divorced	2.104 ***	0.437
Widowed	2.815 ***	0.730
Household size (ref.: 1–6 people)		
7–10 people	1.129	0.122
11–15 people	1.400 ***	0.159
16 and over	1.663 ***	0.199
Place of residence (ref.: Dakar)		
Other urban centers	0.956	0.114
Rural	1.001	0.123
Social origin of the parents (ref.: children of executives)		
Children of employees	1.281	0.218
Children of self-employed workers	1.212	0.196
Children of parents with another CSP	0.644 **	0.132
Constant	0.053 ***	0.018
Wald chi-squared (36)	1021.03	
Prob > chi-squared	0.000	
Pseudo R^2	0.237	
Log pseudolikelihood	−2439.989	
Classified correctly	77.34%	

Note: The endogenous variable represents the participation of women in the labor market (holding any employment position). Signs ***, **, and * indicate the significance of variables to their respective thresholds of 1%, 5% and 10%. Source: authors' own computation. CFEE: Certificat de Fin d'Etudes Elémentaires, BFEM: Brevet de Fin d'Etudes Moyennes, CAP: Certificat d'Aptitude Professionnelle, BEP: Brevet d'Etudes Professionnelles, BAC: Baccalauréat, DEUG: Diplôme d'Etudes Universitaires Générales, DUT: Diplôme Universitaire de Technologie, BTS: Brevet de Technicien Supérieur, DESS: Diplôme d'Etudes Supérieures Spécialisées, DEA: Diplôme d'Etudes Approfondies.

Table 3 shows that age significantly influences job prospects in Senegal. The results show that young women aged 25–34 and adult women aged 35–64 are 1.24 and 1.62 times more likely, respectively, to be employed than younger women aged 15–24, who are typically entering the labor market for the first time. This trend is partly due to the fact that in Senegal, young people often leave the education system later, which delays their acquisition of the professional experience that builds employers' trust. While these young women may possess recent, up-to-date skills that could be advantageous, their lack of experience is often seen as a drawback. Employers favor older women, who are perceived as more responsible and experienced.

In our sample, where descriptive statistics highlighted the predominance of informal employment, this finding aligned with the tendency of adult women to work independently to supplement household income. Conversely, young women aged 15–24 were still more likely to be employed than women aged 65 and over.

Women in Senegal who leave school with only primary education are 1.5 times more likely to find employment than those with no education at all, while secondary or higher education appears to have no significant impact on labor market participation.

The pattern is similar regarding qualifications: holding a higher diploma does not significantly increase employment prospects, while women with primary and lower-secondary diplomas are more likely to be employed than those without any diploma. This could be because those with advanced qualifications may resist taking lower-skilled jobs, viewing them as unworthy of their years of study. Furthermore, the prevalence of informal employment in Senegal reduces demand for highly qualified women, who often seek wages commensurate with their credentials—wages that the informal sector is less willing or able to offer. This result corroborates that of Kpadonou (2022), who showed that in Benin, for example, an analysis of gender disparities in the labor market revealed that the educational level is negatively correlated with the probability of women being employed. Women with secondary or higher education are less likely to be employed than those with no education. This trend contrasts with findings by Lopez-Acevedo et al. (2021), which show that holding a higher diploma significantly boosts women's participation in Morocco's labor market.

The type of apprenticeship significantly influences the probability of participating in the job market. Women with practical training and those who combined theory and practice were respectively 7.96 and 7.97 times more likely to be employed than those with only theoretical training.

Marital status is an important factor in women's decision to participate in the labor market. Indeed, compared to single women, married (1.4 times), divorced (2.1 times), and widowed (2.8 times) women have a higher probability of participating in the labor market. This implies that social norms such as caring for one's spouse, childcare, or responsibility for domestic chores are not obstacles to women's participation in the Senegalese labor market. These results are in line with those of Nounagnon (2022), who found in Benin that being a single woman reduces the chances of working relative to married women. They are contrary to those of Spierings et al. (2010), who showed that the absence of a partner, husband, or any other adult male has a positive effect on women's employment. They also take issue with the findings of Killingsworth and Heckham (1986), who examined the determinants of female labor supply and its interactions with fertility rates, marriage, and divorce decisions in the USA, Canada, Great Britain, and Germany. They found that single women are always more likely to work than married women.

Number of siblings has a positive and significant influence on the chances of getting a job. The results show that as household size increases, so does the likelihood of participating in the labor market. Specifically, women from households of over 16 people are 1.6 times more likely to participate in the labor market than those from households of 6 people or less.

This result can be explained by the fact that, as household size increases, so do the needs of the household, which may bring the woman into the labor market in order to improve the household's standard of living, leading to an increase in resources devoted to children and better outcomes for them. This result runs counter to those of Nounagnon (2022), who showed that women's participation in the labor market decreases significantly with household size. Women with households of 5 to 7 people participate the least (0.85 times) in the labor market relative to households of less than 3 people.

The social background of parents is a determining factor in getting a job. Women with a managerial parent are more likely to enter the job market than women with parents from another socio-professional category. This finding corroborates the numerous studies highlighting the importance of social capital in access to employment in Senegal (Kane et al., 2020, 2021). However, this result is contrary to those of Ningaye and Njong (2015) for the case of Cameroon. These authors found that women in poor households or in poverty have a higher probability of accessing the labor market than women from wealthy households.

- **Impact of the mother's participation in the labor market on girls' and boys' academic achievement at the end of primary school**

To assess the impact of mothers' employment on children's educational outcomes, we used the instrumental variables method to control for unobservable factors. The instrumentation tests confirmed the robustness of our approach. The first stage F-statistic was above the threshold of 10, and the under-identification test was significant, indicating that the instrument was relevant, and the model was identified (see Appendix C, Table A2). In addition, the results of the second-stage estimation (Table 4) showed that the probabilities of the Sargan statistical test were greater than 10% and, therefore, did not reject the validity hypothesis of our instruments.

Table 4 shows that the mother's participation in the labor market has a positive and statistically significant impact at the 10% threshold on boys' academic success at the end of elementary school. For girls, the effect was negative and insignificant. A plausible explanation is that Senegalese families may invest more in boys' education than in girls' education, which may influence school success according to the child's gender. However, it should be noted that the significance for boys is at the 90% confidence level, so we can say that "mothers' participation in the labor market does not seem to have a significant impact on their children's academic progress".

In addition, mothers' professional occupations can lead their children, especially girls, to take on household chores and other domestic obligations, such as shopping at the local store or market. This leads to a reduction in revision time and a deterioration in girls' school results.

The results indicate that higher maternal education correlates with improved performance on children's primary school exit exams. Comparatively, girls outperform boys, possibly due to educated mothers having more knowledge about the education system, which may help to reduce traditional gender norms and encourage equal educational investment for both genders.

This pattern holds true when considering mothers' educational qualifications: children whose mothers lack formal qualifications tend to perform less well in school, likely due to fewer financial resources, limited cultural capital, and less familiarity with the education system (Duée, 2005). Specifically, having a mother with a primary or lower secondary diploma significantly increases a child's probability of passing primary school exams. This aligns with Duée (2005) findings, suggesting that mothers with some formal education are better equipped to navigate the school system and support their children's progress. Notably, this effect is more pronounced for girls, who may feel a stronger motivation to

excel academically, recognizing that a good education could lead to more opportunities in the workforce.

Other characteristics that significantly influence the likelihood of obtaining a primary school diploma include the mother's type of training, the household's place of residence, and the size of the family, with these effects being particularly pronounced for boys. Specifically, boys whose mothers have undergone practical training or a combination of theoretical and practical education are more likely to achieve academic success compared to those whose mothers have only received theoretical training.

Table 4. Impact of the participation of mothers in the labor market on the academic success of girls and boys at the end of primary school.

	Boys		**Girls**	
Variables	**Coef.**	**Std. Err.**	**Coef.**	**Std. Err.**
Labor force participation (non-employed women)				
Employed women	0.110 *	0.064	−0.038	0.075
Mother's level of education (ref.: no level)				
Primary	0.019	0.012	0.016	0.012
Secondary	0.262 ***	0.017	0.443 ***	0.021
Higher	0.284 ***	0.027	0.451 ***	0.043
Mother's diploma (ref.: no diploma)				
CFEE	0.323 ***	0.011	0.501 ***	0.011
BFEM	0.277 ***	0.0124	0.485 ***	0.013
CAP	0.537 ***	0.034	0.700 ***	0.024
BEP	0.287 ***	0.017	0.472 ***	0.020
BAC	0.261 ***	0.023	0.468 ***	0.042
DEUG, DUT, BTS	0.262 ***	0.042	0.476 ***	0.063
License	0.272 ***	0.035	0.474 ***	0.055
Master's degree, DESS, DEA, Engineering diploma	0.275 ***	0.037	0.469 ***	0.063
Type of learning (ref.: theoretical training)				
Simple (practical, without theory)	0.107 **	0.046	0.006	0.053
Dual (theoretical and practical)	0.088 **	0.044	0.018	0.049
Mother's place of residence (ref.: Dakar)				
Other urban centers	0.006	0.007	0.003	0.007
Rural	0.014 **	0.007	−0.001	0.007
Household size (ref.: 1–6 people)				
7–10 persons	0.009	0.006	0.001	0.006
11–15 persons	0.007	0.006	0.004	0.007
16 and over	−0.016 **	0.007	0.004	0.008
Parents' social background (ref.: children of executives)				
Children of employees	0.0039	0.009	−0.012	0.010
Children of self-employed people	0.007	0.009	−0.010	0.009
Children of parents with other CSP	0.016	0.011	0.0101	0.011
Mother's occupation group (ref.: highly skilled)				
Low-skilled jobs	−0.008	0.008	0.001	0.006
Skilled jobs	−0.007	0.006	0.008	0.006
Unskilled jobs	−0.002	0.006	0.009	0.007
Constant	−0.022	0.022	0.011	0.020
Observations	2810		1984	
LM statistic	9.829		6.686	
***p*-value**	0.132		0.333	
Sargan statistic test	5.617		9.955	
***p*-value**	0.777		0.354	

Note: The endogenous variable represents the academic success of girls and boys at the end of primary school. The signs ***, **, and * indicate the significance of variables to their respective thresholds of 1%, 5% and 10%. Source: author's own computation. CFEE: Certificat de Fin d'Etudes Elémentaires, BFEM: Brevet de Fin d'Etudes Moyennes, CAP: Certificat d'Aptitude Professionnelle, BEP: Brevet d'Etudes Professionnelles, BAC: Baccalauréat, DEUG: Diplôme d'Etudes Universitaires Générales, DUT: Diplôme Universitaire de Technologie, BTS: Brevet de Technicien Supérieur, DESS: Diplôme d'Etudes Supérieures Spécialisées, DEA: Diplôme d'Etudes Approfondies.

Additionally, boys living in rural areas have a higher likelihood of passing their primary school exit exams than those residing in the capital, Dakar. Furthermore, larger household sizes correlate with decreased chances of successfully completing primary education. This finding aligns with the study by Goux and Maurin's (2005), who used a living conditions approach and concluded that overcrowded housing significantly increases the risk of academic underachievement.

5. Conclusions

The recent rise in the supply of female labor in Senegal has significantly impacted family dynamics and child-rearing practices. The primary objective of this research was to analyze the potential effects of mothers' labor market participation on the educational success of both girls and boys at the end of primary school. Using primary data from the Integrated Regional Survey on Employment and the Informal Sector (ERI-ESI) by (ANSD & AFRISTAT, 2019),we employed instrumental variable techniques to address the endogeneity of the variable "mother's participation in the labor market." This approach recognizes that the observed correlations between a child's educational success and their mother's employment may not be directly causal but could instead result from other factors influencing both variables simultaneously.

Our findings first identify the factors that determine mothers' participation in the labor market, followed by an analysis of how this participation affects children's academic outcomes at the end of primary school. We discovered that certain individual characteristics, such as age, education level, and marital status, as well as family characteristics, including household size and parents' social background, play significant roles in maintaining women's labor market activity.

Furthermore, we concluded that mothers' participation in the labor market has a positive and significant effect on boys' success in primary school exit exams, while the impact on girls is negative and not statistically significant. Furthermore, when controlling for various factors, we found that children whose mothers possess higher levels of education are more likely to pass their primary school exams, with this effect being more pronounced for girls.

These results prompt a societal reflection on the roles of women, the responsibilities of fathers, and the concept of parenthood as female labor participation rates increase. However, the results highlight the significance of women's education, underscoring its role in not only integrating women into the labor market, but also in fostering their children's academic success. In terms of economic policy implications, the study suggests that state authorities should continue to invest more in improving women's literacy rates and in strengthening their academic and professional capacities, thereby enabling them to achieve advanced levels of education and higher qualifications. Furthermore, the Senegalese government must implement strategies to raise awareness among parents and communities of the benefits of girls' education.

The discrepancies in academic progress between girls and boys at the conclusion of primary school warrant further investigation through qualitative studies, which can provide valuable insights complementing the current quantitative analysis. These studies can inform the development of targeted public policy initiatives to assist girls whose mothers are engaged in the labor market in enhancing their performance in primary school exit examinations.

This research suffers from a number of limitations. The first is that the data did not capture the extent of temporary or permanent unemployment among women and the dropout rate among children, particularly those from disadvantaged backgrounds, following the COVID-19 pandemic. However, we hypothesize that there have not been significant differences in the results obtained, as women continue to enter the labor market. Indeed,

according to official statistics, the female activity rate rose from 48.6% in 2020 to 49.1% in 2024, demonstrating the increase in the number of women in the workforce (ANSD, 2024). This increase is explained by the support provided to women after the COVID-19 pandemic in Senegal through several financing, training, and coaching programs to enable them to resume their economic activities, strengthen their resilience in the face of future crises, and bridge gender gaps in entrepreneurship and employment.

Another limitation is that our estimates do not take into account the fact that our sample sometimes includes several children from the same household. We, therefore, assume that by comparing the educational achievement of two children at the end of primary school from the same household, the same result is found. This similarity in school results between siblings may be due to the strong explanatory power of observed family characteristics (parents' qualifications, etc.).

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Appendix A

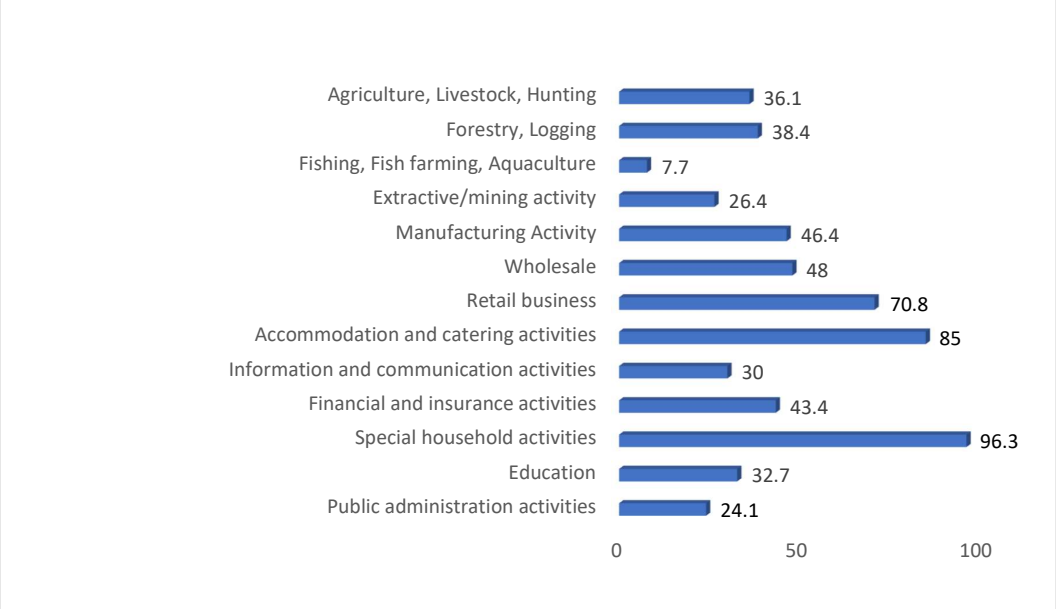

Figure A1. Part of women in some branches of activity in Senegal. Source: ANSD, ERI-ESI 2018.

Appendix B

Table A1. Descriptive statistics of the variables used in the estimated models.

	Employed Women					Non-Employed Women				
Variables	**N**	**Average/ Proportion**	**Standard Deviation**	**Min**	**Max**	**N**	**Average/ Proportion**	**Standard Deviation**	**Min**	**Max**
Children at the end of their primary school years										
Promoted to the next grade	109	0.733945	0.4439345	0	1	1163	0.9243336	0.2645773	0	1
Not promoted to the next grade	109	0.266055	0.4439345	0	1	1163	0.0756664	0.2645773	0	1
Mother's age										
15–24 years	12,392	0.2293415	0.4204263	0	1	50,885	0.482657	0.499704	0	1
25–34 years	12,392	0.2503228	0.4332164	0	1	50,885	0.2239363	0.416884	0	1
35–64 years	12,392	0.4713525	0.4991988	0	1	50,885	0.2226786	0.4160484	0	1
65 years and over	12,392	0.0489832	0.2158417	0	1	50,885	0.0707281	0.2563727	0	1
Mother's place of residence										
Dakar	12,392	0.1265332	0.3324628	0	1	50,885	0.0743245	0.2623008	0	1
Other urban areas	12,392	0.2997095	0.4581492	0	1	50,885	0.2730274	0.4455192	0	1
Rural	12,392	0.5737573	0.4945499	0	1	50,885	0.6526481	0.4761334	0	1
Mother's level of education										
No level	12,392	0.6792285	0.4667919	0	1	50,885	0.5638579	0.4959107	0	1
Primary	12,392	0.1964977	0.3973652	0	1	50,885	0.3075471	0.4614829	0	1
Secondary	12,392	0.1112815	0.3144931	0	1	50,885	0.1226114	0.3279941	0	1
Higher	12,392	0.0129923	0.1132453	0	1	50,885	0.0059837	0.0771232	0	1
Mother's diploma obtained										
Without diploma	12,392	0.6381256	0.4806017	0	1	50,885	0.7178749	0.4500446	0	1
CFEE	12,392	0.1687929	0.3746149	0	1	50,885	0.1636836	0.3699969	0	1
BFEM	12,392	0.1177625	0.3223662	0	1	50,885	0.0742385	0.2621648	0	1
CAP	12,392	0.0068695	0.0826073	0	1	50,885	0.0042975	0.065416	0	1
BEP	12,392	0.0206084	0.1420869	0	1	50,885	0.0223849	0.1479352	0	1
BAC	12,392	0.0252699	0.1569629	0	1	50,885	0.0126092	0.1115832	0	1
DEUG, BTS, DUT	12,392	0.0039254	0.0625377	0	1	50,885	0.0011806	0.0343409	0	1
License	12,392	0.0103042	0.1009977	0	1	50,885	0.0020307	0.0450185	0	1
Master's degree	12,392	00034347	0.0585131	0	1	50,885	0.0006139	0.0247706	0	1
Marital status										
Single	12,392	0.1475145	0.3546324	0	1	50,885	0.4136249	0.4924914	0	1
Married	12,392	0.7307133	0.4850656	0	1	50,885	0.4868353	0.4952862	0	1
Divorced	12,392	0.0323596	0.1769604	0	1	50,885	0.0158807	0.1250162	0	1
Widowed	12,392	0.0894125	0.2853498	0	1	50,885	0.0836591	0.2768807	0	1
Household size										
1–6 persons	12,392	0.2169948	0.4122157	0	1	50,885	0.156274	0.3631184	0	1
7–10 persons	12,392	0.2883312	0.4530043	0	1	50,885	0.2932691	0.4552652	0	1
11–15 persons	12,392	0.2458844	0.4306277	0	1	50,885	0.2607841	0.4390667	0	1
16 and over	12,392	0.2487895	0.432329	0	1	50,885	0.2896728	0.4536149	0	1
Vocational training										
Yes	12,392	0.3289219	0.4698405	0	1	50,885	0.5037289	0.4999923	0	1
No	12,392	0.6710781	0.4698405	0	1	50,885	0.4962711	0.4999923	0	1
Mother's group job										
Highly qualified	12,392	0.138525	0.3454657	0	1	50,885	0.1317143	0.3381973	0	1
Low-skilled workers	12,392	0.3161672	0.4649999	0	1	50,885	0.2026137	0.4019677	0	1
Qualified employees	12,392	0.2848556	0.4513659	0	1	50,885	0.4277629	0.4947797	0	1
Unqualified employment	12,392	0.2604522	0.438901	0	1	50,885	0.237909	0.4258251	0	1
Parents' social origin										
Children of executives	12,392	0.0249485	0.1559841	0	1	50,885	0.0278065	0.1644238	0	1
Children of employees	12,392	0.0981443	0.2975404	0	1	50,885	0.0852136	0.2792088	0	1
Children of self-employed people	12,392	0.7948454	0.4038562	0	1	50,885	0.7584351	0.4280467	0	1
Children of parents with other CSP	12,392	0.0820619	0.2744872	0	1	50,885	0.1285448	0.334707	0	1

Appendix C

Table A2. Result of the first stage of the IV regression.

	Participation in the Labor Market	
Variables	**Coefficient**	**Standard Error**
p-syndica	0.357 ***	0.017
Age (ref.: 15–24 years)		
25–34 years	0.084 ***	0.006
35–64 years	0.143 ***	0.006
65 years and over	−0.101 **	0.011
Diploma (ref.: without diploma)		
CFEE	0.013 **	0.005
BFEM	0.033 ***	0.006
CAP	−0.019	0.025
BEP	0.005	0.012
BAC	−0.076 ***	0.132
DEUG, DUT, BTS	−0.040	0.031
License	0.049 *	0.253
Master's, DESS, DEA, degree in Engineering	0.011	0.035
Type of apprenticeship (ref.: theoretical training)		
Simple (practice without theory)	0.334 ***	0.005
Dual (theoretical and practical)	0.394 ***	0.009
Marital status (ref.: Single)		
Married	0.113 ***	0.006
Divorced	0.082 ***	0.009
Widowed	0.023	0.018
Household size (ref.: 1–6 people)		
7–10 people	−0.026 ***	0.006
11–15 people	−0.024 ***	0.006
16 and over	−0.029 ***	0.006
Place of residence (ref.: Dakar)		
Other urban centers	−0.020 ***	0.006
Rural	−0.023 ***	0.006
Constant	0.048 ***	0.008

Note: The endogenous variable represents the participation of women in the labor market (holding any employment position). Signs ***, **, and * indicate the significance of variables to their respective thresholds of 1%, 5% and 10%. Source: authors' own computation. CFEE: Certificat de Fin d'Etudes Elémentaires, BFEM: Brevet de Fin d'Etudes Moyennes, CAP: Certificat d'Aptitude Professionnelle, BEP: Brevet d'Etudes Professionnelles, BAC: Baccalauréat, DEUG: Diplôme d'Etudes Universitaires Générales, DUT: Diplôme Universitaire de Technologie, BTS: Brevet de Technicien Supérieur, DESS: Diplôme d'Etudes Supérieures Spécialisées, DEA: Diplôme d'Etudes Approfondies.

F test of exclued instruments
F(1, 35716) = 441.52
Prob > F = 0.000
Sanderson-Windmeijer multivariate F test of excluded instruments:
F (1, 35716) = 441.52
Prob > F = 0.000
Underidentification test
Anderson canon. Corr. LM statistic Chi-sq (1) = 436.44 *p*-val = 0.000

Notes

[1] Progress measures the level at which pupils move from one year to the next. It is calculated using the school survival rate, which is the proportion of children who have moved from one level to another in two consecutive school years.

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