DO WIVES' EARNINGS CONTRIBUTE TO REDUCE INCOME INEQUALITY?: EVIDENCE FROM SPAIN*

Alfonso Alba-Ramírez and Lola Collado

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Correspondence: University of Alicante. Facultad de Ciencias Económicas.
Depto. de Fund. del Análisis Económico. Ctra. San Vte. del Raspeig, s/n.
03071 ALICANTE

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** Alfonso Alba-Ramírez: Universidad Carlos III (Madrid)
M. Dolores Collado: University of Alicante.

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A B S T R A C T

In this paper we analyze the effect of female labor force participation on family income inequality. We present evidence from Spain by using data from the Family Expenditure Survey for 1980 and 1990. The case of Spain is particularly interesting because inequality decreased over the eighties, while the labor force participation rate of married women increased substantially over the same period. Our results show that although female labor force participation has contributed to decrease income inequality in Spain, it is far from being one of the main factors behind the observed decrease in inequality over the eighties.

Keywords: Income Ínequality; Female Earnings; Female Participation.

I.- INTRODUCTION

The question "Do wives' earnings contribute to reduce income inequality?" has received much attention since Mincer's observation that women married to low income husbands tend to be more active in the labor market than wives of high income men (Mincer (1962, 1974)). This implies that the labor market earnings of married women can have an equalizing effect on the distribution of family income. However, as it will be referred in the next section, no definitive answer has yet been found to such conjecture. In this paper we add evidence from Spain.

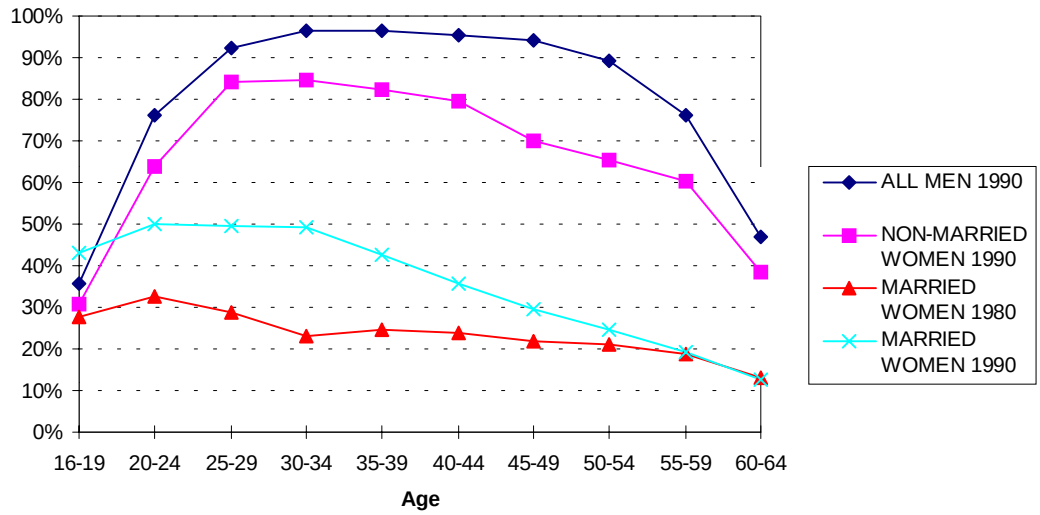
The case of Spain is particularly interesting to shed light on the issue for two reasons. Firstly, the labor force participation rate of married women increased dramatically in the country over the 1980s, from 22.8 percent in 1980 to 33.8 percent in 1990. Secondly, this upward trend coincided with a significant decline in inequality over the same time period. Figure 1 documents with more detail the labor force increase from 1980 to 1990 by showing the age-participation profiles of married women. We have also included men's and non-married women's participation rates in 1990 for the sake of comparison. The figure shows that all cohorts of married women younger than 40 increased their participation rate over the decade.

The decline in inequality in Spain contrasts sharply with the significant increase observed in the US and the UK in the 1980s. The evolution of income inequality in Spain is also different from most of the countries in continental Europe, where inequality did not change substantially over the period (Gottschalk and Smeeding (1997) and Gottschalk, Gustafsson and Palmer (1997)).

Woman's earnings can contribute to reduce family income inequality when her participation in the labor market is related to other sources of income in the family. For instance, women could be more likely to participate in the labor market when their husbands are unemployed. The empirical evidence regarding the effect of wives' earnings on family

income inequality is based on two different approaches. Some authors compare the observed income distribution with some counterfactual reference distributions as, for instance, the distribution of family income less wives' earnings (Danziger (1980) and Cancian and Reed (1998). The latter distribution can be roughly considered as an approximation to the income distribution that would arise if women do not work. The second approach consists in decomposing inequality indexes by groups, according to wives' labor market status, namely, whether she is working or not (Betson and Van Der Gaag (1984), Davies and Joshi (1998)). In this article we follow both approaches and we present evidence from Spain using data from the Spanish Family Expenditure Surveys (EPF) for 1980-81 and 1990-91.

FIGURE 1.- LABOR FORCE PARTICIPATION RATES BY MARITAL STATUS, SEX, AND AGE GROUPS



Source: Labor Force Survey (EPA).

The main contribution of this article is to analyze to what extent the decrease in inequality in Spain during the eighties can be due to the increase in the labor force participation of married women. To address this question, we simulate the distribution of income in 1990 using the labor force participation rate of married women in 1980. Our results indicate that women's labor force participation has a second order contribution to the

observed decrease in inequality. Further research is needed to determine what are the primary factors behind the significant decline in inequality in Spain over the 1980s.

The paper is organized as follows. In section II we describe the data, in section III we present the methodology and results, and in section IV we summarize and conclude.

II.- DATA AND DESCRIPTIVE ANALYSIS

In this study we use data from the Spanish Family Expenditure Survey (EPF) for 1980-81 and 1990-91. This survey was carried out by the Spanish National Institute of Statistics (INE) and it was designed to be representative of the whole Spanish population. The total sample size is 23,971 households for the 1980-81 survey and 21,155 households for the 1990-91 survey. For both periods we use a sample of married couples younger than 65, resulting 16,318 households in 1980-81 and 11,223 households in 1990-91[1].

Table 1 shows the differences in the labor force participation of husbands and wives. We observe a 50% increase in female participation from 1980 to 1990, while male participation decreased slightly over that period[2]. Table 2 presents the number of earners in the couple. It shows that the percentage of households with two earners increased from 14.4 percent in 1980 to 21.6 percent in 1990, while households in which the wife was the only earner increased from 2 percent to 2.9 percent. These figures show that the percentage increase in female participation was similar in both groups.

[1] We select households where the reference person is married and the spouse is present, and both are aged 16-64. Thus, we cannot consider couples where neither husband nor wife is the reference person because in that case we are unable to identify their marital relationship.

[2] We are only considering couples, therefore, through all the paper, when talk about male or female participation or earnings we refer to married people.

Table 3 presents each spouse's contribution to family income[3] and wife's share in couple's earnings. Over the 1980s, the latter increased about 65 percent, which is 10 percentage points higher than the increase of wives' contribution to family income (55 percent), and 15 percentage points higher than the fraction of women obtaining labor income (table 1). This implies that average wives' labor income has increased relative to that of their husbands. We have also calculated the ratio of average male to female earnings for those working. The results show that while in 1980 average labor income was 82% higher for men than for women, these differences were reduced to 63% in 1990.[4]

TABLE 1.- LABOR FORCE PARTICIPATION RATES FOR MARRIED COUPLES

Male participation	1980	1990
Earning	89.59	84.59
Employees	67.96	62.94
Self-employed	21.63	21.64
Female participation	**1980**	**1990**
Earning	16.37	24.45
Employees	11.98	18.68
Self-employed	4.39	5.77

Source: Tabulated from the Family Expenditure Survey.

TABLE 2.- NUMBER OF EARNERS IN MARRIED COUPLES

	1980	1990
Both earning	14.38	21.58
Husband only earning	75.21	63.00
Wife only earning	1.99	2.87
Neither earning	8.42	12.55

Source: Tabulated from the Family Expenditure Survey.

TABLE 3.- INCOME SHARES IN MARRIED COUPLES

	1980	1990
% Husbands' income in total income	78.64	69.04
% Wives' income in total income	7.85	12.16
% Wives' earnings in (Husband+Wife)'s earnings	9.14	15.08

Source: Tabulated from the Family Expenditure Survey.

[3] The income measure is annual income after taxes, excluding non-cash compensations.

[4] Because labor income is that obtained during the year, the indicated income differential also reflects that women are more likely to hold part-time jobs and to have non-employment spells. Data that controls for the latter show that in 1992 annual labor income of men was 40 percent higher than for women (INE, 1995).

The upper panel of figure 2 contains wives' labor force participation rate and the percentage of wives earning income (employed) by their husband income deciles in 1980 and 1990. Wives' labor force participation and employment increased over the decade for all deciles of men's income, but more markedly for the higher deciles. Both variables present a U-shape pattern, which is more apparent for 1990 than for 1980. A similar U-shape is obtained when wives' mean income is depicted by their husband income deciles (lower panel of figure 2). Finally, in the last panel of figure 2, we present wives' income shares by their husband income deciles. Wives' income share for the lowest decile is about double as for the highest decile, this indicates that women's earnings are an important source of income for very low-income families.

Consistent with Mincer's observation, these results suggest that wives of low-income husbands are more likely to participate in the labor market than wives of middle-income husbands. The reason is that if low-income husbands are unemployed or hold poorly-paid jobs, their wives tend to work to smooth off household income. However, wives of high-income husbands are also more likely to participate than wives of middle-income husbands, but supposedly for a different reason. If we believe that there is marital sorting, women married to high-income husbands are expected to have a higher level of education than women married to low income husbands, and therefore, their opportunity cost for working at home will be higher. Moreover, figure 2 shows that the increase in wives' earnings from 1980 to 1990 was bigger for the high-income families than for middle-income families. This will tend to increase family income inequality over time. However, the higher fraction of income earned by the wife in low-income families will contribute to reduce inequality.

FIGURE 2.- MEASURES OF WIVES' LABOR FORCE PARTICIPATION BY HUSBANDS' INCOME DECILES

Source: Family Expenditure Survey.

III.- INEQUALITY INDEXES AND RESULTS

The purpose of this research is to analyze the effect of female labor force participation on family income inequality. We use three different indexes to measure income inequality: Theil's I_0 index, the Gini coefficient and the coefficient of variation. These indexes are defined as follows:

Theil's I_0 index:

$$I_0 = \frac{1}{n}\sum_{i=1}^{n}\log(\mu / y_i)$$

The Gini coefficient:

$$G = \frac{1}{2n^2\mu}\sum_{i=1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right|$$

The coefficient of variation

$$CV = \frac{s}{\mu}$$

where y_i is family i's income, μ is the arithmetic mean and *s* is the standard deviation.

The reason why we are using three different measures of inequality is twofold. On the one hand, we can check the robustness of our results for different inequality indexes. On the other hand, most of the applied research in this area for some other countries, mainly for the US and the UK, are based on any of these measures; therefore, we will be able to compare our results with those for other countries.

As mentioned above, we want to analyze the effect of female labor force participation on family income inequality. We follow different approaches. For the static analysis, we compare the actual income distribution with the distribution of family income excluding wives' earnings (see Danziger (1980), and Cancian and Reed (1998) among others). A shortcoming of this approach is that it does not take into account possible reactions of husbands to changes in wives' labor supply. However, given the difficulty in measuring husbands' reactions, it is

reasonable to use the indicated distribution as a reference distribution to study wives' contribution to family income inequality. For the dynamic analysis, we simulate the income distribution that would have arisen in 1990 if female participation had not change from 1980 to 1990. We also use a different approach consisting in decomposing the coefficient of variation according to different sources of income. Thus, we calculate the coefficient of variation in 1990 if the distribution of wives' earnings had not change from 1980 to 1990 (Cancian and Reed (1998)). Finally, we divide the sample in two groups according to the labor market status of the wife. We use a decomposition of the Theil index (Shorrocks (1980)) to analyze whether the observed decrease in inequality is mainly due to a decrease in inequality within or between groups.

We present in Table 4 the inequality indexes for 1980 and 1990. We use a measure of household income adjusted for family size (equivalent income)[5]. In column (2) we calculate the indexes excluding wives' earnings from total income. We report estimates of the asymptotic standard errors[6], and t-ratios for the null hypothesis that inequality indexes for the population are the same in 1980 and 1990 (the t-ratios are distributed as standard normals under the null hypothesis).

We first compare the indexes for household equivalent income in 1980 and 1990, and conclude that, based on the sample used in this article, inequality in Spain decreased over the eighties[7]. This contrast with results for the US (Cancian and Reed (1998)) and for the UK (Davies and Joshi (1998)) which show that income inequality increased over that period. The percentage change in the index value varies for the alternative measures and it ranges from 1.7% decrease for the coefficient of variation to a 10% decrease for the Theil index. The

[5] Equivalent income is calculated using the equivalent number of adults in the household proposed by the OECD.

Equivalent income = Income/Equi

Equi = 1+0.7*(number of adults-1)+0.5*(number of children younger than 15)

[6] See Cowell (1989), and Mills and Zandvakili (1997) for Theil's I_0 index and the Gini coefficient, and Cowell (1995), pp. 117-119, for the coefficient of variation.

[7] Inequality also decreased when all households are considered. See Alvarez *et al* (1996), Del Río (1996) and Del Rio and Ruiz-Castillo (1998) for studies on inequality and poverty in Spain in the eighties.

changes are significant at a 1% level for both the Theil index and the Gini coefficient, while the changes for the coefficient of variation is not statistically significant at a 10% level.[8]

In column 2, we present the inequality indexes for the distribution of equivalent income once wives' earnings have been excluded. As indicated above, we use this distribution as a reference distribution and we analyze the effect of wives' earnings on income inequality by comparing the actual income distribution with the reference distribution. The results are not very conclusive. On the basis of the Theil index, wives' earnings reduced income inequality both in 1980 and in 1990, whereas the Gini coefficient shows that wives' earnings contribute to increase inequality. As we showed above (figure 2), the mean of wives' income by husbands' income deciles present a U-shaped pattern. The large average income of women married to high-income husbands points to a disequalizing effect of wives' earnings on income inequality. However, the fact that average income of women married to low income husbands is larger than that of women married to middle-income husbands points to the opposite direction. Therefore, the U-shaped pattern of the wives' average income by husbands' deciles can explain the contradictory results found for different indexes.

[8] We also obtained the figures shown in table 4 for total non-adjusted family income with similar results. Inequality declined over the period according to three indexes. However the decrease was not statistically significant on the basis of the Gini coefficient. Results are provided upon request.

TABLE 4.- INEQUALITY INDEXES FOR HOUSEHOLD INCOME ADJUSTED FOR FAMILY SIZE

	Theil		
	Total Equivalent Income	Excluding Wives' Earnings	% Change
1980	0.1912	0.2127	11.26
	(0.0043)	(0.0066)	
1990	0.1720	0.1848	7.45
	(0.0050)	(0.0075)	
1990b	0.1829		
	(0.0065)		
% Change 80-90	-10.05		
% Change 80-90b	-4.32		
t 80-90	-2.90		
t 80-90b	-1.06		

	CV		
	Total Equivalent Income	Excluding Wives' Earnings	% Change
1980	0.7246	0.7098	-2.05
	(0.0057)	(0.0057)	
1990	0.7125	0.7150	0.36
	(0.0068)	(0.0068)	
1990b	0.7202		
	(0.0069)		
% Change 80-90	-1.68		
% Change 80-90b	-0.61		
t 80-90	-1.37		
t 80-90b	-0.49		

	Gini		
	Total Equivalent Income	Excluding Wives' Earnings	% Change
1980	0.3214	0.3085	-4.01
	(0.0027)	(0.0028)	
1990	0.3060	0.2884	-5.76
	(0.0033)	(0.0037)	
1990b	0.3006		
	(0.0035)		
% Change 80-90	-4.77		
% Change 80-90b	-6.49		
t 80-90	-3.60		
t 80-90b	-4.72		

Source: Family Expenditure Survey.

Note: See note 4 for definition of equivalent income.

As indicated in the previous section, female labor force participation in Spain has experienced a large increase during the eighties. It is therefore interesting to assess whether the observed decrease in family income inequality between 1980 and 1990 is partly due to the increase in female labor force participation. Ideally, we would like to know how the distribution of income in 1990 would have been, if married women's labor force participation would have remained at the 1980 level. For the same reasons as we mentioned above, namely husbands reactions to changes in wives' labor supply, it is very difficult to infer accurately how the distribution would have been. Here we just consider the distribution of family income that would arise in 1990 if husbands did not react, but the proportion of married women working had not changed from 1980 to 1990.

We select a random sample of working women and we set their earnings to zero, so that married women labor force participation in 1990 is the same as it was in 1980. The inequality indexes associated with this new family income distribution are presented in table 4 under 1990b. The results are again not very conclusive and the reason is the U-shaped pattern for female participation by husbands' income deciles (upper panel of figure 2). According to the Theil index and the coefficient of variation, income inequality in 1990 would have been larger than actual inequality if female participation in 1990 would have been the same as it was in 1980. However, according to the Gini coefficient, the decrease in income inequality from 1980 to 1990 would have been larger if female participation had not increased.[9]

We will now consider an alternative reference distribution to analyze the effect of changes in wives' earnings on family income inequality. We can decompose total family income into three components, husbands' earnings, wives' earnings and other income (Cancian and Reed (1998)). Thus, the square of the coefficient of variation can be written as

$$CV^2 = S_h^2 CV_h^2 + S_m^2 CV_m^2 + S_o^2 CV_o^2 + 2\rho_{hw} S_h S_w CV_h CV_w + 2\rho_{ho} S_h S_o CV_h CV_o + 2\rho_{wo} S_w S_o CV_w CV_o \quad (1)$$

[9] The results are qualitatively similar when total non-adjusted income is used. It is worth mentioning that, on the basis the Theil index, inequality would have increased in Spain over the eighties, if female labor force participation in 1990 would have been the same as in 1980.

where

$$S_k = \mu_k / (\mu_h + \mu_w + \mu_o)$$

and CV_k is the coefficient of variation for income component k (k=h,w,o), where h is husbands' earnings, w is wives' earnings and o is other income), S_k is the share of income component k in total income, μ_k is the mean of income component k, and ρ_{kj} is the coefficient of correlation between two income components. Using equation (1), we can calculate the coefficient of variation in 1990 if the distribution of wives' earnings had not changed from 1980 to 1990. We use the mean and the coefficient of variation of wives' earnings in 1980 and we keep the remaining variables at the 1990 levels. The problem with this approach is that if the distribution of wives' earnings had not changed from 1980 to 1990, we would expect to have different correlations between wives' earnings and the other sources of income, than the observed correlations in 1990. Following Cancian and Reed (1998), we consider two extreme situations, first, the correlations between income components for the reference distribution are the observed correlations in 1990, and second, the correlations between wives' earnings and the other sources of income remain to the 1980 levels.

The results for the actual and simulated coefficients of variation in 1990 are presented in table 5[10]. In both cases, the counterfactual distribution implies a slightly lower decrease in inequality over the period. The conclusion we obtain using this method reinforces the results obtained above, the increase in wives' earnings seems to be just partly responsible for the observed reduction in family income inequality in Spain in the 1980s. Cancian and Reed (1998) did a similar exercise for the US. They found that the observed increase in family income inequality in the 1980s would have been even larger if the distribution of wives' earnings had not changed over the period.

[10] Notice that the observed CV in 1990 presented in table 5 does not coincide with the figure reported in table 4. The reason is that, in table 5, we use total family income instead of equivalent income to be able to compare our results with those of Cancian and Reed (1998). Also, notice that the CV using total family income is lower than that obtained with equivalent income, and the reduction in inequality in the period is higher according to the latter measure (10.05 versus 6.69 per cent).

TABLE 5. COEFFICIENT OF VARIATION FOR HOUSEHOLD INCOME NOT ADJUSTED FOR FAMILY SIZE

		% Change compared to observed value in 1980
Observed CV 1980	0.6831	
Observed CV 1990	0.6522	-4.5%
Simulated CV 1990 μ_w, CV_w at 1980 levels	0.6593	-3.5%
Simulated CV 1990 μ_w, CV_w, ρ_{hw}, ρ_{wo} at 1980 levels	0.6607	-3.3%

Finally, we now consider a different approach to analyze the effect of female labor force participation on family income inequality. We will calculate the Theil index for households where the wife is employed and for households where she is not employed. The advantage of the Theil's I_0 index compared to other inequality measures is that it can be decomposed for population subgroups into within-groups inequality and between-groups inequality. This useful property of I_0 is shared by all the indexes of the Generalized Entropy Family (see Shorrocks (1980)). Suppose that we divide the population into *G* groups, then, we can write any index of this family as

$$I = \sum_{g=1}^{G} w_g I_g + B$$

where I_g is the inequality index within group *g*, w_g is the weight of group *g*, and B is the between groups inequality. In general, the weight of each group depends on average income for that group. Thus, as pointed out by Shorrocks (1980), a change in average income in each group (keeping inequality within each group constant) would not only affect between-groups inequality but also total within-groups inequality through the weights, and therefore, the interpretation of the decomposition is not obvious. However, for Theil's I_0 index, the weights only depend on the relative sizes of the groups, and therefore, this sort of income changes would only affect the between groups inequality and the interpretation of the decomposition is very clear.

As indicated, we divide the sample of married couples according to the employment status of wives: working or not working. The decomposition of I_0 for these two groups can be written as

$$I_0 = wI_0{}^{wk} + (1-w)I_0{}^{wnk} + w\log(1/\lambda^{ww}) + (1-w)\log(1/\lambda^{wnw})$$

where *w* is the proportion of married couples where the wife works, I_0^j is the index for the j-th group (j=*ww*, means wife working and j=*wnw* means wife not working) and $\lambda^j = \mu^j / \mu$ is group j's mean income relative to the population mean (μ^j is the average of family income in group j). The first two terms are the total within-groups inequality and the last two are the between groups inequality. The change in this index between two years can also be decomposed into the change in the within-groups inequality, the change in subgroups means, and the change in the population shares of the groups (Mookherjee and Shorrocks (1982)):

$$\Delta I_0 \approx \overline{w}\Delta I_0{}^{ww} + (1-\overline{w})\Delta I_0{}^{wnw} + (\overline{\theta^{ww}} - \overline{w})\Delta\log(\mu^{ww}) + (\overline{\theta^{wnw}} - (1-\overline{w}))\Delta\log(\mu^{wnw}) +$$
$$(\overline{I_0^{ww}} + \overline{\lambda^{ww}} - \overline{\log(\lambda^{ww})})\Delta w + (\overline{I_0^{wnw}} + \overline{\lambda^{wnw}} - \overline{\log(\lambda^{wnw})})\Delta(1-w)$$

where Δ is the difference operator, θ^j is group j's share of total income, and a bar over a variable indicates the average of the two period values. The first two terms indicate the change in the within-groups inequality, the third and forth the change attributable to relative changes in subgroups means, and the last two terms pick up the change in the population shares of the groups. The decomposition of I_0 for 1980 and 1990 is presented in table 6. We express the changes in terms of percentage changes by dividing the expression above by the I_0 index in 1980 and multiplying by 100.

The results show that inequality within each group decreased from 1980 to 1990 and this effect dominates the overall change in inequality. The change in the relative means have a very small inequalizing effect. Finally, the change in the shares has contributed to increase inequality. The reason is that the population share increase for the group where the wife is working[11] and in this group average inequality was higher than in the other group.

[11] Notice that the change in the shares of both groups are of the same size and have opposite sign.

Furthermore, in the group where the wife is working, the percentage differences in average income between the group and the whole population are larger than in the group where the wife is not working. Davies and Joshi (1998) used the same decomposition of the I_0 index to analyze the increase in family income inequality observed in the UK over the seventies and eighties. They also found that the overall effect is dominated by the change in inequality within-groups.

TABLE 6.- DECOMPOSITION OF THE THEIL INDEX

	Equivalent Income			
	Married couples	Wife employed	Wife not empl.	Between
1980	0.1912	0.2025	0.1736	0.0128
1990	0.1720	0.1500	0.1557	0.0176
	Married couples	Within-groups	Means	Shares
% change	-10.05	-13.05	0.34	2.65

IV.- SUMMARY AND CONCLUSIONS

In this article we have analyzed the impact of wives' earnings on family income inequality. We use Spanish data from the Family Expenditure Survey for 1980-81 and 1990-91 and we compare our results with those for the US and the UK. It is particularly interesting to analyze this question using Spanish data. The reason is that over the eighties the labor force participation rate of married women increased substantially, while, over the same period, we observe a non-negligible improvement on the income distribution.

We used different approaches based on the comparison of the observed distribution and some reference distributions. For the static analysis, we compare the observed level of inequality with the level of inequality if wives had no earnings. We obtain that wives' earnings contribute to reduce income inequality according to the Theil index, but have no effect, or inequality increases slightly, when we use the coefficient of variation or the Gini coefficient. For the dynamic analysis, we calculate the indexes in 1980 and 1990, and as addressed above,

we observed that inequality diminishes over the period, more significantly according to the Theil and Gini indexes than to the coefficient of variation. In this context, we try to measure what would have happened to family income inequality if married women's labor force participation had not increased from 1980 to 1990. Although our results are not very conclusive, we can assert that, in this case, the decrease in inequality would have been slightly smaller than the observed decrease from 1980 to 1990. We also considered a different approach based on an alternative counterfactual distribution. We decompose family income into each spouse contribution and other income, and we use the distribution of wives' earnings 1980 to calculate the coefficient of variation in 1990. The results indicate that the increase in wives' earnings have contributed to decrease inequality. Finally, we divide the sample of married couples according to the employment status of wives: working or not working, and we decompose the Theil index into within and between groups inequality. We found that inequality decreased within each group from 1980 to 1990, and that this change dominated the overall change in inequality.

According to the indicated results, we can conclude that women's labor force participation has contributed slightly to the observed reduction in income inequality. Further research needs to be done to determine what are the main reasons behind the significant decline in family income inequality in Spain over the eighties.

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