Participation of Women in the Labor Market in Europe and Informal Care Hours

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Abstract

An analysis was made of the effect of providing informal care, in terms of the weekly work hours, on middle-aged women in Europe aged between 30 and 59 years, using as reference subjects women aged between 20 and 29 years. The data come from the eight European Community Household Panel surveys (ECHP). We compared the group of women caregivers and noncaregivers using a zero-inflated negative binomial (ZINB) regression model. The results show that caring for dependents reduces weekly work hours, especially in southern European countries.

Keywords: Informal care, Labour market, Women

JEL Classification: H31; I11; I12; J14; J22

1. Introduction

The aging of the population, in conjunction with low fertility rates and increased life expectancy, has brought an increase in the number of dependents in most countries in the Organization for Economic Co-operation and Development (OECD, 2007).

The family traditionally has been the primary source of care for people in situations of dependency, especially in southern European countries (OECD, 2005). By "family" as the primary source of care, we mean the informal care provided by middle-aged women. However, modifications in family structure and, above all, changes in the social position of women undermine the sustainability of informal care in the medium term.

Providing informal care affects the ability of women to participate in the labor market. According to an OECD study (2008), between 89% and 93% of the informal care burden is borne by women of intermediate generations, although the situation differs depending on the country.

In the Nordic countries, a wide range of formal care for dependents is available. Consequently, although women also provide informal care, their participation rate in the labor market is above 70%. The southern European countries are characterized by less development of formal systems, so there is concern is that the increase in the number of dependents is impeding the growth in the rate of labor force participation of future cohorts of middle-aged women (Casado et al. 2008).

These facts are relevant socially and economically. In a social sense, the World Economic Forum prepares the Global Gender Gap Report and has pointed out that the reduction of differences between men and women not only is a question of human rights and fairness, but also efficiency. In many areas, links between gender equality and productivity, and growth and development can be demonstrated, such as women's participation in the workforce (Escribano, Pardo and Bahmani, 2012). In an economic sense, a recent report prepared by Elborgh-Woytek et al (2013) for IMF show that when women are able to develop their full labor market potential, there can be significant macroeconomic gains. Related to the female participation in the labor market, some studies point out that raising this rate, would raise GDP in the United States by 5 per cent and in Japan by 9 per cent, for instance. Besides, we can consider that the aging of the population implies a reduction in the total labor force and higher female labor participation can boost growth by mitigating the impact of a shrinking workforce (Elborgh-Woytek et al. 2013).

If we consider these findings, increase in the number of dependents and women, to investigate relationship in the informal care, provide that informal care and female labor participation is a relevant question. Therefore, the aim of this paper is to analyze the effect of providing informal care has on participation in the labor market, particularly on the labor intensity of the cohort of middle-aged women (30-59 years) in Europe. We used data obtained from the eight

waves of the European Community Household Panel survey (1994-2001) and zero-inflated negative binomial regression analysis to examine the influence of providing informal care on labor intensity (measured by the number of hours of work per week) and participation in the labor market of the group of women caregivers versus women non-caregivers.

From the Introduction on, the article continues with a Literature Review (section 2), Methodology (section 3), Results (section 4), and Conclusions.

2. Literature Review

The relation between informal care and its costs in terms of loss of employment opportunities for women has been studied in the US and in some countries of the European Union, but, in general, literature on this topic is sparse.

When the relationship between providing informal care and employment opportunities is investigated, caregiving can be considered as an endogenous or exogenous variable. If the caring decision in endogenous, the question is, do individuals give up work in order to engage in informal care or do individuals take care responsibilities in the absence of employment opportunities? It is to say, both decision are simultaneous. If the care decision is exogenous, we assume that both decisions are independent.

Studies that consider caregiving as an endogenous variable (Ettner [1995, 1996] in the US; Heitmueller [2007] in the UK, and Crespo [2007] and Bolin [2008] in Europe) find that there are costs in terms of being able to avail oneself of job opportunities associated with being an informal caregiver, given that the probability of being employed decreases when one is also a caregiver.

Carmichael and Charles (1998 and 2003) consider caregiving as an exogenous variable and obtain the same negative relation between caregiving and employment, but it is less pronounced.

Other authors make comparisons between European countries. The studies of Crespo (2007), Bolin (2008), Casado et al, (2008), and Viitanen (2005) focus especially on investigating the effect of being an informal caregiver and various features of that role on the probability of being employed or not. They found that people who provide more hours of informal care have less participation in the labor market.

Generally speaking, the literature has analyzed the effect of providing informal care on the probability of being employed and has considered only women caregivers. The effect of caregiving on work intensity has hardly been studied in the literature. Likewise, it has not been studied whether the behavior differs between women who provide informal care and those who do not. Only Spiess and Schneider (2003) analyze the changes in the number of hours of work a week using a difference-in-differences approach.

ZINB regression models allow the effect of informal care on employment intensity, as measured by the number of hours of work a week, to be determined and the comparison of the likelihood of being employed among women caregivers and no caregivers. Therefore, there are two research questions; first, whether women caregivers have more or less probability of being employed and second, if there are differences among countries.

3. Methodology

3.1 Sample and Selection of Variables

The database used is the European Union Households Panel (ECHP). Peracchi (2002) carry out some relevant characteristics about this survey. It is centrally designed and coordinated by the Statistical Office of the European Communities (Eurostat). National Statistics Institutes are responsible for sample selection, adaptation of the questionnaire, fieldwork, basic data processing and editing. All national samples are selected through probability sampling and use a common questionnaire centrally designed by Eurostat. To collect data, the interviewing method recommended by Eurostat is face-to-face personal interviewing. The questionnaire covers demographic, labor force behavior, income, health, education and training, housing and migration

This survey provides 8 waves of micro data on living conditions in most Member States of the EU – 15. It is suitable for the analysis of relations between providing informal care and work behavior for several reasons.

In first place, the survey provides information on the working behavior of the subjects of the sample, employment situation, type of workday, and the number of hours worked or wages.

In second place, it provides information about informal caregiver-related aspects. Subjects were asked about whether they care for an adult dependent or not, the number of hours of caregiving provided per week, or whether the care recipient resides in the same household or outside.

In third place, the survey contains socioeconomic information about the respondent and other household members with whom the respondent lives, such as their age, sex, education level, health status, employment history, income from labor and capital which allow us to include some variables in our analysis.

Finally, it allows us to consider several states: employed and providing care, employed and not providing care, not employed and providing care, and neither employed nor providing care.

The selected sample were women aged 30 to 59 years from three groups of countries: southern European group (Spain, Greece, Italy and Portugal), continental group (Germany, France, UK, Belgium and Ireland), and the Nordic group (Denmark, the Netherlands and Luxembourg). The choice of the cohort of middle-aged women is based on empirical evidence that the percentage of women caregivers exceeds that of men and that most of the women engaged in providing informal care are in this age group. Women aged 20 to 29 years were used as reference subjects in the analysis.

The occupational status of the women, i.e., employed or not employed, including inactive status, had to be known. We also needed to know whether or not they were caring for a dependent (other than women dedicated exclusively to childcare).

In addition, all the women had to have completed the eight ECHP surveys. Finland, Austria, and Switzerland were excluded from the analysis because they were not present in all eight years of the survey. We analyzed separate models for each group of countries.

The maximum number of observations used for the southern European group (Spain, Greece, Italy and Portugal) was 50,968, for the continental group (Germany, France, UK, Belgium and Ireland) it was 52,136, and for the Nordic group (Denmark, Netherlands and Luxembourg) it was 18,128.

Table 1 shows the variables included in the analysis. The dependent variable was the number of weekly work hours. The care-related variables were different intervals of caregiving intensity compared to no caregiving.

The other variables included in the analysis were socio-demographic variables related to the individual characteristics of each person at the time of interview.

Table 1. Variables included in analysis

Comportamiento status	
Weekly work hours	Hours worked weekly
Informal care	
Care14	1 if caring for a dependent person fewer than 14 h a week, 0 otherwise
Care14_28	1 if caring for a dependent person between 14 h and 28 h a week, 0 otherwise
Care28	1 if caring for a dependent person more than 28 h a week, 0 otherwise
No_care	1 if not caring for dependents, 0 otherwise
Sociodemographic variables	
Age20_29	1 if between 20 and 29 years, 0 otherwise
Age30_39	1 if between 30 and 39 years, 0 otherwise
Age40_49	1 if between 40 and 49 years, 0 otherwise
Age50_59	1 if between 50 and 59 years, 0 otherwise
Married	1 if married, 0 otherwise
Sep_div	1 if separated or divorced, 0 otherwise
Widow	1 if widowed, 0 otherwise
Single	1 if single (never married), 0 otherwise
Educ_prim	1 if educational level is lower than cycle 1 secondary, 0 otherwise
Educ_sec	1 if educational level is cycle 2 secondary, 0 otherwise
Educ_tert	1 if educational level is tertiary, 0 otherwise
Health	1 if your health is poor or very poor, 0 otherwise
Children12	Children under 12 years at home
Home_size	Number of members of household
City	1 if place of residence is a big city, 0 otherwise
Macroeconomic variables	
Countries_south	Countries with low proportion of institutionalized dependents (Spain, Greece, Italy and Portugal)
Countries_continental	Countries with medium proportion of institutionalized dependents (Germany, France, United Kingdom, Belgium and Ireland)
Countries_Nordic	Countries with high proportion of institutionalized dependents (Denmark, Netherlands and Luxembourg)

Source: Prepared by authors

3.2 Method of analysis

In the literature on employment and the care of dependents, both variables are related negatively and the probability of having employment diminishes for informal caregivers in all cases.

This situation is reinforced in the case of middle-aged women, who are the main providers of care and have traditionally had less participation in the labor market. Differences in occupational status also exist between women caregivers and no caregivers.

Since the distribution of the dependent variable, "Weekly work hours" is a discrete variable that corresponds to whole non-negative values; count data models were used for the analysis and comparison of the occupational status of caregivers versus no caregivers.

The ZINB model developed by Lambert (1992) and Greene (1994) assumes that there are two latent groups in the sample, and that it is impossible to know a priori which group the individual belongs to. Some individuals have a certain probability of working 0 hours a week, a group identified as "Always 0," or women who do not work outside the home and thus always have 0 weekly work hours with a probability of 1.

The first of the equations estimated using a binomial logit reflects the potential risk of belonging to the "Always 0" group, i.e., the probability of working 0 hours a week or not working.

The second equation includes a negative binomial function-containing zero as one of the values in the distribution and reflects the potential risk of working some hours a week. This is the "Not Always 0" group, where the dependent variable takes values other than 0.

If the target variable, Y_1 (Weekly Work Hours) follows a negative binomial distribution with excess zeros, then the estimate will have two stages (Cheung, 2002). This model is the same as that followed by Albert and Davia (2011) to analyze the risk of material privation of young people.

$$pr(Y_1 = y_1) = \pi_1 + (1 - \pi_1)(\frac{1}{1+k\gamma_i})^k \text{ if } y_1 = 0 \quad (1)$$

$$pr(Y_1 = y_1) = (1 - \pi_1)\frac{\tau(k^{-1}+y_i)}{\tau(k^{-1})y_i!})(\frac{k\gamma_i}{1+k\gamma_i})^{y_1}(\frac{1}{1+k\gamma_i})^{k-1} \quad \text{si } y_1 > 0 \quad (2)$$

for each i = 1, ..., N. The mean and variance of the target variable, which follows a ZINB distribution, is E (Y_1) = $(1 - \pi_1)\ \gamma_i$ and Var (Y_1) = $(1 - \pi_1)\ \gamma_i(1 + (k + \pi_1)\ \gamma_i)$. (3)

π_1It will be modeled through a logit model: logit $(\pi_1)X_1\beta$ where X_1 is a row vector $1 \times p$ of covariates (including a constant) and β is the column vector $p \times 1$ of the respective parameters. The logistic specification allows us to find the odds ratio for the relative risk of being in subset A (working 0 hours), where $y_1 = 0$. The expectation of the counting part is modeled as follows: log $(\gamma_i) = Z_{i\delta,}$ where Z_i is a row vector $1xq$ of covariates, and δ is the corresponding vector column (q x 1) of coefficients. Being $\theta = [\beta', \delta']'$. The vectors of covariates X_i and Z_i may or may not contain the same set of regressors. In our case, we chose the same specification for both models.

The likelihood function maximized in the ZINB model is the following:

$$\ln L = \sum_{i\in A} w_i ln\left[\pi_1 + \{1 - \pi_1\}(\frac{1}{1+k\gamma_i})^{k-1}\right] + \sum_{i\not\in A} w_i \left[ln\{1 - \pi_1\} + ln\tau(k^{-1} + y_i) - ln\tau(y_i + 1) - ln\tau(k^{-1}) + k^{-1}ln(\frac{1}{1+k\gamma_i}) + y_i \ln\ (1 - (\frac{1}{1+k\gamma_i})\ \right] \quad (4)$$

Where w_i are the weights associated with the negative binomial distribution (Greene, 2008), while $\tau()$ is the gamma function (Long and Freese, 2006).

4. Results

Table 2 shows the descriptive statistics (mean and standard deviation) of the variables included in the analysis of each group of countries.

Table 2. Descriptive statistics of variables included in the analysis

	Southern European countries		Continental countries		Nordic countries	
	Mean	SD	Mean	SD	Mean	SD
Weekly work hours	19.660	20.693	23.766	18.614	21.596	16.412
Care14	0.025		0.054		0.033	
Care14_28	0.030		0.006		0.013	
Care28	0.031		0.006		0.005	
No_care	0.470		0.540		0.408	
Age20_29	0.193		0.135		0.132	
Age30_39	0.312		0.338		0.351	
Age40_49	0.305		0.334		0.339	
Age50_59	0.190		0.193		0.179	
Married	0.747		0.715		0.709	
Sep_div	0.034		0.099		0.089	
Widow	0.029		0.023		0.013	
Single	0.190		0.162		0.188	
Educ_prim	0.588		0.370		0.436	
Educ_sec	0.262		0.349		0.366	
Educ_tert	0.149		0.280		0.198	
Health	0.059		0.087		0.039	
Children12	0.562		0.448		0.645	
Home_size	1.355	0.018	1.578	1.821	1.345	1.683
City	0.018		0.013		0.027	
Observations	**50968**		**52136**		**18128**	

Source: Prepared by authors from ECHP data (Eurostat)

The results the ZINB model estimates show the effect of informal care, as measured by the hours of care dedicated to dependents, on weekly work hours in each group of countries.

The probability of working more or fewer hours a week, "Working Group" (Table 3) and the probability of not working, "Nonworking Group" (Table 4) are presented for the different groups of countries.

As explanatory variables we include data related to informal care, taking as the reference value a woman aged 20 to 29 years who does not care for dependents, single, with a level of education below compulsory secondary level, good health status, no children under the age of 12 years, and living in a small home not located in a large city.

In all cases, the model estimates are presented as relative risk (increase in relative risk) (IRR) and the value of the Z statistic. Relative risk indicates the degree of probability of belonging to the working group or the nonworking group compared to the reference subject. The sign of the coefficient indicates the direction of the influence of each variable on the probability of pertaining to one group or another.

For the working group and related to research questions, the results show that the probability of working is affected by the intensity of care and the effects differ across the countries of the European Union. In the case of southern European countries, intensive caregiving (providing more than 28 hours of care a week to a dependent person) adversely affects the number of work hours, i.e., the probability of working is lower for a person providing intensive informal caregiving than for individuals who do not perform caregiving tasks. This did not occur in the Nordic countries, where intensive informal caregiving is not relevant. In this case, informal caregiving is of low or medium intensity, which has a negative impact on the number of weekly work hours. The situation is intermediate for the continental countries.

Table 3. Results of pertaining to "Not always 0" or "Working" Group

	Southern European countries		Continental countries		Nordic countries	
Independent variables	**IRR**	**z**	**IRR**	**z**	**IRR**	**z**
Care14	1.0075	0.724	1.0065	0.415	1.0932***	3,284
Care14_28	1.0192*	1.862	0.9433**	(-2.506)	0.8830***	(-3.614)
Care28	0.9688***	(-2.764)	1.0444*	1.741	1.0266	0.617
Age30_39	1.002	0.344	0.9554***	(-7.022)	0.9522***	(-3.888)
Age40_49	0.9941	(-0.940)	0.9858**	(-2.086)	0.9749*	(-1.912)
Age50_59	0.972***	(-3.733)	0.9719***	(-3.589)	1.0076	0.488
Married	0.9747***	(-4.855)	0.8755***	(-23.526)	0.7977***	(-22.238)
Sep_div	1.0016	0.157	0.9578***	(-5.418)	0.9372***	(-4.032)
Widow	1.005	0.399	0.9648***	(-2.528)	0.8636***	(-3.928)
Educ_sec	0.957***	(-9.272)	1.0551***	11.029	1.1447***	14.871
Educ_tert	0.902***	(-19.859)	1.1223***	23.559	1.2975***	25.586
Health	0.9583***	(-3.935)	1.0148*	1.818	0.9390**	(-2.120)
Children12	0.9982	(-1.136)	1.0041***	4.16	1.0065***	(4.334)
Home_size	0.999	(-0.759)	0.9873***	(-10.289)	0.9907***	(-3.702)
City	1.003***	2.679	1.0035***	3.17	1.0064***	3.519

Source: Prepared by authors from ECHP data (1994-2001). Reference subject: Woman 20 to 29 years old, does not care for dependents, single, educational level below lower secondary, good health status, no children under 12 years, small home, and residence not in a large city.

These results are consistent with the literature because the situation of women providing low-intensity care is more frequent in the Nordic countries and that of women caring for dependents for more hours a week is more common in southern countries. Previous studies corroborate these findings (Heitmueller, 2007; Moya et al, 2012; Spiess and Schneider, 2003; Carmichael and Charles, 1998). Although the intervals in caregiving hours examined by these authors are not the same, they agree that a higher intensity of caregiving activity reduces the number of weekly work hours.

The results for the group of zero probability of working, i.e., nonworking women, are presented in Table 4.

Table 4. Results of pertaining to "Always 0" or "Nonworking" Group

	Southern European countries		Continental countries		Nordic countries	
Independent variables	**IRR**	**z**	**IRR**	**z**	**IRR**	**z**
Care14	0.7361***	(-6.531)	0.6122***	(-7.992)	0.6852***	(-3.600)
Care14_28	0.8477***	(-3.697)	1.0921	0.972	1.3982***	2.76
Care28	1.6593***	10.883	1.6215***	5.279	1.1225	0.723
Age30_39	0.606***	(-16.906)	0.8268***	(-5.514)	0.8872*	(-1.952)
Age40_49	0.5749***	(-17.730)	0.7090***	(-9.505)	0.7487***	(-4.470)
Age50_59	1.0062	0.175	1.1818***	4.218	1.0979	1.308
Married	1.687***	18.451	1.6762***	15.705	1.9826***	12.151
Sep_div	0.4498***	(-12.184)	1.0635	1.343	1.8401***	7.639
Widow	1.1204*	1.862	1.3793***	3.871	2.7076***	6.665
Educ_sec	0.6939***	(-16.268)	0.5540***	(-26.231)	0.6680***	(-9.795)
Educ_tert	0.2952***	(-40.459)	0.2523***	(-49.634)	0.2409***	(-23.161)
Health	2.0701***	17.066	2.4629***	27.219	6.9534***	22.45
Children12	0.9836*	(-1.959)	0.9637***	(-7.103)	0.9732***	(-4.135)
Home_size	1.0757***	12.52	1.0874***	14.276	1.1612***	12.822
City	0.9642***	(-6.507)	1.0170***	3.041	0.9783**	(-2.403)

Source: Prepared by authors from ECHP data (1994-2001). Reference subject: Woman 20 to 29 years old, does not care for dependents, single, educational level below lower secondary, good health status, no children under 12 years, small home, and residence not in a large city.

For the nonworking group it was observed that a person who provides more than 28 hours a week of care is more likely to not work than a person not caring for dependents. However, the results of the nonworking group in the Nordic countries show that this is not relevant.

Providing less than 14 hours of caregiving decreases the probability of not working in the Nordic countries. This observation indicates that if caregiving is not intensive, women combine work and care and tend to overexert themselves.

Considering the effect of different sociodemographic variables on the weekly work hours, the work status pattern is similar across countries. The probability of having employment depends on age; a woman more than 50 years old works fewer hours than a woman under 30 years old. However, in some countries the probability of working decreases starting in the 30s. Previous authors confirm these results (Moya et al. 2012).

Marital status influences the probability of women working; single women generally work longer hours than women with any other marital status. Evidence in the literature suggests that a married women are less likely to work (Spiess and Schneider, 2003; Viitanen, 2005).

Another key factor affecting participation in the labor market is educational level. The results for this variable differ depending on the group of countries considered. In all the countries, the higher the level of education is, the greater the chance of having employment and of working more hours is, except in the southern European countries. All earlier research confirms that women with higher levels of education are more likely to participate in the labor market (Moya et al. 2012; Heitmueller, 2007; Viitanen, 2005).

Health status is also important for participation in the labor market as women whose health is poor or very poor work fewer hours. These results coincide with those of Heitmueller (2007).

Having children under the age of 12 years implies working more hours a week, but living in a larger home with more members tends to reduce the number of work hours. This circumstance may indicate that when household size increases, caregiving needs increase and it becomes more difficult to reconcile both activities. These variables were not relevant in the southern European countries. Previous studies demonstrate that having pre-adolescent children reduces the probability of working (Viitanen, 2005).

Finally, women who live in a large city are more likely to work more hours than those who live in a small city. This result confirms the findings of Moya et al. (2012) that living in a large city increases the probability of being employed because job opportunities are greater in larger labor markets.

5. Conclusions

There is empirical evidence that informal caregiving responsibilities influence women's employment, particularly among middle-aged women (30 to 59 years), and that this effect varies depending on the availability of formal caregiving systems and the employment rates of women in each country.

This study provides relevant data compared to earlier research regarding the effect of informal caregiving responsibilities on labor intensity, as measured by weekly work hours. This is because this study analyzes the effect of the number of weekly care hours on work hours by comparing individuals caring for dependents with those who do not have caregiving responsibilities.

We estimated the relative risk using ZINB models against a reference subject who does not provide informal care. It has been found that women engaged in high intensity informal care, i.e., caring for a dependent person more than 28 hours a week, are less likely to participate in the labor market than women who do not have to care for dependents, except in the Nordic countries, where intensive informal care is rare. In addition, higher educational level and health status are key factors for women to participate in the labor market.

In the group of southern European countries, middle-aged women caring for dependents more than 28 hours a week work fewer hours outside the home. In the other countries, the negative impact on employment intensity occurs when a woman has fewer informal caregiving hours.

These results are consistent with the long-term care system in each country. In the countries of southern Europe, intensive informal care is much more frequent than in the other countries, especially the Nordic countries.

These data underline the need to develop policies that provide aid to women who care for dependents and, in particular, women who dedicate more than 28 hours a week to caring for dependents as this makes it difficult for them to enter the labor market.

Participation in the labor market depends on the degree of development of formal caregiving services. In the countries of central and northern Europe, where the public long-term care systems are more developed, informal caregiving has less impact on employment.

In the countries of southern Europe, informal caregiving still carries a lot of weight and formal caregiving services are less developed. Therefore, economic policy measures have to consider not only aid to dependent persons but aid to informal caregivers in order to allow caregivers to combine their informal care responsibilities with employment by increasing labor flexibility and education and training policies to facilitate their entry into the labor market.

This study has certain limitations. Data are from the period between 1994 and 2001 and changes that have taken place in the last 10 years can alter results. The employment rate of women differs in each group of countries, but increased up to 2008, although it decreased in recent years due to the economic downturn.

It should also be considered that as the dependent population has increased, formal care systems have been launched, especially in the countries of southern Europe. These factors may modify some of the results of our present work for the years after the period under study. Therefore, a logical extension of this study is to analyze a more recent period when the statistical data become available.

Another limitation is that the variable of informal care has been considered exogenous. The empirical evidence in this regard also supports the negative effect of informal care on the probability of having employment, but in this case the effect is smaller. It would thus be useful to study the effect of caregiving responsibilities on employment by considering caregiving as an endogenous variable. Authors who have used the ECHP database have considered informal care as an exogenous variable, due to the lack of instrumental variables that explain its endogeneity.

In any case, it is noteworthy that none of the previous studies has used the ZINB method to assess the effect of caregiving on employment intensity, its main advantage being the possibility of comparing women who care for dependents versus those who do not have caregiving responsibilities. By dividing the sample into two groups, we could examine in a single analysis the effect of caregiving on participating in the labor market and weekly work hours.

Future research should be developed with this topic. It could be investigated whether differences between the countries of northern and southern Europe remain after developing formal care system in some southern European countries, as Spain.

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