Universidad
Carlos III de Madrid

This is a postprint version of the following published document:

Alonso-Borrego, C. and Carrasco, R. (2017). Employment and the risk of domestic violence: does the breadwinner's gender matter? [Applied Economics](#), v. 49, n. 50, pp. 5074-5091
Available in: [https:// doi.org/10.1080/00036846.2017.1299103](https://doi.org/10.1080/00036846.2017.1299103)

© Taylor & Francis

Employment and the risk of domestic violence: does the breadwinner's gender matter?

César Alonso-Borrego and Raquel Carrasco

Department of Economics, Universidad Carlos III de Madrid, Getafe, Spain

ABSTRACT

This article studies the effect on the risk of female victimization of the employment status of the woman and her partner. We use individual-level data from the violence against women surveys for Spain, which also provide information on income and a rich set of sociodemographic characteristics. To address the potential endogeneity of the binary employment indicators, we exploit exogenous geographical information on the employment and unemployment rates by gender and age, within a multivariate probit framework. Our estimation results show that male partner employment plays a major role in the risk of physical violence, while female employment only lowers it when her partner is employed too. The lowest risk appears for more egalitarian couples in which both partners are employed.

KEYWORDS

Intimate partner violence; employment; discrete choice; instrumental variables; multivariate probit; endogeneity

JEL CLASSIFICATION

J12; D19; J16; C25; C26.

1. Introduction

Violence against women (VAW) perpetrated by their intimate partners is an issue of social and political concern. It is rooted in social inequalities between men and women and a form of gender-based discrimination (Garcia-Moreno et al. 2005). About 25% of European women experience domestic violence at some point in their lives, and between 6% and 10% suffer domestic violence in a given year (European Commission 2010). The United States shows similar numbers, with 5.9% of women having experienced domestic violence in 2010, and 35.6% during their lifetime (OECD 2013). This problem imposes a significant economic burden on society as a whole, in the form of health care costs, policing and legal costs, or declines in productivity, among others. It can also have harmful long-lasting consequences for children who witness it in terms of their emotional, cognitive and behavioural development and in their odds of being involved in violent relationships as adults (Pollak 2004).

One potential way advocated to prevent abuse is to improve the outside opportunities of the woman. In particular, female participation in the labour market can reduce the risk of abuse by making her threat of leaving the relationship more credible. This will not

only increase her bargaining power, but also promote gender equality within the household. The implications of the socioeconomic status of the woman relative to her partner for intimate relationships has been pointed out by Anderson (1997), Coleman and Straus (1986) and Kaukinen (2004). Gender asymmetries in the socioeconomic characteristics of both partners are thought to reflect important cultural differences in the social and economic roles of men and women. In particular, egalitarian couples (in terms of education parity, labour market parity, etc.), in opposition to traditional couples, are more likely to share values that challenge the traditional roles of partners by gender, especially those linked to male dominance. Besides, the less common couples characterized by employment status reversal with respect to the traditional couples challenge the standard social roles by gender and might underlie differential patterns in personality traits of both partners.

The existing evidence from empirical studies on the effect of relative female resources on domestic violence is mixed. They differ in the level of disaggregation of the data, the subpopulation under study and in the methodological approach, particularly whether endogeneity of both partners' resources is acknowledged or not. In this article, we assess the causal effects of the

employment status of the woman and her partner on the risk of intimate-partner violence (IPV). We exploit individual level data on employment and incidence of IPV from the VAW surveys for Spain in the years 1999, 2002 and 2006, which also provides information on household income and a set of sociodemographic characteristics. We consider separately binary indicators for two types of intimate-partner abuse, physical and non-physical. The challenge of identifying the causal effect of employment indicators on the risk of IPV originates from the potential endogeneity of these variables. Such endogeneity might be driven by the omission of unobserved confounding factors affecting both the employment indicators and the probability of abuse, such as non-random matching of individuals into intimate relationships and personality traits.

Our identification strategy exploits exogenous geographical information on the employment and unemployment rates by gender and by age. Notwithstanding, the discrete nature of the employment indicators makes standard instrumental variable methods inappropriate to estimate a binary choice model. Thus, we estimate a multivariate probit model in which we estimate jointly the parameters of the reduced-form equations for all the endogenous variables of the model, that is, the IPV and the employment status of the woman and her partner. Therefore, we rely on the normal distributional assumption of the multinomial probit model and, additionally, on the exclusion restrictions to identify the parameters of the model.

If employment were just an indicator of availability to economic resources, the main mechanism linking the lack of employment and violence should be the stress derived from the lack of resources within the household. Thus, one would expect that the employment status of each partner had little or at most a limited effect on domestic violence, once other measures of economic resources, such as income, are accounted for. Moreover, if in addition to the absolute amount of resources, the relative contribution of each partner affects their corresponding bargaining power, then we should expect woman's and her partner's employment to have differential roles in the incidence of IPV. However, male employment might also have a 'symbolic' role and entail more than just economic resources. As Macmillan and Gartner (1999) point out, 'notions of masculinity remain strongly tied to beliefs about being a good provider and breadwinner'. From this

perspective, the effect of women employment would be different depending on her partner's employment status. Equally, a strong effect of men's employment status as opposed to women's could also reveal the symbolic consideration of men's employment.

Our estimation results show that reckoning endogeneity has critical consequences on the estimation of the causal effects of employment and income on both types of IPV. The results that do not account for endogeneity issues are difficult to interpret because they do not disentangle the true causal effect of employment status on IPV from other confounding factors. When endogeneity is controlled for, our results show that there is an asymmetry in the role of employment statuses of the partners in the risk of physical IPV, with male employment playing the major role, and female employment only reducing physical IPV provided that her partner is employed too. The risk of physical violence is significantly lower when the male partner is employed, ranging from 2.9 to 1.9 percentage points less depending on whether the woman is employed or not, respectively. Female employment reduces the probability of physical violence by 2.5 percentage points, provided that her partner is employed too. Regarding non-physical IPV, the risk is significantly reduced by 4.9 percentage points for employed women whose partners are employed too, while the reduction for employed partners when women are employed too amounts to 2.7 percentage points. Considering that the respective sample rates of physical and non-physical IPV are 3.9% and 8.2%, the marginal effects of employment statuses are quantitatively relevant.

The fact that female and male employment matter, even after conditioning on household income, indicates that the role of the labour market statuses of the partners goes beyond economic considerations in the risk of partner abuse. They may shape different family patterns in terms of partners' parity or disparity, which might affect both the propensity to conflict and the partners' ability to manage conflict non-violently (Coleman and Straus 1986). Our results indicate that more egalitarian couples, in which both partners are employed, tend to have lower risk of physical violence than traditionally gendered couples in which only the male partner is employed. The highest risk arises for unbalanced couples in which the male partner is not employed while the woman is. The result for this type of

couples characterized by status reversal agrees with the instrumental use of violence by abusing partners predicted by backlash theories: when the traditional role of the male as provider is challenged by a relative improvement in the woman's position within the household, he inflicts violence in order to assert his dominant position.

The rest of the article is organized as follows. In Section II, we provide an overview of previous theoretical and empirical contributions about IPV. In Section III, we describe the sources of the data used in the analysis and provide a descriptive analysis of the main data. In Section IV, we discuss the methodological approach, and present the estimation results in Section V. Section VI summarizes the main findings and discusses the policy implications.

II. Previous research on IPV

Family violence has originally been a topic of study in the fields of criminology and sociology, for which IPV serves two purposes. The first is expressive, to the extent that some men derive direct utility from the violence. The second purpose of violence is instrumental, thus increasing partner's utility indirectly through the control of female behaviour. The major issue of concern has been the relationship between the socioeconomic situation and the risk of spousal violence. According to the sociological 'absolute resource theory' (Gelles, 1976), diminished household resources lead to conflict that can culminate in female victimization. Thus, violence might be particularly prevalent in households in which the indicators of economic resources point to a difficult situation, as for instance low income households, low educated households or households in which both partners are unemployed.

The economic research in family violence is relatively recent and scant. The main theoretical contributions consist of game-theoretical approaches which challenge the cooperative, altruistic models set up by Becker (1965, 1973). Tauchen, Witte, and Long (1991) and Farmer and Tiefenthaler (1997) consider non-cooperative game models with partners' utilities being functions of their consumption

levels and the violence exerted by the male partner, which plays both an expressive and an instrumental role. Improving economic opportunities for the woman outside the relationship might increase the woman's reservation utility. Among such economic opportunities, we should mention improved education, income and labour market participation, but also the odds of a generous divorce settlement and the quality of help services for battered women (Farmer and Tiefenthaler 1996). It is generally assumed that the female reservation utility is binding and the woman receives net income transfers from her partner, which would mostly correspond to situations in which relative income is dominated by men. Under such case, according with Tauchen, Witte, and Long (1991), changes in male and female income have the opposite effects on violence, which only plays an expressive purpose. Instrumental use of violence would be discarded to the extent that women have the possibility of ending the relationship (Aizer 2010). An increase in male income allows him to exert more violence, while an increase in female income forces her partner to reduce violence in order to assure her reservation utility. Such situation provides support to fostering women economic empowerment as a way to reduce the risk of abuse.

Notwithstanding, Tauchen, Witte, and Long (1991) remark that when the female reservation utility is not binding, violence exerted by the male partner can also have an instrumental purpose. In this case, violence is not necessarily decreasing with income if the male marginal utility of violence increases when the woman is better off, so that an income increase might lead to an increase in violence. In particular, when the female reservation utility is not binding and there are not income transfers between partners (so that each partner income increase is devoted to the own partner's consumption), whereas an increase in male income would just increase male consumption and decrease violence, an increase in female income might increase female consumption and increase violence.¹ The instrumental use of violence by male partners is on the basis of the sociological theory of 'male backlash' (Hornung, McCullough, and Sugimoto 1981;

¹If there are transfers between partners and the male marginal utility of violence is increasing with female consumption, changes in income have the same sign irrespective of whether it is male's or female's income, but the effect of an income increase on violence can be positive, if the income effect were strong enough to allow a greater female consumption.

Macmillan and Gartner 1999), which predicts that an improvement in the economic situation of women might increase the risk of abuse. Exercise of violence emerges as a result of imbalance in access to resources within the household. Male partners can perceive women improvement in outside opportunities as a threat, to which they might respond violently to assert their dominance in the relationship. On the other hand, according to the 'extractive theory' the male might exercise violence on a woman with more economic resources to extract a monetary transfer, thus weakening her bargaining position. Pollak (2004) develops a model with expressive violence where both men and women are heterogeneous in their corresponding probabilities of inflicting and suffering abuse, which in turn depend on whether each of them were raised in violent homes. The model recognizes the importance of assortative mating (in terms of whether they grew up in violent homes) and divorce in the risk of IPV, showing that factors that reduce the incidence of abuse in the short run might have strong effects in the long run because of its impact in intergenerational transmission.

The theoretical predictions establishing a decreasing effect of woman economic opportunities on the incidence of violence are confirmed by some empirical studies (Aizer 2010; Farmer and Tiefenthaler 1997; Tauchen, Witte, and Long 1991). However, other studies find, particularly for patriarchal cultures where divorce is hardly an option for women, that a relative increase in female income may increase the risk of victimization, as it challenges the socially prescribed male dominance, triggering male backlash (Luke and Munshi 2011). The empirical evidence on the effect of female employment status on the incidence of violence is also mixed. In this regard, one of the first studies is Gelles (1976), who find a negative relationship. Other studies, such as DeMaris et al. (2003), find greater violence towards women who are employed. Interestingly, Kaukinen (2004) finds that the association between a woman's employment and her risk of abuse depends on the employment status of her partner,

the risk being higher if she is employed while her partner is not.

But the main shortcoming of some of these papers, and others that followed, is that they do not account for the potential endogeneity of women's empowerment in general and, in particular, of women's labour market status due to the omission of unobserved factors affecting both the probability of abuse and the employment status of the woman and her partner. These unobserved factors are mainly related to personal characteristics of the woman and her partner that may make her more susceptible to suffer abuse or increase her partner's willingness towards abuse, respectively. Amongst them, we should mention the role of personality traits, which appear both as predictors and causes of socioeconomic outcomes like education and labour market status, health and criminal activity (see Almlund et al., 2011; Heckman and Kautz 2012). Personality traits shape the individual's identity and the way that others perceive the individual. On the woman side, traits like lack of personal autonomy (conscientiousness), lack of self-confidence, and emotional instability may make her more vulnerable to abuse. On her partner side, traits affecting bad temperament, like lack of empathy (agreeableness) and lack of self-control (emotional instability) may increase his propensity to exert violence.²

Personality traits might also determine the mating prospects of men and women (Kalmijn 1994; Schwartz 2013). Men and women are likely to match nonrandomly in terms of both socioeconomic and personality traits, as individuals face constrained opportunities. In particular, the opportunity set of partners for those women with negative personality traits might be dominated by men with worse personality traits, which could include his tendency to violent behaviour. Additionally, these personality traits are important predictors of the employment prospects of the woman and her partner. The omission of personality traits variables and other unobserved variables potentially correlated with employment statuses and IPV thus induces a

²Most personality psychologists agree with a taxonomy of traits grouped under 'Big Five' domains, which are openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. Conscientiousness has been found to be the most predictive trait domain across a variety of labour market and social outcomes (Heckman and Kautz 2012). Some of the traits mentioned earlier, like lack of personal autonomy and lack of self confidence would also correspond with the conscientiousness domain. Traits related with bad temperament traits would belong to the agreeableness domain, and emotional instability and lack of self control would be included in the neuroticism domain.

potential endogeneity bias in the estimation of the causal effects of employment statuses.

To overcome this problem, some authors have estimated structural models (Bowlus and Seitz 2006) or used panel data techniques (Tauchen, Witte, and Long 1991) to control reverse causality and omitted variable bias. Other authors have used instrumental variables techniques, such as Villarreal (2007), who uses the level of control exercised by her partner; Chin (2012) who uses the exogenous variation in rural women's working status driven by rainfall shocks and the rice-wheat dichotomy; and Bhattacharyya, Bedi, and Chhachhi (2011), who assume that children and family type affect female participation but not violence.

Another strand of the literature focuses on the effect of the unemployment risk of the woman and her partner on the incidence of partner's abuse. Anderberg et al. (2015) relate the individual incidence of IPV to the local unemployment rates by gender and age, finding that male unemployment rate has a negative effect on abuse, while the effect of the female unemployment rate is negative. Tur-Prats (2016) finds similar results for Spain. However, they do not account for the own employment status of the partners. Aizer (2010) uses aggregate data to estimate the causal effect of the gender wage gap at the municipality level on the risk of abuse by exploiting exogenous changes in the demand for labour in female dominated industries relative to male dominated ones.

A recent line of empirical research has focused on the use of experimental data to assess the effect of some policies implemented in developing countries aimed at empowering the women on different household outcomes, which include IPV. We should mention Bobonis, González-Brenes, and Castro (2013) and Hidrobo, Peterman, and Heise (2016), among others, who use data on randomized conditional cash transfer (CCTs) programs targeted to women in Mexico and Northern Ecuador, respectively. Both studies find a significant drop in the risk of physical IPV, but the results regarding non-physical IPV are mixed. The specificity of the interventions undertaken in this sort of programs (the targeted population, the small amount of transfers,

its short-term duration) makes difficult to extrapolate the results to more general frameworks and alternative policies to empower disadvantaged women, like programs aimed at boosting female employment. Interestingly, Ramos (2016) posits and estimates a structural model using the same dataset as Hidrobo, Peterman, and Heise (2016). Her structural approach allows to exploit the estimated preference parameters to simulate the effect of alternative related policies in a more general framework, to the extent that they affect the female relative bargaining power. She finds that IPV has a significant negative effect on female productivity, and that in-kind transfers have a stronger effect on IPV reduction than cash transfers.

III. Data and descriptive evidence

Our primary source of data consist of the 1999, 2002 and 2006 cross-sectional surveys on VAW for Spain.³ This data source has been used by Tur-Prats (2016) and Brassiolo (2016). These surveys were fostered by the First National Response Programme against Domestic Violence,⁴ established in 1998, which led to subsequent legislative proposals that gave rise in 2004 to the first constitutional law against gender-based violence. This bill not only established harsher penalties for offenders, but also finance public help services and shelters for battered women, promoted training programmes for health professionals and judges, and campaigns in public education institutions and the media to raise awareness about VAW. After its approval, both the number of legal actions, the number of emergency calls, and the number of women affiliated to the special phone service for victims of abuse has increased (see Table 1). However, this increasing trend has flattened in the aftermath of the recession, following a funding reduction in help resources for victimized women.

The VAW surveys form broad and representative samples, both at the national and at the regional level, of women living in Spain for each corresponding year. The surveys were conducted by phone to adult women (at least 18 years old). The original dataset contains 69,627 observations. In order to conduct our analysis, we have imposed the following selection criteria. We

³Data for 2011 are also available. However, we have excluded them, given that there are important methodological differences, which entail the survey design and the way in which the survey was conducted.

⁴Primer Plan de Acción contra la Violencia Doméstica.

Table 1. Indicators of intimate-partner violence (IPV) in Spain.

Year	Homicides committed by current or former partner			Number of indictments ^a	Users of public help service to abused women	Number of emergency phone calls
	All	Cohabiting	Without indictment			
1999	54					
2000	63					
2001	50					
2002	54			47,165		
2003	71	55		56,484		
2004	72	48		67,171		
2005	57	36		72,098	2374	
2006	69	45	36	80,751	5661	
2007	71	47	40	126,293	8787	15,715
2008	76	40	45	142,125	12,274	74,951
2009	56	35	33	135,540	13,696	68,541
2010	73	46	41	134,105	8830	67,696
2011	61	39	40	134,002	9939	70,679
2012	52	37	38	128,477	9405	55,810
2013	54	29	30	124,893	10,426	58,268
2014	54	35	30	126,742	10,502	68,612

Source: Spanish Monitoring Centre on Violence Against Women, Ministry of Justice and Ministry of the Interior.

^aUntil 2006, it only computed direct complaints to the police forces, but not in court.

have restricted the sample to women younger than 65 years old, cohabiting with her partner and not enrolled in school. Moreover, we have removed those women reporting more than two relationships. Finally, we have discarded all respondents with missing covariate information. The sample size is thus reduced to 32,410 observations. The VAW surveys include information on domestic violence, as well as sociodemographic characteristics for the woman and her partner.

The survey undertakes the widely accepted methods to measure exposures to violence by an intimate partner. Gold standard methods to estimate the prevalence of any form of violence are obtained by asking respondents direct questions about their experience of specific acts of violence over a defined period of time, rather than using more generic questions about whether the respondent has been ‘abused’ or has experienced ‘domestic violence’ or ‘rape’ or ‘sexual abuse’, which tends to yield less disclosure (World Health Organization 2013). The information about domestic violence experienced by women is gathered by means of a multiple choice question module addressed to all women except for those currently either living alone or without a partner. This module presents a list of 26 behaviours that constitute domestic abuse. Women are asked to indicate which, among such behaviours, they have experienced lately, and if

so, how often (usually, sometimes, rarely), and by whom (partner, different relatives living at home, other people living at home). We consider, following Anderberg et al. (2015), those behaviours that entail serious abuse by the partner, which, in the Spanish VAW survey, are circumscribed to 13 out of the 26 listed behaviours (see Tur-Prats 2016). We then construct two binary indicators of IPV, physical and non-physical, which takes on value one if the respondent attributed her partner to behave ‘usually’ or ‘sometimes’ to the categories corresponding to physical and non-physical abuse, respectively.⁵ The qualitatively different forms of IPV have been acknowledged by previous studies, which may indicate distinctive correlates and distinctive behaviours for the different types of violence (see Macmillan and Gartner 1999). Table 2 presents the list of behaviours from which we have constructed our IPV indicators.

In Table 3, we report the IPV incidence for the three years we have considered. About 11.7% of women reported to have experienced some situation of serious abuse. When breaking down into physical and non-physical abuse, we find that about 5% of women reported physical abuse, while 9.3% reported serious non-physical abuse. The incidence has significantly decreased over time, the rates of physical and non-physical abuse ranging from 6.4% and 10.3% in 1999

⁵The measures under this methodology, however, cannot tell anything about the intensity of the abuse. In particular, the fact that among two women for which the IPV indicator takes on value one but the first woman declares to have experienced a higher number of listed behaviours than the second one does not imply that the first woman faces a more serious situation of abuse. The characteristics of the available IPV information precludes the use of principal components as an alternative to build a synthetic measure of IPV, as the values of such synthetic variable could be hardly interpreted in terms of more or less serious abuse.

Table 2. Categories of serious abuse in the Spanish VAW surveys.

Behaviour	Physical abuse	Non physical abuse
Stopped from seeing relatives, friends and neighbours		×
Prevented from fair share of household money		×
Insulted or threatened you	×	
Prevented from deciding by yourself		×
Forced to have sexual intercourse	×	
Deprived of your necessities		×
Scared you sometimes		×
Pushed you or hit you	×	
Scorned about your capacity		×
Criticized for the things you do		×
Despised for your beliefs		×
Disregarded for your work		×
Disrespected in front of your children		×

Table 3. IPV by year and type.

	Obs.	IPV type		
		Any	Physical	Non phys.
1999	9379	13.40	6.42	10.35
2002	9934	12.39	5.18	9.92
2006	13097	9.96	3.92	8.20
All	32410	11.70	5.03	9.35
Test for independence (χ^2)		69.1	71.8	35.3

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

to 3.9% and 8.2% in 2006, about one year after the constitutional law against gender-based violence was passed by the Spanish Parliament. The drop in 2006 can be partly attributed to the reform of divorce legislation in 2005 that reduced the length and costs of divorce (Brassiolo 2016).

In Table 4, we break down the IPV incidence by region. The incidence of any type of IPV ranges from 8.8% to 14.4%, and the differences across regions are statistically significant. It is interesting to mention that most Southern regions, whose average per capita income is clearly below the national average (Andalucia, Castilla-La Mancha, Extremadura, and the African autonomous cities of Ceuta and Melilla) exhibit the highest incidence of IPV, quite above the average value at the national level.

The main summary statistics by IPV status are reported in Table 5. These statistics point out that women, partner and household characteristics differ depending on the presence of abuse, where the stronger differences appear for physical abuse. Women experiencing abuse are significantly older and exhibit substantially lower levels of education than women who are not abused. Equally, the partners of women

Table 4. IPV by region.

	Obs.	IPV type		
		Any	Physical	Non phys.
Andalucia	5345	12.95	5.97	10.10
Aragon	1355	8.78	3.03	7.38
Asturias	958	11.27	3.86	9.60
Baleares	886	10.50	4.51	8.24
Canarias	1174	12.44	5.79	9.63
Cantabria	823	9.48	3.89	7.53
Castilla La Mancha	1299	14.40	6.47	11.39
Castilla y Leon	1653	12.70	6.05	9.38
Catalufia	3841	10.34	4.17	8.49
Comunitat Valenciana	2609	11.73	4.98	9.08
Extremadura	847	13.93	6.61	10.39
Galicia	2154	11.23	4.83	9.24
Madrid	4868	11.89	4.87	9.98
Murcia	948	12.03	4.85	9.81
Navarra	843	9.96	3.91	7.59
Euskadi	1516	10.95	4.88	8.64
La Rioja	463	9.50	4.10	7.99
Ceuta & Melilla	828	13.29	6.16	10.39
Test for independence (χ^2)		55.1	53.6	34.1

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

experiencing abuse tend to be significantly older and with significantly lower levels of education than those of women who are not abused. Particularly, many abused women have not even completed primary studies, while much fewer women with a college degree have experienced abuse. This same pattern in education arises for abusing partners. This differential effect of both partners' age in the incidence of abuse points out an age cohort effect in this phenomenon. The negative correlations between both partners' education and abuse also hold when conditioning on the ages of the woman and her partner.

Interestingly, there are strong differences in the income distribution between households with abusing partners and households where abuse is absent. Households with victimized women are substantially poorer, what appears consistent with Gelles' (1976) absolute resources theories by which diminished resources increase the risk of victimization. There are not differences in marital status between abused and non-abused women and in the size of the municipality of residence, and households with abusing partners are just slightly larger than households where abuse is absent.

In Table 6, we report the incidence of IPV in accordance with employment statuses of the woman and her partner, finding significant differences. Specifically, abused women seem to be less likely to work than non-abused women and, to a lesser extent, abusive partners are less likely to work than non-abusive partners. We could then think that

Table 5. Summary statistics for partners and household characteristics by IPV status.

	No abuse		IPV type					
			Any		Physical		Non phys.	
Woman age								
18 29 years	0.09	(0.29)	0.07***	(0.25)	0.07***	(0.25)	0.07***	(0.25)
30 49 years	0.59	(0.49)	0.53***	(0.50)	0.47***	(0.50)	0.54***	(0.50)
50 64 years	0.32	(0.46)	0.40***	(0.49)	0.46***	(0.50)	0.39***	(0.49)
Woman education								
Primary or less	0.59	(0.49)	0.71***	(0.44)	0.80***	(0.40)	0.73***	(0.44)
Secondary	0.21	(0.41)	0.16***	(0.36)	0.11***	(0.32)	0.15***	(0.35)
College	0.20	(0.40)	0.13***	(0.34)	0.09***	(0.28)	0.12***	(0.32)
Partner age								
18 29 years	0.05	(0.21)	0.03***	(0.17)	0.03***	(0.16)	0.03***	(0.17)
30 49 years	0.56	(0.50)	0.48***	(0.50)	0.43***	(0.50)	0.48***	(0.50)
50 64 years	0.32	(0.47)	0.39***	(0.49)	0.42***	(0.49)	0.39***	(0.49)
above 65 years	0.07	(0.26)	0.10***	(0.30)	0.12***	(0.32)	0.10***	(0.30)
Partner education								
Primary or less	0.59	(0.49)	0.71***	(0.45)	0.77***	(0.42)	0.70***	(0.46)
Secondary	0.21	(0.41)	0.15***	(0.36)	0.14***	(0.34)	0.16***	(0.37)
College	0.19	(0.39)	0.13***	(0.33)	0.09***	(0.29)	0.14***	(0.35)
Household size	3.55	(1.21)	3.69***	(1.34)	3.69***	(1.32)	3.69***	(1.34)
Married (Y/n)	0.95	(0.22)	0.95	(0.22)	0.95	(0.21)	0.94	(0.23)
Household income								
Below average	0.11	(0.31)	0.19***	(0.39)	0.23***	(0.42)	0.19***	(0.39)
Average	0.27	(0.45)	0.30***	(0.46)	0.30**	(0.46)	0.29**	(0.46)
Above average	0.62	(0.49)	0.51***	(0.50)	0.47***	(0.50)	0.52***	(0.50)
Large municipality	0.24	(0.42)	0.24	(0.43)	0.23	(0.42)	0.25*	(0.43)

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

Means and standard deviations (between parentheses).

*, **, ***Denote mean difference with respect to not abused significant at the 10%, 5% and 1%, respectively.

Table 6. Summary statistics for partners' employment and IPV status.

	No abuse		IPV type					
			Any		Physical		Non phys.	
Woman empl.	0.42	(0.49)	0.34***	(0.47)	0.31***	(0.46)	0.35***	(0.48)
Partner empl.	0.84	(0.37)	0.78***	(0.42)	0.74***	(0.44)	0.78***	(0.41)
Both employed	0.39	(0.49)	0.30***	(0.46)	0.26***	(0.44)	0.31***	(0.46)
Woman not empl., Partner empl	0.45	(0.50)	0.48***	(0.50)	0.48***	(0.50)	0.47**	(0.50)
Woman empl. Partner not empl.	0.03	(0.17)	0.04***	(0.20)	0.05***	(0.21)	0.04***	(0.20)
Both not empl.	0.13	(0.33)	0.18***	(0.39)	0.21***	(0.41)	0.18***	(0.38)

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

Means and standard deviations (between parentheses).

*, **, ***Denote mean difference with respect to not abused significant at the 10%, 5% and 1%, respectively.

male partners are less likely to abuse if the woman is working; however, when we consider the interaction between the statuses of the woman and her partner, this does not seem to be the case. In fact, male partners are less likely to abuse when the woman is working, only if the male partner is working too: when the woman is working but her partner is not, the probability of abuse does increase.

In summary, the descriptive evidence indicates that sociodemographic characteristics of women and their partners differ depending on the presence or the absence of abuse. In particular, both partners tend to be older and much less educated, and live in much poorer households. Interestingly, the domestic abuse is correlated with the woman's employment, her partner's employment, and the interaction

between employment statuses. Of course, these differences just express marginal correlations, behind which there can be differences in observed and unobserved individual and demographic characteristics, so we cannot necessarily infer the existence of causal effects.

We have also considered complementary data to control for geographical effects and to exploit exogenous variation in order to undertake endogeneity problems in employment and income variables. In order to control for local effects, we have also gathered province-level information on per capita GDP (Source: Spanish National Accounts, National Statistics) and population density (Source: Spanish Census, National Statistics). Regarding employment variables, we have constructed the employment and

unemployment rates by year, province, age group and gender (Source: Spanish Labour Force Survey, National Statistics). For our purposes, we have calculated them as the fraction of the total population in each age-gender group that is employed or unemployed, respectively. Regarding geographical information on income, we have computed the fraction of poor households, defined as the ones whose income is one standard deviation below the national average, by year, region and size of municipality (Source: Spanish Consumer Expenditure Surveys, National Statistics).

IV. Empirical model

To study the effect of female and male employment statuses on the probability of female abuse, we use nonlinear discrete models. Let IPV_i^* be the latent process that guides IPV, characterized by the following underlying behavioural model:

$$IPV_i^* = \alpha_0 + \alpha_1 f_i + \alpha_2 p_i + \alpha_3 (f_i \times p_i) + \mathbf{X}_i' \delta + v_i \equiv \mathbf{W}_i' \beta + v_i, \quad (1)$$

where $\mathbf{X}_i$ is a set of exogenous variables and f_i and p_i are dummy variables for women and her partner employment, and $(f_i \times p_i)$ is the interaction between them. This specification is consistent with non-cooperative household bargaining models that incorporate the possibility that the male partner inflicts violence on the woman, similar to the ones proposed by Tauchen, Witte, and Long (1991) and Farmer and Tiefenthaler (1997), among others, and Aizer (2010), who presents a stylized model to show under what assumptions a change in women's relative income leads to a change in violence.

We observe a binary variable, IPV_i , which indicates whether women i experiences IPV,

$$IPV_i = \mathbf{1}(IPV_i^* > 0) = \mathbf{1}\left(\alpha_0 + \alpha_1 f_i + \alpha_2 p_i + \alpha_3 f_i \times p_i + \mathbf{X}_i' \delta + v_i \geq 0\right), \quad (2)$$

where $\mathbf{1}$ denotes the indicator function. This model is known as 'dummy endogenous variable model' (Amemiya 1985).

If $v_i | \mathbf{X}_i, f_i, p_i \sim N(0, 1)$, model (2) becomes a standard probit model. If f_i and p_i were continuous endogenous variables, provided we had a set of instruments $\mathbf{Z}$ for them, such that the distribution

of the f_i, p_i conditional on $\mathbf{X}_i, \mathbf{Z}_i$ were Normal, the reduced form for IPV_i would also be a probit model and, therefore, the parameters in Equation (2) could be easily estimated by means of a two-stage method. Nevertheless, the presence of dummy endogenous regressors in a binary choice model makes the analysis differ substantially from that in continuous variable models. More precisely, since the distribution of the endogenous variables is not normal due to their binary nature, one can not use the 2SLS approach.

Given this, we account for the endogeneity problem by considering a multivariate probit model. We specify reduced form equations for female and male employment:

$$f_i = \mathbf{1}(f_i^* > 0) = \mathbf{1}(\mathbf{Z}_{1i}' \lambda_1 + \varepsilon_{i1} > 0), \quad (3)$$

$$p_i = \mathbf{1}(p_i^* > 0) = \mathbf{1}(\mathbf{Z}_{2i}' \lambda_2 + \varepsilon_{i2} > 0), \quad (4)$$

where $(v_i, \varepsilon_{i1}, \varepsilon_{i2})$ are assumed to be jointly normally distributed with zero mean vector and covariance matrix

$$\Omega = \begin{pmatrix} 1 & \rho_{v\varepsilon_1} & \rho_{v\varepsilon_2} \\ & 1 & \rho_{\varepsilon_1\varepsilon_2} \\ & & 1 \end{pmatrix}. \quad (5)$$

Notice that if $\rho_{v\varepsilon_1} = \rho_{v\varepsilon_2} = \rho_{\varepsilon_1\varepsilon_2} = 0$ consistent estimators of the parameters could be obtained by estimating each equation separately. $\mathbf{Z}_{1i}$ and $\mathbf{Z}_{2i}$ are sets of exogenous variables that include $\mathbf{X}_i$. Although the model is identified by functional form assumptions, exclusion restrictions by which there are regressors in the employment equations that do not directly affect the domestic violence outcome enhance identification of the parameters of the model. Equations (3) and (4) represent the reduced form equations from an underlying structural model that allows feedback effects also from IPV to employment. Our concern is not in the estimation of these feedback effects but in dealing with the endogeneity of the employment dummies using a flexible approach and plausible exclusion restrictions.

Model parameters are jointly estimated by Maximum Likelihood. The log-likelihood function (LF) of the model (omitting subscript i for the sake of simplicity) depends on the trivariate standard normal distribution function, $\Phi_3(\cdot)$. It contains eight joint probabilities corresponding to the eight possible combinations of the endogenous dummies. The log

LF is maximized with respect to $\beta, \lambda_1, \lambda_2, \rho_{ve_1}, \rho_{ve_2}$, and $\rho_{e_1 e_2}$ and takes the following form:

$$L = \sum_{i=1}^N \log \Phi_3(\mu_i, \Sigma_i),$$

where

$$\mu_i = (K_{i1} \mathbf{W}_i' \beta, K_{i2} \mathbf{Z}_{1i}' \lambda_1, K_{i2} \mathbf{Z}_{2i}' \lambda_2),$$

$$\Sigma_i = (K_{i1} K_{i2} \rho_{ve_1}, K_{i1} K_{i3} \rho_{ve_2}, K_{i3} K_{i2} \rho_{e_1 e_2}),$$

with $K_{i1} = 2IPV_i - 1$, $K_{i2} = 2f_i - 1$, and $K_{i3} = 2p_i - 1$.

Evaluating multivariate normal distribution functions by numerical approximation is computationally cumbersome. Instead, we use simulation to approximate them, implementing the most popular simulation method by Geweke, Hajivassiliou and Keane (GHK). This method is based on the expression of the multivariate normal distribution as the product of sequentially conditioned univariate normal distributions, which can be easily evaluated (see Borsch-Supan and Hajivassiliou 1993).⁶

In our empirical model the income variable, which is an indicator of living in a poor household, is also a potentially endogenous variable. Thus, we add to our specification a reduced form equation for the probability of being a low income household, and estimate a tetravariate probit model that takes into account the correlation between the error terms of the four different outcomes, domestic violence, female employment, male employment, and low household income.

Finally, in nonlinear discrete models the parameters of policy interest are typically the marginal effects of the variables evaluated at certain values of the explanatory variables, for instance the mean. Given that our specification includes an interaction between the employment indicators for both spouses, the marginal effect of female and male employment depends on the value of the partner's employment status. For instance, for the sample mean values of the covariates $\bar{\mathbf{X}}$, the estimated effect of female employment on the probability of IPV when the male partner is employed is obtained by considering the difference:

$$\begin{aligned} \widehat{\Pr}(IPV = 1 | f = 1, p = 1, \bar{\mathbf{X}}) - \widehat{\Pr}(IPV = 1 | f \\ = 0, p = 1, \bar{\mathbf{X}}) \\ = \Phi(\hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_2 + \hat{\alpha}_3 + \bar{\mathbf{X}}' \hat{\delta}) \\ - \Phi(\hat{\alpha}_0 + \hat{\alpha}_2 + \bar{\mathbf{X}}' \hat{\delta}), \end{aligned}$$

where $\hat{\alpha}_0, \hat{\alpha}_1, \hat{\alpha}_2, \hat{\alpha}_3$ and $\hat{\delta}$ are the multivariate model estimates and $\Phi(\cdot)$ denotes the cumulative distribution function of the univariate standard normal distribution. Equally, the effect of female employment when the male partner is not employed is given by

$$\Phi(\hat{\alpha}_0 + \hat{\alpha}_1 + \bar{\mathbf{X}}' \hat{\delta}) - \Phi(\hat{\alpha}_0 + \bar{\mathbf{X}}' \hat{\delta}).$$

V. Results

In this section, we discuss our estimation results to assess the effect on the probabilities of physical and non-physical IPV of the employment statuses of both partners, household income, and other measures of socioeconomic status such as partners' education. Our variables for employment status consist of two binary variables on whether the corresponding partner is employed or not, and the interaction between them. Our income variable consists on an indicator of low household income (when the respondent asked that her household income was significantly below the average). We have included sets of dummy variables on each partner's completed education, as well as a binary variable indicating whether the woman is more educated than her partner. We control for additional sociodemographic variables: woman's age, number of household members, and a binary variable for large municipality of residence (above 200,000 inhabitants).

We have taken into account geographical differences which can induct differences in the incidence of IPV. For such purpose, we have included province-level variables such as the logarithm of per capita income and the population density. Moreover, in order to account for further unobserved time-invariant regional differences, we also included regional binary variables. Our preliminary estimates showed a significant distinction between two broad areas, one comprising the peripheral

⁶The simulated maximum likelihood estimator is consistent as the number of draws and the number of observations tend to infinity. Increasing the draws increases accuracy, but at the cost of lengthening run time. According to Hajivassiliou and Ruud (1994) ensuring that the number of random draws is similar to the square root of the sample size ensures that the simulation bias is reduced to negligible.

Northern regions and most Mediterranean regions, the other comprising the central and the Southern regions. Therefore, we have defined a single binary variable *RNorMed* to control for unobserved regional differences.⁷

We report maximum likelihood estimates of the models as described in Section IV. The qualitative impacts of the variables are discussed in terms of the sign and statistical significance of the estimated coefficients and of their marginal effects. The estimates for the probability of being victim of physical and non-physical abuse are reported in Tables 7 and 8, respectively. In the first column, we report the univariate probit estimates, which ignore the potential endogeneity of employment indicators and household income. The multivariate probit estimates for the equations of the corresponding type of IPV are reported in the second column, and the multivariate probit estimates for the three auxiliary equations of each partner's employment status and low income are reported in the subsequent columns.⁸ The marginal effects of the employment status of each partner on each type of IPV based on the corresponding multivariate probit estimations are reported in Table 9.

The univariate probit estimates for physical IPV show a significantly positive coefficient for woman employment and a negative and significant coefficient for the interaction between woman and partner employment, while the coefficient of partner employment is small and non-significant. These results indicate that, conditional on income, other household characteristics and characteristics of both partners, in couples in which the woman is employed but her partner is not, the risk of physical IPV is higher than in couples in which neither partner is employed. Nonetheless, the sign of the effect of woman employment is reversed when her partner is also employed, that is, physical abuse risk were reduced only when both partners are employed. Therefore, the mere fact that the woman is employed would not make her less vulnerable to IPV, as such

effect is contingent to the employment status of his partner. These results resemble previous findings in Hornung, McCullough, and Sugimoto (1981), Macmillan and Gartner (1999) and Terrazas-Carrillo and McWhirter (2015), among others, that couples characterized by employment status reversal with respect to the traditional couples face a substantially higher risk of IPV.

Nonetheless, due to the endogeneity problems previously pointed out, these coefficients do not only capture the effect of the variables of interest on the IPV, but also the effect of other factors potentially correlated with both. To get estimates that have a causal interpretation, we estimate multinomial probit models, which undertake the endogeneity problem of employment statuses and low household income. For that purpose, we consider, in addition to the IPV equation, three additional reduced form equations for these three variables.⁹ The specification of these equations is the usual in the literature.¹⁰ In addition to the joint normal distributional assumption, we consider exclusion restrictions, so that we will include additional variables (instruments) in the auxiliary equations but not in the IPV equation. Specifically, we use annual province-level female and male employment and unemployment rates by age. Our choice of instruments, in the spirit of Aizer (2010) and Anderberg et al. (2015), exploits information on local labour market conditions, which help to predict the individual employment status while are unrelated with workers characteristics related with the risk of IPV. Regarding income, we use the fraction of low income households by year, region and size of municipality which is related with the household poverty risk, but does not have a direct effect on IPV.

Unlike the univariate probit, multivariate estimates for physical IPV show that the estimated coefficient of the partner employment status is significantly negative, whereas female employment status does not increase the risk of physical violence. In fact, the effect of female employment depends critically on the employment

⁷Namely, *RNorMed* equals one for the peripheral Northern regions (Galicia, Asturias, Cantabria, Euskadi, Navarra, La Rioja and Aragon) and the Mediterranean regions of Cataluña, Balears and Valencia, and zero for the remaining central regions of Castilla y Leon, Castilla La Mancha and Madrid, and the Southern regions of Extremadura, Andalucía, the two African autonomous cities of Ceuta and Melilla and Canarias.

⁸To obtain our estimates, we use the Stata third party application *mvprobit*, written by Capellari and Jenkins (2003).

⁹Notice that in this case the potential endogeneity of income arises, not only because of the obvious simultaneity bias, but because of potential measurement error too.

¹⁰The specification used for the corresponding binary employment equations for each partner resemble the baseline specifications for labour market participation that have been widely used in the empirical literature (see for instance Mroz 1987). One of the major differences between labour force participation specifications for women and men is that in the case of women, a measure of household income (excluding the woman's labour income) is usually included among the covariates.

Table 7. Estimates for risk of physical IPV.

	Univariate	Tetravariate			
	IPV Physical	IPV Physical	Woman empl.	Partner empl.	Low income
Woman employed	0.1359** (0.0662)	0.1267 (0.1826)			
Partner employed	0.0058 (0.0375)	0.1585** (0.0802)			
Woman empl. × partner empl.	0.1817** (0.0715)	0.1818** (0.0729)			
Household size	0.0472*** (0.0097)	0.0416*** (0.0108)	0.0761*** (0.0066)	0.0179** (0.0085)	0.0263*** (0.0084)
Woman age 30 49	0.0147 (0.0482)	0.0094 (0.0487)	0.0194 (0.0386)		
Woman age 50 64	0.1899*** (0.0513)	0.0960 (0.0639)	0.0641 (0.0611)		
Woman: secondary	0.1309*** (0.0445)	0.1002* (0.0515)	0.3804*** (0.0221)		0.3373*** (0.0362)
Woman: college	0.1358** (0.0569)	0.0511 (0.0811)	0.9975*** (0.0265)		0.5360*** (0.0501)
Partner: secondary	0.1429*** (0.0381)	0.1542*** (0.0397)	0.0405* (0.0225)	0.1983*** (0.0289)	0.4602*** (0.0337)
Partner: college	0.2435*** (0.0517)	0.2607*** (0.0537)	0.0252 (0.0268)	0.4936*** (0.0316)	0.7294*** (0.0458)
ln(province GDP per capita)	0.0815 (0.0542)	0.0818 (0.0607)	0.1051** (0.0491)	0.0453 (0.0531)	0.2459*** (0.0596)
Prov. population density	0.0145 (0.0167)	0.0104 (0.0168)	0.0195* (0.0116)	0.0254* (0.0152)	0.0059 (0.0141)
Woman more educated	0.0258 (0.0451)	0.0214 (0.0447)			
Low income household	0.2566*** (0.0339)	0.0477 (0.1445)	0.3871*** (0.1230)		
Large municipality	0.0428 (0.0292)	0.0383 (0.0289)			
Y3	0.0897*** (0.0248)	0.0932*** (0.0323)			
RNorMed	0.0945*** (0.0198)	0.1078*** (0.0260)			
Partner age 30 49			0.1765*** (0.0476)	0.1193 (0.0747)	0.1456** (0.0584)
Partner age 50 64			0.2322*** (0.0536)	0.3088*** (0.0799)	0.0701 (0.0665)
Partner age 65+			0.3044*** (0.0890)	0.5474*** (0.1046)	0.0927 (0.0969)
Fem. emp. rate			1.4676*** (0.1148)	1.0019*** (0.1092)	0.4213*** (0.1114)
Fem. unem. rate			0.4568* (0.2344)	1.0429*** (0.3086)	0.1227 (0.2755)
Male emp. rate			0.3960*** (0.0903)	2.2619*** (0.0867)	1.0646*** (0.0941)
Male unem. rate.			0.1810 (0.3109)	1.4885*** (0.4127)	0.0692 (0.3888)
Fraction low income households					1.6177*** (0.1788)
Wald tests of joint significance (p value)					
Employment ind.	0.0316**	0.0002***			
Woman age	0.0000***	0.0403**	0.0532*		
Woman educ.	0.0073***	0.1037	0.0000***		0.0000***
Partner age			0.0003***	0.0000***	0.0079***
Partner educ.	0.0000***	0.0000***	0.1963	0.0000***	0.0000***
Regional emp. and unemp.			0.0000***	0.0000***	0.0000***
Cross equations correlation coefficients					
IPV physical			0.1652* (0.0968)	0.0736* (0.0391)	0.1417* (0.0764)
Woman empl.				0.0340* (0.0176)	0.0581 (0.0657)
Partner empl.					0.3559*** (0.0142)

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

Standard errors in parentheses

*, **, *** denote significance at the 10%, 5% and 1%, respectively.

Table 8. Estimates for risk of non-physical IPV.

	Univariate	Tetravariate			
	IPV Non phys	IPV Non Phys	Woman empl.	Partner empl.	Low income
Woman employed	0.0817 (0.0574)	0.1848 (0.1588)			
Partner employed	0.0276 (0.0322)	0.1252 (0.0773)			
Woman empl. × partner empl.	0.1164* (0.0612)	0.0930 (0.0623)			
Household size	0.0453*** (0.0080)	0.0362*** (0.0090)	0.0761*** (0.0066)	0.0178** (0.0085)	0.0265*** (0.0084)
Woman age 30 49	0.0877** (0.0389)	0.0681* (0.0396)	0.0209 (0.0386)		
Woman age: 50 64	0.1676*** (0.0421)	0.1156** (0.0539)	0.0595 (0.0611)		
Woman: secondary	0.1250*** (0.0342)	0.1019** (0.0414)	0.3778*** (0.0221)		0.3342*** (0.0361)
Woman: college	0.1945*** (0.0432)	0.1192* (0.0679)	0.9943*** (0.0266)		0.5355*** (0.0501)
Partner: secondary	0.0971*** (0.0301)	0.1249*** (0.0320)	0.0366 (0.0224)	0.1978*** (0.0289)	0.4629*** (0.0338)
Partner: college	0.0562 (0.0392)	0.0977** (0.0417)	0.0201 (0.0267)	0.4942*** (0.0316)	0.7275*** (0.0457)
ln(province GDP per capita)	0.0143 (0.0443)	0.0111 (0.0516)	0.1095** (0.0490)	0.0455 (0.0532)	0.2422*** (0.0595)
Prov. population density	0.0151 (0.0140)	0.0120 (0.0141)	0.0190* (0.0115)	0.0256* (0.0152)	0.0045 (0.0142)
Woman more educated	0.1342*** (0.0355)	0.1229*** (0.0352)			
Fraction low income households	0.2190*** (0.0298)	0.2037 (0.1332)	0.4410*** (0.1194)		
Large municipality	0.0781*** (0.0235)	0.0731*** (0.0232)			
Y3	0.0770*** (0.0263)	0.0725*** (0.0259)			
RNorMed	0.0827*** (0.0210)	0.0845*** (0.0211)			
Partner age 30 49			0.1735*** (0.0474)	0.1166 (0.0747)	0.1434t (0.0583)
Partner age 50 64			0.2344*** (0.0536)	0.3062*** (0.0799)	0.0703 (0.0663)
Partner age 65+			0.3135*** (0.0890)	0.5477*** (0.1046)	0.1007 (0.0966)
Fem. emp. rate			1.4700*** (0.1147)	1.0046*** (0.1092)	0.4346*** (0.1111)
Fem. unem. rate			0.4544 (0.2342)	1.0497*** (0.3088)	0.1439 (0.2747)
Male emp. rate			0.3670*** (0.0903)	2.2572*** (0.0867)	1.0711*** (0.0937)
Male unem. rate			0.1848 (0.3108)	1.4956*** (0.4130)	0.0760 (0.3876)
Fraction low income households					1.6160*** (0.1782)
Wald tests of joint significance (p value)					
Employment ind.	0.0449*	0.0030***			
Woman age	0.0001***	0.0991*	0.0002***		
Woman educ.	0.0000***	0.0484**	0.0000***		0.0000***
Partner age			0.0002***	0.0000***	0.0002***
Partner educ.	0.0055***	0.0005***	0.2636	0.0000***	0.0000***
Regional emp.and unemp.			0.0000***	0.0000***	0.0000***
Cross equations correlation coefficients					
IPV non phys.			0.1564* (0.0843)	0.0108 (0.0366)	0.2193*** (0.0709)
Woman empl.				0.0288 (0.0175)	0.0879 (0.0641)
Partner empl.					0.3566*** (0.0142)

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006.

Standard errors in parentheses.

*, **, *** Denote significance at the 10%, 5% and 1%, respectively.

Table 9. Estimated marginal effects of woman and partner employment on IPV.

Effect of woman employment		
Partner not employed	Physical 0.0157 (0.0221)	Non physical 0.0439 (0.0270)
Partner employed	0.0254* (0.0140)	0.0491** (0.0212)
Effect of partner employment		
Woman not employed	Physical 0.0191* (0.0102)	Non Physical 0.0219 (0.0152)
Woman employed	0.0289** (0.0131)	0.0272* (0.0159)

Source: own calculations from Spanish VAW Surveys, 1999, 2002, 2006. Marginal effects evaluated for 2006, using the sample mean values at that year.

Standard errors, computed using the Delta method, in parentheses.

*, **, *** Denote significance at the 10%, 5% and 1%, respectively.

status of her partner. Whereas female employment does not reduce the risk of IPV when her partner is not employed, it does when her partner is employed too. Thus, according to these results, partner employment status plays a crucial role: women cohabiting with an employed partner face significantly lower risk of experiencing physical abuse than women whose partner is not employed, which is even lower when the woman is employed too.¹¹

We compute the marginal effects of employment on physical IPV (first column of Table 9) evaluated at the mean values of the variables for 2006. The risk of violence is significantly lower in households where the male partner is employed, amounting to 2.9 and 1.9 percentage points less depending on whether the woman is employed or not. Considering female employment, we have already seen that it only has a significantly lowering effect on the risk of physical violence provided that her partner is employed. In particular, the risk of violence is 2.5 percentage points lower. To weigh the importance of these figures, it must be recalled that the sample rate of physical IPV in 2006 amounted to 3.9%.¹²

To better understand the underlying causes of the differences between the univariate and the multivariate estimates, it is useful to look at the estimated

correlation coefficients among the error terms in the four equations, reported at the end of Tables 7 and 8 for physical and non-physical violence, respectively. They point out a positive endogeneity bias in the estimated coefficients of the employment statuses of the woman and of her partner. This suggests that unobserved factors that increase the risk of IPV are positively correlated with the employment statuses of each of them. We could think on several potential reasons behind this positive bias, such as that working women are more likely to report physical abuse than non-working women (as pointed out by Anderson 1997, among others), or certain unobserved characteristics of each partner that make abuse more likely (such as unobserved family background) or that make them more likely to be employed. Last three columns in Tables 7 and 8 present the estimated coefficients for the two employment and the low income equations, that resemble usual specifications. It is worth noticing that the results for these equations, both for physical and non-physical abuse, are very similar. Moreover, the set of instruments used have a highly significant effect in explaining the probabilities of each partner's employment and the probability of living in a low income household.

Our findings challenge absolute resource theories by which it is availability of resources, rather than who is the breadwinner, what matters for violence. Besides, the results are not fully supportive of relative resource theories either, by which, other things equal, woman's employment should improve her bargaining position, thus reducing the risk of violence, particularly when her partner's position is weaker (as when he is not employed). The fact that it is male employment what matters most for reducing domestic violence suggests that the role of male employment status goes beyond economic aspects, emphasizing its symbolic role in strengthening the masculinity in the relationship among partners.

¹¹To assess the robustness of our results we have also performed estimates excluding individuals older than 59. The qualitative results hold, although the precision of the estimates is lower.

¹²Alternatively to our multivariate estimates, we could have considered a linear probability model (LPM), estimated by two stage least squares (2SLS), using as instruments the province level employment and unemployment rates by age and gender (for employment statuses) and the local percentage of low income households (for low income). Although the linear models are not useful for predictive purposes, it is interesting to see how the implications from these models differ from non linear ones.

We have estimated a LPM, both by OLS and 2SLS (not reported here), finding that the signs of the marginal effects of interest hold, although these are estimated with less precision mainly in the 2SLS estimates in comparison with the preferred multivariate probit estimates. This could be due to the fact that the two stage strategy in this case also ignores the discrete nature of the potentially endogenous variables, leading to a measurement error problem that is not present in the multivariate probit model.

These results are consistent with the interpretation that different family patterns, particularly more egalitarian *versus* traditional families, which entail symmetry or asymmetry in labour market participation, are associated with different risks of abuse. Anderson (1997) remarked that status incompatibilities among partners are differentially associated with IPV. Expectations about the relative statuses of male and female partners are based on what is normative within society, and deviations from the norm result in dissatisfaction for the male partner (Hornung, McCullough, and Sugimoto 1981). As an extreme case, a situation where the male partner is not employed challenges the cultural depiction of the male partner as breadwinner, what might trigger the risk of violence.

The differential results between the univariate and the multivariate estimated effect of employment estimates are qualitatively similar for physical and non-physical IPV. In this latter case, even though employment effects are not individually significant, they remain jointly significant. The marginal effects of employment statuses of each partner on the risk of non-physical IPV (reported in the second column of Table 9) are negative though only significant when the other partner is employed too. Interestingly, the effect of female employment looks substantially higher than the effect of male employment. Specifically, the risk of non-physical violence is 4.9 percentage points lower when the woman is employed, provided that her partner is employed too, whereas such risk is 2.7 percentage points lower when the male partner is employed, provided that the woman is employed too. These effects are quantitatively sizeable, considering that the sample rate of non-physical IPV in 2006 was 8.2%.

Regarding the effect of income, the positive effect of living in a poor household on both physical and non-physical abuse that is found in the univariate estimations, disappears and becomes statistically non-significant once we account for the potential endogeneity of this variable. As with the employment variables, we also find that ignoring it induces a positive bias, which is validated by the sign and significance of the correlation coefficient between the unobservables affecting the probability of experiencing abuse and the equation of low household income. It is worth noting that the correlation coefficient between the IPV and the low income equations

are significantly positive for both types of abuse. This suggests that the unobservables that increase the risk of both types of IPV are positively associated with the unobservables that increase the risk of household poverty.

With respect to other characteristics of the woman and her partner, we find that the risk of experiencing both physical and non-physical abuse increases with woman's age. Interestingly, the education of the potential abuser seems to matter more than the education of the potential victim: we find that women whose partners are more educated have lower risk of any type of abuse, while the effect of woman's education seems less relevant for physical abuse. Furthermore, differences in education among partners, that capture to some extent socioeconomic disparities among partners, have only a significant effect for non-physical abuse. In particular, if the woman has a higher level of education than her partner, the risk of non-physical abuse increases.

Household size has a significantly positive effect on both types of IPV. This variable provides an imperfect measure of children, who may be seen as a marriage-specific capital, which enhance the value of the relationship and may decrease the chance that the relationship ends (Becker, Landes, and Michael 1977). The theoretical effect of children in the risk of abuse is ambiguous, depending on their relative value to each partner and how it affects the marginal utility for violence of the male partner. The positive effect suggests two channels by which the risk of violence would rise. First, children increase the child care responsibilities for the woman, lowering her reservation utility level; second, children increase the stress within the household, contributing to rise the risk of violence.

Finally, the coefficient of *RNorMed* in the IPV equation was found to be significant and systematically negative. This variable captures unobserved differences between these two broad geographical areas, which might include cultural differences. Even though our analysis does not allow to provide a conclusive interpretation, the Spanish regions for which this variable equals one coincide with those where stem families (in opposition to nuclear families) have been historically more prevalent. According to Tur-Prats (2016), territories where stem families were more prevalent in the past, currently exhibit lower rates of domestic violence

because both partners had typically contributed to household income and less differentiated gender roles are expected to be found.

VI Conclusions

In this article, we have studied the effect of employment statuses of the woman and her partner on the risk of IPV, using cross-sectional data on Spanish women from the 1999, 2002 and 2006 VAW surveys. We have explicitly considered the separate effects of the employment status of each partner, as well as the interaction between them. We have analysed separately physical and non-physical IPV. Our measures of employment status are two binary indicators that capture the employment status of each partner. We have also conditioned on income and a set of socio-demographic characteristics. Our estimation strategy accounts for the potential endogeneity bias induced by the effect of unobserved factors that could influence both the employment status of the partners and domestic violence, such as personality traits or non-random matching of individuals into intimate relationships.

Our estimation results confirm the importance of accounting for the endogeneity of employment statuses and income, both for physical and non-physical abuse. Particularly, our results indicate that the employment status of the partner plays a leading role in the risk of physical abuse. Women whose partner is employed are much less likely to experience physical abuse than women cohabiting with non-working partners; this effect is much stronger when the woman is employed too. Quantitatively, the estimated marginal effects of the employment statuses of both partners on both types of IPV are sizeable. We find that the risk of abuse is less than half among couples in which both partners are employed with respect to couples in which only the male partner works, and much lower with respect to couples in which the male partner does not work. This latter result, by which couples characterized by employment status reversal exhibit the highest risk of abuse, resembles the instrumental use of violence predicted by backlash theories, by which violence is exerted when the male partner faces a relative improvement in the woman's position within the household in order to assert his position within the household.

Our results favour the interpretation that different family patterns, particularly more egalitarian *versus* traditional families, which entail symmetry or asymmetry in labour market participation, are associated with different risk of abuse (Anderson 1997). A major finding is that the risk of physical violence is the lowest for those balanced couples in which both partners are employed. Laws and services devised to empower women and encourage men to value an equal partner are likely to be important steps towards abuse reduction (Coleman and Strauss, 1986). Additionally, as long as more children grow up in nontraditional households with working mothers (Nock 2001), this will induce an intergenerational transmission of nontraditional gender patterns (Pollak 2004; Bowlus and Seitz 2006).

Besides, the risk of violence is strongly increased in those couples where the male partner is not employed, so that his traditional role as main breadwinner is challenged. Programs designed to increase women's independence should give priority to such vulnerable relationships. Long run policies towards women's economic independence and gender equality must be complemented with short run interventions to increase female empowerment within the household, particularly reinforcing law and deterrence mechanisms and increasing the resources for shelters and help services for battered women. Also, promoting early intervention to target children who witness violence or experience abuse.

Our study is limited by the characteristics of the data. In particular, our data lacks of family background information on violence during partners' childhood. Availability of such information would help us to understand the forces driving female risk of victimization. In addition, it would shed light on the intergenerational effects of family patterns on the transmission of abuse in the long run, given the evidence that domestic violence as a child dramatically increases the odds that men become abusers (Bowlus and Seitz 2006). Also, it would allow to gauge the extent of assortative mating on the basis of violence in the partners' families of origin (Pollak 2004).

In addition, the use of cross-sectional data prevents us to understand the dynamics of employment and violence, for which longitudinal data would be needed. In particular, we could exploit past employment statuses to ascertain the long run and short run effects of employment statuses, and the persistence

effects of employment on the risk of abuse (see Tauchen and Witte 1995).

Acknowledgements

We thank Diego Blázquez for his help in providing the raw data. We thank Victor Aguirregabiria, Juan Carlos Berganza, Rocio Sanchez Mangas, audiences at the Symposium of the Spanish Economic Association, Girona, December 2015, and two anonymous referees, for their comments. The first author acknowledges the hospitality of the UCD Geary Institute for Public Policy and FEDEA. Research funding from the Ministry of Finance and Competitiveness, Grant Nos. ECO2015 65204 P, MDM2014 0431, and Comunidad de Madrid, Grant No. MadEco CM (S2015/HUM 3444), is gratefully acknowledged.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Research funding from the Ministry of Finance and Competitiveness, Grant Nos. ECO2015 65204 P, MDM2014 0431, and Comunidad de Madrid, Grant No. MadEco CM (S2015/HUM 3444), is gratefully acknowledged.

ORCID

César Alonso Borrego <http://orcid.org/0000 0003 4934 9134>

Raquel Carrasco <http://orcid.org/0000 0003 2550 6350>

References

- Aizer, A. 2010. "The Gender Wage Gap and Domestic Violence." *The American Economic Review* 100: 1847–1859. doi:10.1257/aer.100.4.1847.
- Almlund, M., A. L. Duckworth, J. Heckman, and T. Kautz. 2011. "Personality Psychology and Economics". In *Handbook of the Economics of Education Volume 4*, eds. E. A. Hanushek, S. Machin, and L. Woessmann, 1–181. doi:10.1016/B978 0 444 53444 6.00001 8.
- Amemiya, T. 1985. *Advanced Econometrics*. Oxford: Basil Blackwell.
- Anderberg, H., J. Rainer, J. Wadsworth, and T. Wilson. forthcoming. "Unemployment and Domestic Violence: Theory and Evidence." *The Economic Journal*. doi:10.1111/ecoj.12246.
- Anderson, K. L. 1997. "Gender, Status, and Domestic Violence: An Integration of Feminist and Family Violence Approaches." *Journal of Marriage and Family* 59 (3): 655–669. doi:10.2307/353952.
- Becker, G. S. 1965. "A Theory of the Allocation of Time." *The Economic Journal* 75: 439–519. doi:10.2307/2228949.
- Becker, G. S. 1973. "A Theory of Marriage: Part I." *The Journal of Political Economy* 81 (4): 813–846. doi:10.1086/260084.
- Becker, G. S., E. M. Landes, and R. T. Michael. 1977. "An Economic Analysis of Marital Instability." *The Journal of Political Economy* 85 (6): 1141–1187. doi:10.1086/260631.
- Bhattacharyya, M., A. S. Bedi, and A. Chhachhi. 2011. "Marital Violence and Women's Employment and Property Status: Evidence from North Indian Villages." *World Development* 39 (9): 1676–1689. doi:10.1016/j.worlddev.2011.02.001.
- Bobonis, G. J., M. González Brenes, and R. Castro. 2013. "Public Transfers and Domestic Violence: The Roles of Private Information and Spousal Control." *American Economic Journal: Economic Policy* 5 (1): 179–205. doi:10.1257/pol.5.1.179.
- Borsch Supan, A., and V. Hajivassiliou. 1993. "Smooth Unbiased Multivariate Probability Simulators of Maximum Likelihood Estimation of Limited Dependent Variable Models." *Journal of Econometrics* 58: 347–368. doi:10.1016/0304 4076(93)90049 B.
- Bowlus, A. J., and S. Seitz. 2006. "Domestic Violence, Employment, and Divorce." *International Economic Review* 47: 1113–1149. doi:10.1111/j.1468 2354.2006.00408.x.
- Brassiolo, P. 2016. "Domestic Violence and Divorce Law: When Divorce Threats Become Credible." *Journal of Labor Economics* 34 (2): 443–477. doi:10.1086/683666.
- Capellari, L., and S. P. Jenkins. 2003. "Multivariate Probit Regression Using Simulated Maximum Likelihood." *The Stata Journal* 3 (3): 278–294.
- Chin, Y. 2012. "Male Backlash, Bargaining, or Exposure Reduction?: Women's Working Status and Physical Spousal Violence in India." *Journal of Population Economics* 25 (1): 175–200. doi:10.1007/s00148 011 0382 8.
- Coleman, D. H., and M. A. Straus. 1986. "Marital Power, Conflict, and Violence in a Nationally Representative Sample of American Couples." *Violence and Victims* 1 (2): 141–157.
- DeMaris, A., M. Benson, G. Fox, T. Hill, and J. Van Wyk. 2003. "Distal and Proximal Factors in Domestic Violence: A Test of an Integrated Model." *Journal of Marriage and Family* 65 (3): 652–667. doi:10.1111/j.1741 3737.2003.00652.x.
- European Commission. 2010. "Domestic Violence Against Women" *Special Eurobarometer* 344. Brussels: Directorate General for Justice, Freedom and Security, European Union.
- Farmer, A., and J. Tiefenthaler. 1996. "Domestic Violence: The Value of Services as Signals." *The American Economic Review Papers and Proceedings* 86 (2): 274–279.
- Farmer, A., and J. Tiefenthaler. 1997. "An Economic Analysis of Domestic Violence." *Review of Social Economy* 55 (3): 337–358. doi:10.1080/00346769700000004.

- Garcia Moreno, C., L. Heise, H. A. F. M. Jansen, M. Ellsberg, and C. Watts. 2005. "Violence Against Women." *Science* 310 (5752): 1282–1283. doi:10.1126/science.1121400.
- Gelles, R. 1976. "Abused Wives: Why Do They Stay?." *Journal of Marriage and Family* 38 (4): 659–668. doi:10.2307/350685.
- Hajivassiliou, V., and P. Ruud. 1994. "Classical Estimation Methods for LDV Models Using Simulation." In *Handbook of Econometrics*, edited by R. Engle and D. McFadden, 2383–2442. Vol. IV. Amsterdam: North Holland.
- Heckman, J., and T. Kautz. 2012. "Hard Evidence on Soft Skills." *Labour Economics* 19 (2): 451–464. doi:10.1016/j.labeco.2012.05.014.
- Hidrobo, M., A. Peterman, and L. Heise. 2016. "The Effect of Cash, Vouchers, and Food Transfers on Intimate Partner Violence: Evidence from a Randomized Experiment in Northern Ecuador." *American Economic Journal: Applied Economics* 8 (3): 284–303. doi:10.1257/app.20150048.
- Hornung, C. A., B. C. McCullough, and T. Sugimoto. 1981. "Status Relationships in Marriage: Risk Factors in Spouse Abuse." *Journal of Marriage and Family* 43 (3): 675–692. doi:10.2307/351768.
- Kalmijn, M. 1994. "Assortative Mating by Cultural and Economic Occupational Status." *American Journal of Sociology* 100 (2): 422–452. doi:10.1086/230542.
- Kaukinen, C. 2004. "Status Compatibility, Physical Violence, and Emotional Abuse in Intimate Relationships." *Journal of Marriage and Family* 66: 452–471. doi:10.1111/j.1741-3737.2004.00031.x.
- Luke, N., and K. Munshi. 2011. "Women as Agents of Change: Female Income and Mobility in India." *Journal of Development Economics* 94 (1): 1–17. doi:10.1016/j.jdeveco.2010.01.002.
- Macmillan, R., and R. Gartner. 1999. "When She Brings Home the Bacon: Labor Force Participation and the Risk of Spousal Violence against Women?." *Journal of Marriage and Family* 61: 947–958. doi:10.2307/354015.
- Mroz, T. A. 1987. "The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions." *Econometrica* 55 (4): 765–799. doi:10.2307/1911029.
- Nock, S. L. 2001. "The Marriage of Equally Dependent Spouses." *Journal of Family Issues* 22 (6): 755–775. doi:10.1177/019251301022006005.
- OECD. 2013. "Gender Differences in Well Being: Can Women and Men Have It All?," in *How's Life? 2013: Measuring Well Being*. Paris: OECD Publishing. DOI: 10.1787/how-life-2013-en
- Pollak, R. 2004. "An Intergenerational Model of Domestic Violence." *Journal of Population Economics* 17: 311–329. doi:10.1007/s00148-003-0177-7.
- Ramos, A. 2016. *Household Decision Making with Violence: Implications for Transfer Programs*. mimeo. Barcelona: Universitat Autònoma de Barcelona.
- Schwartz, C. R. 2013. "Trends and Variation in Assortative Mating: Causes and Consequences." *Annual Review of Sociology* 39: 451–470. doi:10.1146/annurev-soc-071312-145544.
- Tauchen, H., and A. D. Witte. 1995. "The Dynamics of Domestic Violence." *The American Economic Review Papers and Proceedings* 85 (2): 414–418.
- Tauchen, H. V., A. D. Witte, and S. K. Long. 1991. "Domestic Violence: A Nonrandom Affair." *International Economic Review* 32: 491–511. doi:10.2307/2526888.
- Terrazas Carrillo, E. C., and P. T. McWhirter. 2015. "Employment Status and Intimate Partner Violence among Mexican Women." *Journal of Interpersonal Violence* 30 (7): 1128–1152. doi:10.1177/0886260514539848.
- Tur Prats, A. 2016. *Unemployment and Intimate Partner Violence: A Gender Identity Approach*. mimeo. Barcelona: Universitat Pompeu Fabra.
- Villarreal, A. 2007. "Women's Employment Status, Coercive Control, and Intimate Partner Violence in Mexico." *Journal of Marriage and Family* 69 (2): 418–434. doi:10.1111/j.1741-3737.2007.00374.x.
- World Health Organization. 2013. *Global and Regional Estimates of Violence against Women: Prevalence and Health Effects of Intimate Partner Violence and Nonpartner Sexual Violence*. ISBN 978-92-4-156462-5. Geneva: World Health Organization