

Motherhood Wage Penalties and the Informal Sector in Latin America

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Previous research has established the presence of motherhood wage penalty in a significant number of industrialized societies. Yet, few studies have examined whether mothers face similar disadvantages in developing countries. This article assesses the motherhood wage penalty in five middle-income Latin American countries: Argentina, Brazil, Chile, Mexico and Peru. We analyze microdata from 31 national household surveys, all conducted between 2000 and 2014. After accounting for selection into employment and human capital characteristics, we find mothers receive lower wages than childless women in all five countries. Furthermore, mother's higher likelihood to work in the informal sector explains part of the wage penalty. For two countries –Argentina and Brazil– we find the penalties are greater in the informal sector. We discuss potential mechanisms driving the divergence.

Over the past two decades, social science research on women's labor force participation has paid particular attention to the motherhood wage penalty. Indeed, while the movement for gender equality has made major progress, the gender pay gap persists, and is increasingly concentrated among parents (for the US, Budig, 2014). As a result, a burgeon body of research, using data for a number of countries, has demonstrated that mothers experience a sizeable wage penalty if compared with childless women (Budig & England, 2001; Budig, Misra, & Boeckmann, 2012; Correll, Benard, & Paik, 2007; Waldfogel, 1997). At the same time, research shows that parenthood is associated with a wage premium for men (Petersen, Penner, & Høgsnes, 2014). Yet, importantly, scholars also point out that motherhood penalties are not universal, nor similar across societies. For example, Budig, et al. (2012) find penalties ranging from 33 percent in West Germany to zero in 9 out of the 22 countries analyzed. Among countries such as Australia, Belgium, East Germany, Finland and Sweden, the authors found that mothers do not receive lower earnings than childless women, after accounting for selection into the labor markets and individual-level characteristics. To account for these differences, scholars have largely focused on the role of family policies. Research has shown that policies contributing to the defamiliarization of childcare (mainly public-funded childcare) reduce the negative effect of children on mother's earnings (Budig et al., 2012; Han, Waldfogel, & Brooks-Gunn, 2001) and occupational status (Abendroth, Huffman, & Treas, 2014). Others, such as mandatory parental leaves, might have unintended negative consequences on mother's wages (Mandel & Semyonov, 2005; Pettit & Hook, 2005) through mechanisms such as a larger human capital depreciation and the reinforcement of traditional gender roles. Without doubt, this strain of literature has made significant progress towards our understanding of motherhood penalties in industrialized countries. However,

little is known about the relationship between parenthood and labor earnings among women in developing societies.

In this article, we ask if motherhood is associated with lower labor earnings in a set of five middle-income Latin American countries. Moreover, we explore the relationship between (potential) motherhood penalties and labor informality– a critical characteristic of labor markets in developing countries. While research for industrialized societies certainly informs our work, we argue that the presence of motherhood penalties cannot be assumed for Latin America. Equally important, a different array of potential intervening factors emerge when examining mothers' labor compensation in non-industrialized countries. First, developing countries are often characterized by weak capabilities for law enforcement (Berkowitz et al, 2003; Botero et al, 2004). Thus, in Latin America, a significant body of research has documented the prevalence of violations to labor regulations, in some cases, even within the public sector (for Mexico, Instituto Nacional de Estadística, 2008). Consequently, family-friendly policies and labor regulations– regardless of their level of generosity- have limited impacts on the actual outcomes.

Second, overall social protection nets tend to be much limited in developing than in industrialized countries, even when compared with liberal welfare regimes such as the U.S. (ILO, 1999). Consequently, most of workers in non-industrialized countries (and certainly working mothers) have negligible or no financial aid if unemployed. When social safety nets are minimal, leaving the labor force might not be a viable option. Despite its heterogeneity, low rates of unemployment across the Latin American region are an indication of overall poor social safety protections¹. Hence, in Latin America taken as a whole, mothers have a higher labor force participation rate than non-mothers (Pagés-Serra & Stampini, 2007), a pattern connected to the weakness of existing welfare systems. Therefore, whereas the retreat of mothers from paid employment has been clearly identified as a major contributor to the motherhood penalty in industrialized countries, this mechanism is plausibly less salient in Latin America.

Third, informal, not-registered jobs, constitute a large segment of non-industrialized labor markets. Across Latin America, around 50 percent of workers are in the informal sector (ILO, 2012). Their jobs are unregulated by labor laws, and, consequently associated with a reduction of social protection. Informal sector workers are unprotected from mandatory benefits such as minimum wages,

¹ In the context of non-industrialized countries, open unemployment is not affordable for most of workers. Thus, the dichotomy employed/unemployed hides a large proportion of workers in low-quality jobs (Dewan & Peek, 2007)

compensation for work-related injuries, sick leaves or parental leaves. Thus, when examining the intersection of gender, family and work in non-industrialized societies, it is key to remember that a large group of workers are not covered by the family-friendly labor regulations. That is to say, though family-friendly policies contribute to shape the motherhood penalty across industrialized countries (Abendroth et al., 2014; Misra & Strader, 2013; Petersen et al., 2014), taking this sort of policy by its face value would be a mistake in an analysis for Latin America. Moreover, unregulated jobs are particularly important for understanding female labor force participation in developing countries. Working women are more likely to have informal jobs than men (ILO, 2012), and less likely to transit from informal to formal jobs (for Mexico, Gong & van Soest, 2002). The implications are acute for women, not only in the short-term, but also in the long run². Furthermore, some scholars argue that childrearing responsibilities might play a role at explaining the larger proportion of women in the informal sector, since informal jobs tend to offer more flexible schedules (Maloney, 2004; Perry, 2007).

This article contributes to the literature on motherhood penalty by analyzing data from a set of middle-income Latin American countries: Argentina, Brazil, Chile, Mexico and Peru. We harmonized data from 31 waves of household surveys, conducted between 2003 and 2014. Taken together, these five countries comprise around 67% of the population in the region. The resulting study advances the literature in several ways. First, we provide evidence on the presence and magnitude of motherhood penalties in a non-industrialized region for which research on this topic is scarce. Second, we investigate the potential connection between motherhood penalties and labor informality— a critical feature of labor markets in developing countries. While doing so, we argue for the importance of incorporating contextual factors in the study of women's labor outcomes. Moreover, we examine whether the (potential) motherhood penalty varies across formal and informal sector, and if so, which are potential explanations. These questions are interwoven since a number of scholars (Maloney, 2004; Perry, 2007) contend that mothers would voluntarily join the informal labor market, given it tends to offer more flexible arrangements.

While we focus on Latin American countries, the concept of informality resonates the emerging precarious work in developed countries. Though not-registered, informal jobs are markedly fewer in industrialized societies, an increasing number of precarious jobs are identified in the formal sector,

² Since formal jobs are tied with contributions to jubilatory pensions, the overrepresentation of women in the informal sector has implications to their financial security at older age. Consequently, in most countries in the region, women are less likely to than men to receive an elderly pension and enjoy income independence (Da Costa, de Laiglesia, Martínez, & Melguizo, 2011, UN Women, 2015)

featured by reduced wages, job insecurity, and nonstandard work arrangements (Kalleberg, 2008). In the U.S., these precarious jobs are also overwhelmingly occupied by women, especially mothers (Jacobs and Padavic, 2014). Furthermore, remarkably similar arguments are made in Latin America and industrialized countries to advocate for lowering the level of labor protection for workers, in order to benefit their employability and earnings. Understanding how precarious jobs affect workings mothers in middle-income countries, therefore, has the potential to inform policy interventions aiming to close the gender wage gap in developed nations. The remaining of this article is structured as follows. Section 2 summarizes current explanations for the motherhood wage penalty. It is followed by a brief discussion on labor informality and its implications for mother's work. Section 4 describes our research design and Section 5 presents the results. We discuss the implications of our findings to conclude.

THE MOTHERHOOD PENALTY

The growing body of research on motherhood penalties have demonstrated a wage gap affecting women with children in a number of countries (Budig et al., 2012; Mandel & Semyonov, 2005). Yet, at the same time, cross-national studies show striking differences in the size and even the presence of penalties across societies, a variation that is often attributed to diverging family-friendly policies (Budig et al., 2012; Harkness & Waldfogel, 2003; Misra & Strader, 2013). The potential mechanisms explaining motherhood penalties fall into two broad perspectives. Demand-side explanations concentrate in the role of discrimination against mothers. Given motherhood is a devaluated status in workplace settings, employers perceive mothers as less capable or committed, regardless of their actual level of productivity. Scholars have provided theoretical research exploring the interaction between gender norms and expectations in the workplace (England, 2010; Ridgeway, 1997), as well as empirical tests of a discrimination mechanism affecting working mothers (Benard & Correll, 2010; Correll et al., 2007). For Latin America, qualitative work has investigated the prevalence of discriminatory practices of employers and supervisors against mothers, starting with the pregnancy and despite labor regulations that prohibit them³. For Chile, Ansoleaga, Casas & Godoy documented experiences of women who were harassed after reporting their pregnancies, in the worst-case scenario, with the aim of forcing them to quit (Ansoleaga, Casas, & Godoy, 2011). For Mexico, official statistics indicate that around 30 percent of women were asked to provide prove of a negative pregnancy test when applying for a job (México. Instituto Nacional de Estadística, 2008). Harassment

³ Across Latin America, labor regulations explicitly mandate job security for women during their pregnancy and for a period after the birth, as part of anti-discrimination legal frameworks. The length of the period of job security after the birth varies by country. For a comprehensive review of pertinent legislation by country, see CEPAL and UNICEF, 2011

practices against pregnant women could be plausibly understood as indicative of discrimination, since employers have not had the chance to evaluate an actual decrease in women's productivity due to family obligations.

On the other hand, supply-side theories focus on individual and household characteristics, emphasizing the job costs associated with mothers' employment. Scholars analyze differences between mothers and non-mothers in human capital investments, skill, and work-related preferences. Hence, the observed pay gap could be due to losses in human capital (mainly job experience and seniority) resulting from mothers taking time out of the labor force. Further, gender continues to be a critical factor in the organization of household interactions, with most mothers still being responsible for the bulk of child care in addition to managing the home (Killewald & Gough, 2013). Consequently, mothers may be forced to exert lower effort in paid-work (for West Germany, Kuhhirt & Ludwig, 2012). While most of research on this issue focus on working hours, the large responsibility for household-related duties could also affect labor earnings by diminishing job productivity. To put it in another way, from a supply-side perspective, mothers might actually be less productive than childless women, which, in turn, could explain the observed pay gap. In connection to that, mothers could trade off better wages for "family-friendly" jobs, meaning jobs that allow them to combine paid work with childcare duties (Becker, 1985). The last line of argument is also known as the "compensating wage differentials" (CWD) explanation. Mothers would be willing to trade labor income and occupational status for traits such as flexible scheduling, reduced working hours or lower levels of stress. That is, penalties would be explained by mothers' adjustments of their work conditions to accommodate childcare duties⁴. Researchers exploring a CWD mechanism have found some support for this explanation (Felfe, 2012; Gangl & Ziefle, 2009; Glass, 2004; Petersen, Penner, & Geir, 2010), and, in certain contexts, CWD's fully account for the observed motherhood penalty (For UK and US: Gangl & Ziefle, 2009; for Norway: Petersen et al., 2010). Moreover, Jennifer Glass (2004) found that, indeed, mothers who use family-friendly policies are penalized in a greater extent versus mothers who do not use them.

While not specifically connected to motherhood penalties, a sizeable strain of Latin American research on gender & the workplace suggests that supply-side mechanisms pose obstacles to mother's work for pay. For instance, studies based on survey results on use of time have analyzed the strong prevalence of a gendered division of labor within households. This trend prevails even in

⁴ Certainly, the voluntary character of these decisions is not assumed by scholars assessing the role of this mechanism. Qualitative research has explained that women tend to adopt a discourse of willingness when confronted with a situation of constrained decision-making (Hayes, 1996).

countries with high rates of female participation in the labor force, such as Brazil, Peru and Uruguay. In Peru, while *working* women devote around 37 hours per week to unpaid, household-related work, men allocate about 17 hours to that sort of task (Valladolid & Lopez, 2011). The proportion in Mexico is estimated on 40 hours for working women versus 16 for men (Instituto Nacional de las Mujeres, 2010), and 36 versus 19 in Uruguay (Genta & Perrotta, 2015). Furthermore, while the financial contribution of women to the household's income ameliorates this gap, it still persists as substantial, even among couples with a female breadwinner (for Uruguay, Genta & Perrotta, 2015). Parenthood reinforces these patterns, meaning that the increased demand for unpaid work due to children is mostly assumed by women. Peruvian mothers rise their time in unpaid-domestic work with each additional child, while fathers maintain theirs at the same level regardless of their number of children (Valladolid & Lopez, 2011). Hence, while the specifics about within-family dynamics might differ by region, this pattern is not surprising, and has received substantial attention in industrialized countries (Bianchi, Milkie, Sayer, & Robinson, 2000). As Genta and Perrota point out for the case of Uruguay, men have a family net of women that assume household-related work, a critical factor that allows them to put more hours and effort on the labor market. Further, prevalent policy arrangements in the region, while certainly limited in their enforcement, contribute to the validation of traditional gender roles⁵. Thus, regulations on parental leaves are overwhelmingly concentrated on mothers (CEPAL & UNICEF, 2011), while coverage rates for subsidized childcare remain notably low, despite recent efforts to increase their availability in a handful of countries⁶. In the same line, daily school hours are also low in the vast majority of Latin American countries (Alfaro, Holland, & Evans, 2015). That is, in most of countries the prevalent schooling system is 'in shifts', which means that children stay in school for around 4 or 5 hours. Only in Chile and Mexico full-time schools serve most of the schooling population. Reasonably, shorter school days mean less flexibility and time for mothers to work.

Taken as a whole, the body of research on female labor participation in Latin America leads us to anticipate the presence of a sizeable motherhood penalty in our countries of analysis. This literature suggests that some of the mechanisms associated with wage gaps affecting mothers in other contexts

⁵ The best example on this regard are regulations on maternal leaves, which could be considered generous in the international context, in contrast which paternal leaves that are either minimal or plainly absent. For a review of the legal framework of maternal and parental leaves for Latin American and Caribbean countries, see CEPAL and UNICEF, 2011.

⁶ Chile implemented a childcare program that has been used as regional benchmark in the region (Salas Cuna y Jardines Infantiles). We were not able to find official statistics for most of countries on the proportion of children enrolled on publicly-funded childcare. This issue is relevant to the discussion, given evidence from industrialized contexts shows that publicly-funded childcare reduces the negative impact of children on women's wages (for Norway, Petersen, Penner, & Høgsnes, 2014), labor supply (for Europe: Uunk, Kalmijn, & Muffels, 2005), and occupational status (for Europe: Abendroth, Huffman, & Treas, 2014).

play a role in Latin America as well. In brief, from a demand-side perspective, previous research indicate that discriminatory practices against mothers are fairly habitual in countries for which research is available. From a supply-side perspective, the highly uneven distribution of labor within the household could plausibly take a toll in women's productivity on the job. Furthermore, social policies that have a positive impact on mothers' wages in industrialized countries –public-funded childcare, extended school hours- are not in place in Latin American countries (at the very least, not to a similar extent). Therefore, we hypothesize the following:

Hypothesis 1. There is a motherhood penalty for all five countries in our analysis, and this gap will persist after controlling for individual-level factors and selection into the labor force.

Yet, the question on the presence of motherhood penalties in Latin America is far from obvious. For instance, labor regulations in the region include benefits that have been found counter-productive to mothers' earnings in other contexts. In contrast to Europe, which provides a high cross-national variation on this regard, family-friendly policies in Latin America are substantially similar across countries. Maternal leaves range between 90 days to 18 weeks, and should be paid in full. Likewise, they include a (paid) daily hour allowed for breastfeeding. Certainly, developing countries are often characterized by weak compliance of regulations. Violations to labor laws are pervasive in the region (Kanbur, Ronconi, & Wedenoja, 2013; Ronconi, 2012), and compliance is even lower for working women versus men (For Chile, Ronconi, 2012). However, while difficult to evaluate, we cannot plainly rule out any potential impact of family-friendly policies. For instance, qualitative work conducted by Batthayani suggests that Uruguayan mothers in the public sector receive most of benefits mandated by law (Batthayani, 2002). In the same line, Tornarolli (et al.) finds that minimum wage regulations work somewhat as a benchmark in most of Latin American countries, despite certain dispersion around their mean value. That is, minimum wage regulations are not completely ignored by the labor markets (Tornarolli, Battistón, Gasparini, & Gluzmann, 2014). In other words, although family-friendly policies cannot be taken by its face value, they plausibly have a (more limited) influence in women's labor outcomes in Latin America. To complicate the issue further, the prevalence of informal jobs in Latin America means that for many workers labor regulations simply do not apply. How the presence of a large informal sector could influence motherhood wage penalty is a topic worth further exploration.

Furthermore, while a valuable strain of Latin American literature is devoted to working women, we know rather little about motherhood penalties. Empirical contributions are particularly scarce, and while highly valuable, their results are inconclusive. Piras and Ripani (2005) conducted the first analysis on the topic for the region, a cross-country study for Bolivia, Brazil, Ecuador, and Peru with

data collected around 1999 (single year of data collection by country). The authors found no clear indication of motherhood penalty. Yet, this study did not take into account the selection of women into employment and therefore have the potential to underestimate the wage gap. Gamboa and Zuluaga (2013) analyzed the case of Colombia and found the wage gap between mothers and non-mothers could be entirely explained by observable characteristics. However, they did not restrict the sample to women in the prime years of childbearing and therefore could have underestimated the motherhood penalty. Younger women who might still be primarily engaged in schooling are expected to both be childless and have lower earnings. Finally, Casal and Barham (2013) conducted the only study that compares the difference in motherhood penalty between the formal and informal sectors. Focusing on Argentina between 1995 and 2003, they found a motherhood penalty for women in the informal but not the formal sector. Nevertheless, this result could be driven by their restrictive definition of formality: only workers who enjoy every benefit mandated by law (including Christmas bonuses, for instance) are defined as formal. As a result, the mothers who work in the formal sector are highly selective. Moreover, they include self-employed workers in the informal sector, a decision that obscures the meaning of results.

Having established the association between motherhood and wages among Latin American mothers, we then examine whether informal labor contributes to the observed relationships. We believe our contribution would be fairly limited if we did not take into account specific characteristics of labor markets in our region of interest. Across developing countries, informal labor is ubiquitous—the main distinctive characteristic of the labor structure and a key stratification marker. In the group of the countries included in this study, the informal sector comprises between the 20 and the 60 percent of the workforce, a fact that has critical consequences for labor participation, social protection and even individual's productivity. Not surprisingly, informality has been historically at the core of Latin American research on labor markets. Yet, while this body of literature is rich and dynamic, a comparatively modest number of contributions explore the intersection between gender and informality. In the next section we discuss our inclusion of informal labor in the analysis of motherhood penalties for Latin America. We start by summarizing some of the main relevant characteristics of the informal sector in Latin America, with an emphasis on methodological considerations. Next, we discuss the potential intertwine between informal sector and motherhood penalties.

LABOR INFORMALITY IN LATIN AMERICA

A distinctive feature of labor markets across developing countries is the impact of a large informal sector in the structure and characteristics of employment and earnings (Chong, Galdo, & Saavedra, 2008; Perry, 2007, among others) With about a half of the urban labor force in the informal sector, unregulated work continues to be a central characteristic of Latin American labor markets and a priority of public policy across the region. To be clear, informal work does not mean illegal or criminal work. However, it does mean work that is unregistered. Informal workers engage in employment relationships without a signed contract and, therefore, they are not traceable through administrative records. Their employment does not provide access to protection against health or unemployment shocks, unsafe working environments, disability risks, or savings towards jubilation. Labor regulations of any sort do not apply to them. Even minimum wage regulations are not relevant to informal workers, although they might provide a “lighthouse effect”, meaning a sort of benchmark with regard to compensation. (Tornarolli et al., 2014). Furthermore, jobs in the informal sector include a wide range of activities and industries, such as services and manufacture. They are typically characterized by lower wages, greater instability, a lack of benefits and poor working conditions (Villarreal & Blanchard, 2013). Unskilled labor is overwhelmingly informal, although a significant proportion of skilled workers is informal as well. In any case, most of research in the region has shown a strong wage penalty for workers in the informal sector, even after controlling for individual-level characteristics (Tornarolli et al., 2014)

The rich literature on informal work in Latin America has reached two main agreements. First, a main distinction has been made between salaried versus self-employed informal workers (Maloney, 2003; Perry, 2007; Tornarolli et al., 2014) Moreover, some scholars argue that the self-employed should be seen as an unregulated, but largely voluntary micro-firm sector (Maloney, 2003). Salaried informal jobs, on the other hand, are a better fit to the notion of low-quality jobs or underemployment. Following Tornarolli, et al., among others, in this study we present results excluding the self-employed from our sample of analysis (El Badaoui, Strobl, & Walsh, 2010; Perry, 2007; Tornarolli et al., 2014)⁷. Our decision is mainly practical, since a number of Latin American household surveys do not allow the identification of informal workers if they are self-employed.

⁷ Most of research on informality in Latin America analyze this two sectors separately. That is contributions either restrict their samples to the self-employed or the salaried.

Second, the literature identifies two main perspectives for defining labor informality –a “social protection” definition and a “productive” definition. The later perspective focus in low-productivity as the key characteristic of informal employment. In this view, informal workers provide mainly unskilled labor in low-productive firms with scarce capital. These labor and firms, in the aggregate, have a decisive and negative impact in the overall levels of country competitiveness (Levy, 2008). In operational terms, research from a “productive” perspective defines informal work as functioning in small-scale firms (5 or 10 employee tops).

In contrast, the “social protection” perspective stresses the lack of protection from labor regulations (related to minimum wages, working hours, parental leaves, etc.), as well as social security benefits tied to work. Both definitions overlap substantially (Tornarolli et al., 2014) In addition, while specific labor regulations vary across countries, research on informality in the region usually operationalizes this concept using the individual’s enrollment to a basic “package” of social security benefits (Garganta & Gasparini, 2015; Loayza, Servén, & Sugawara, 2009; Tornarolli et al., 2014). This include mainly elderly pensions, but also disability pensions and health insurance. In Latin America, this “basic package” is often tied to (formal) employment. Employers share some of the cost of social security with government funds, and, consequently, informal jobs do not provide this protection. While enrollment to this “basic package” of benefits does not assure access to every benefit mandated by law (as those associated with motherhood), it constitutes a plausible proxy on that regard. In this study we use the social protection definition, since we are mostly interested in the vulnerability dimension of informal jobs. The social protection framework provides a reasonably consistent definition of informality for the five countries under examination.

Finally, taking into account self-selection poses a main challenge to the study of labor informality. That is, factors such as socioeconomic and human capital characteristics might be important determinants of both a worker’s selection into a formal versus an informal job and earnings. Moreover, to some extent, the informal self-selected workers could be understood as a voluntary sector. In this article, we use a matching strategy to account for this factor. After implementing a matching procedure, we are able to analyze the impact of motherhood on observably similar workers across the formal and informal sectors.

LINKING MOTHERHOOD PENALTIES AND LABOR INFORMALITY

While a burgeoning body of Latin American research is devoted to informal work, existing studies tend to focus on prime-age men and overlook the intersection between informality and gender. We argue that informal work is key to understand women's participation in the workforce in the region, and therefore, critical to an assessment of motherhood penalties. On the one hand, women are overrepresented in the informal labor market worldwide, and certainly, in Latin America (Galli & Kucera, 2008; Pratap & Quintin, 2006, among others). Moreover, informality takes a larger toll on female workers. Women are less likely to transit from informal to formal work (for Mexico: Gong & van Soest, 2002), whereas the wage-loss due to an informal status tends to be higher for women than men (Tornarolli et al., 2014)⁸. On the overall, wage and occupational-status gender gaps are more pronounced in the informal versus the formal sector (International Labour Office & Bureau for Gender Equality, 2013)⁹. In brief, not only the informal sector is relevant to any investigation on labor markets in developing countries, but it is particularly fundamental to the characteristics of female labor participation. Therefore, we expect that informality will contribute to explain the motherhood pay gaps obtained in our analysis.

Hypothesis 2. Across all countries in our analysis, informality will contribute to the explanation of motherhood penalties. Therefore, controlling for a measure on informality will reduce the motherhood penalty identified.

Furthermore, while informal jobs are lower quality in general, they are plausibly more unfavorable for mothers than for childless women. Given labor regulations do not apply to workers in the informal sector, it is reasonable to expect that mothers with unregulated jobs will be more vulnerable to discriminatory practices. That is, if employers of unregulated workers do perceive mothers as less competent or committed, they could likely laid them off or restrict considerably their working hours. In the informal sector, there is no risk for employers who make these decisions. In the same line, mothers with informal jobs do not have access to benefits that were explicitly designed to

⁸ Globally, women are overrepresented in low-quality and precarious work, and L.A. is not an exception to the rule. According to ILO estimates, 34.4% of women hold low-quality jobs in the region, versus only 24.1% of men. These proportions are more salient in certain occupations and countries. 15.3% of working women have jobs as domestic workers, versus less than 1% of men. In Peru, 51% of working women have low-quality jobs, versus only 31.4% of men. (International Labour Office & Bureau for Gender Equality, 2013)

⁹ For instance, a larger proportion of women with informal jobs are domestic workers and subcontractors, whereas only a few of them are in charge of microenterprises (Chen, 2001)

level the field for them, such as maternal leaves. Any disruption in the work of an informal worker is likely to result in a diminution of her income. Hence, unregulated jobs are uncertain by definition, both in terms of job security as for the compensation received. This uncertainty is at the core of informal jobs' precariousness. For instance, in Brazil, informal workers are six times more likely to be paid on commission than formal workers (Carneiro & Henley, 2001). Clearly, job insecurity may be more difficult to navigate for mothers versus childless women. In her work on Potosi (Bolivia) with low-income working mothers, all of them unregistered, Pascale Absi found that formal jobs were associated with a fixed salary. For these women, formal jobs were not 'just' better-paid, but their higher status was due to them being financially secure (Absi, 2009). These insights are aligned with research conducted in developed countries. For the US, scholars have documented the strong impact of financial insecurity on the levels of stress and overall well-being of female workers (Jacobs & Padavic, 2015; Williams, 2006). Reasonably, those conditions may take a toll on the productivity of mothers in the informal sector, and therefore, could have a negative impact on their earnings. To sum up, the body of research on gender and informal work suggests mothers with unregulated jobs face an additional layer of vulnerability. Therefore, we anticipate motherhood penalties will be larger for mothers in the informal sector.

Hypothesis 3. The motherhood penalty identified for our countries of analysis will be larger for women in the informal sector.

Nevertheless, the effect of informality on working mothers is not straightforward. While we could anticipate larger penalties for mothers in the informal sector, due to its lack of protection, there are at least three reasons we might see either a positive or null interaction between motherhood and informality. First, motherhood penalties could be stronger for working mothers in the formal sector *because of* labor regulations. For industrialized countries, research has identified benefits such as extended leaves and job-security targeted to working mothers as having a detrimental impact on their wages, through the mechanism of strengthening labor segregation (Mandel & Semyonov, 2005). In Latin America, motherhood-related benefits are only applicable to women with formal jobs. Formal firms in the region, since forced to comply with maternity benefits, could opt for deducting those costs from mothers' salaries. These additional costs are not assumed by firms in the informal sector. While there is scant research on this topic, certain evidence points to this direction. Prada, Rucci and Urzúa examined the impact of new legislation of working mothers in Chile, and estimated that (formal) firms pay female workers starting salaries between 9 and 20 percent below from what was paid before the new regulations were implemented (Prada, Rucci, & Urzúa, 2015). Similar results have been reported for Mexico (Instituto Nacional de las Mujeres, 2010). In other words, unintended consequences of

“family-friendly” regulations could produce higher penalties in the formal sector. These unintended effects would not occur in the informal sector, since it is not regulated.

Second, while labor regulations are *applicable* to formal workers, they might not be fully enforced. Riquelme (2011) analyzed worker complaints to the Chilean Department of Labor, and found that maternity was cited as a source of discrimination in a third of complaints presented by female workers (Riquelme Giagnoni, 2011). Most of discriminatory practices consisted in harassment with the goal of forcing mothers to quit. Moreover, the practices reported occurred even in large firms, which are commonly formal. For Mexico, official statistics indicate that around 30 percent of women were asked to provide proof of a negative pregnancy test when applying for a job, a practice that seems fairly common even in the public sector (México. Instituto de Estadística, 2008). Similarly, pregnancy tests are conducted on a monthly basis in a number of (formal) ‘maquilas’ in the country (Cooney, 2008). Hence, previous research supports the notion that enforcement of labor regulations could be weak even in the formal sector.

Third, even when we observe an additional motherhood penalty in the informal sector, it could be driven by self-selection. Formal work in Latin America, while usually more desirable, is characterized by rigid schedules and “all-or-nothing” arrangements, which are less accommodating to women in general and mothers in particular. This, in turn, is expected to have an impact at pushing women into unprotected jobs (Cassirer & Addati, 2007). Hence, a strain of the literature argues that most of Latin American working women opt, voluntarily, for unprotected work (Maloney, 2004; Perry, 2007). In brief, given the need to balance family obligations with paid work, informal jobs with flexible schedules might be more desirable for a sizeable segment of women.

This argument is aligned with the notion of compensating wage differentials (CWD), which refers to women shifting towards less-demanding jobs. A CWD explanation would be pertinent for low-income women. Although unregulated jobs are hardly described as “less-demanding”, they are certainly lower-paid and usually offering more options to balance work and child rearing. The case of domestic workers provides a good illustration. Across Latin America, a large proportion of women in the informal market do domestic labor for pay. These precarious and low-status positions provide mothers with a source of income while they take their children to work with them (International Labour Office & Bureau for Gender Equality, 2013; for Mexico: Pablo López, 2013). In a survey conducted in Guatemala city, over 40 percent of randomly sampled mothers were taking care of their children while working for pay (International Food Policy Research Institute, 2003). Moreover, these women cited their need to take care of their children as the main reason for not applying for better jobs in the formal

sector. In the same line, in her analysis of the emergence of ‘flexible’ work schedules in Chile, Sonia Yanez documented the experience of mothers who left protected employment because of the lack of schedule flexibility. Women in her study changed jobs that were secure, but with rigid schedules and a full-time commitment, soon after their first childbirth. The shift resulted in lower earnings, job uncertainty, and also lower-status positions (Yanez, 2004).

Therefore, if a larger motherhood penalty is found for women in the informal sector, a remaining question relates to whether this penalty is driven by self-selection of mothers with low earnings potential. In that case, and given household obligations remain similar across the formal and the informal sector, we would not necessarily anticipate stronger penalties for mothers in the informal sector after accounting for selection. In our study, we address this question by further analyzing the effect of motherhood on a matched sample of comparable women.

We explore the presence of motherhood penalties in a set of middle-income Latin American countries, and the interplay of these potential penalties with labor informality. Our selection of countries – Argentina, Brazil, Chile, Mexico and Peru- offer substantial variation in the extent of their informal sector. Chile has traditionally had a low proportion of informal workers, for Latin American standards (around 22%), while Mexico and Peru are consistently among the countries with higher informality rates in the region (around 60% in Mexico and 55% in Peru).

RESEARCH DESIGN

Labor informality might play a role at determining the presence and magnitude of the motherhood penalty in non-industrialized countries, where unregulated labor markets are pervasive. In this study, we test a set of expectations for the presence of motherhood penalties in 5 Latin American countries, and their potential intersection with labor informality. First, we test whether a pay gap exists between mothers and childless women, after accounting for individual-level factors and selection into the labor force (Hypothesis 1). Second, we expect labor informality to play a role in explaining the motherhood penalties, provided a wage gap affecting mothers is identified (Hypothesis 2). Third, we analyze the interplay between informality and motherhood penalties. That is, we investigate whether mother’s wages are associated with labor informality. We hypothesize that penalties will be more pronounced among mothers in the informal sector (Hypothesis 3). Fourth, if we indeed find stronger penalties affecting mothers in the informal sector, we want to explore whether they are driven by self-selection of mothers with low-income potential into informal jobs. This

explanation would support a Compensating Wage Differentials argument. As discussed, though poorly paid, informal jobs are usually described as more flexible than protected, formal jobs (International Food Policy Research Institute, 2003). To that end, we implement a matching strategy to explicitly deal with the potential problem of self-selection into informal jobs. The goal of this exercise is to compare similar women in terms of the characteristics that could lead them to take a job in the formal versus the informal sector.

I. Data and Measures

We analyze data from the main household survey for each country, conducted by the correspondent census bureau. All surveys used offer information at the individual level, and –with the exception of Argentina- are nationally representative¹⁰. The data sources selected are the most widely-used sources of information for socioeconomic research in Latin American countries. Specifically, we work with data from the following country-years: Argentina (1st quarter files, 2004-2014¹¹), Brazil (2006-2013), Chile, (2003-2011), Mexico (2008-2012) and Peru (2008-2013). All samples were weighted to account for sampling design.

Our analytical sample is limited to women aged 25-40, who are either family heads or partners, in urban areas. The low-bound age restriction is intended to exclude women who have not completed their formal education, while the upper-bound restriction is aimed to minimize the number mothers whose children do not live in the household anymore, and, therefore would appear as childless in our data. We further restrict the sample to women who are either *family* heads or partners. This means that we do not exclude women in extended families from our sample¹². We also restrict our sample to discard owners (or employers), the self-employed, and family workers with no income at all. As mentioned, the self-employed are excluded for both practical and substantive reasons. On one hand, a number of household surveys restrict their questions on benefits to salaried workers. That is the case of the Argentinean EPH. On the other hand, a potential motherhood penalty among the self-

¹⁰ The Argentinean EPH survey is restricted to urban areas. In any case, in this study we focus only in urban areas – rural households are excluded from the samples of the other countries.

¹¹ The Argentinean EPH has a short-panel design, with a segment of households followed by a maximum of 4 quarters or 18 months. We work only with information from the first quarter per year. Moreover, we keep only the first observations for the group of individuals who appeared twice in our sample.

¹² As we know, a household can include more than one family. Moreover, in Latin America, single-mother families within male-headed households tend to be particularly vulnerable. In contrast, single mothers who can afford live on their own might have better work opportunities (Arends-Kuenning & Duryea, 2006)

employed would be difficult to interpret theoretically. Further, the earnings of the self-employed include gains to factors other than labor. As a result, our analysis only includes workers who are salaried (employees) in either the formal or informal sector.

Measures

Consistent with most of previous research on motherhood penalties, our dependent variable is *hourly wages*¹³ (Budig & England, 2001; Glauber, 2012; Waldfogel, 1997) corresponding to the main occupation¹⁴. Hourly wages are logged in all our analysis, but remain unlogged in the descriptive tables for ease of interpretation. Across Latin America, wages are recorded in monthly bases. Following conventional practice, we calculate hourly wages by dividing respondents' monthly wages by the weekly number of hours reported. We top-coded weekly hours at 105 or more, and exclude workers who did not report hours of work. In our analysis, intensity of work is captured with a set of dummy variables that use standard cut points: 35 and fewer hours (part-time), 36-54 (full-time), and 55 & more (overwork).

For *informality*, we use the worker's regular contribution towards a jubilatory pension and/or social security system (Rofman & Carranza, 2005; Tornarolli et al., 2014; Villarreal & Blanchard, 2013). This is the most widely-used strategy for operationalizing informality from a social protection approach. All countries in our sample have a social security system that includes a public component. Mostly registered workers contribute to the system, usually through a deduction in their paycheck¹⁵, and all surveys in this study include a question on this regard¹⁶. Furthermore, cross-national comparative studies on informality for the Latin American region usually work with this definition as well.

¹³ The decision for using this variable is due to our interest on analyzing labor market dynamics. An option for annual earnings (Budig et al., 2012) would provide an additional insight on state—level policies that affect redistribution in terms of women's earnings, a topic which we are not addressing in this study.

¹⁴ This decision is due to data restrictions. For Argentina and Chile, critical variables such as weekly hours are only provided in relation to the main job. For countries with more detailed measures, we re-estimated the models using information of all jobs by respondent. The motherhood penalty is similar.

¹⁵ Employers in all countries from our sample are required to register their workers in a national social security system. They are further mandated to make monthly contributions towards this fund, which provides retirement pensions, among other benefits.

¹⁶ For all surveys used in this study, the question used to identify informality asks workers whether they have deductions for jubilatory pensions in their paychecks. While the Argentinean EPH survey only includes this question to salaried workers, this does not constitute an issue because we restrict our sample to only this category of worker for all countries in our analysis.

To capture whether a woman is currently a *mother*, we constructed a variable equals to one if there is at least 1 child present in the household, aged 0 to 18 years old. Additionally, variables for family characteristics include dummies indicating if the household is *female-headed*, and whether the respondent is *partnered*. Our measure for the presence of a partner includes both marriage and cohabitation arrangements. Further, we include a measure for ethnic, racial or national *minority*, using the information available on this regard. This captures indigenous status in Chile and Mexico. It refers to racial / ethnic minorities in Brazil and Peru, and to nationals from countries that are main senders of migrant labor in Argentina. All models include controls for region within country and survey-year.

There is some variation in the organization of educational levels across Latin American countries. However, those differences are less problematic for comparative analysis than they are for other regions (e.g. Europe). We coded *educational attainment* with a 4-category measure ranging from “Elementary or Less Schooling” to “Some tertiary education and more”. Each category corresponds to levels at each national education system, rather than years of schooling. Tertiary education includes vocational, technical and university programs. Finally, we included an indicator for job in a *small firm* (with 5 workers or fewer). In developing countries, firm-size is closely tied to earnings (Pratap & Quintin, 2006).

Table 1. Means and Proportions. Only Women, 25-40 years old, in urban areas, family heads or partners.

	Argentina		Brazil		Chile		Mexico		Peru	
	Non-Mother	Mothers	Non-Mother	Mother	Non-Mother	Mothers	Non-Mother	Mothers	Non-Mother	Mothers
Hourly Wage	17.67 [16.14]	16.85 [21.46]	9.97 [42.71]	6.53 [17.18]	2106.49 [2708.21]	1492.53 [1902.73]	111.27 [379.88]	56.65 [87.87]	6.64 [9.33]	5.44 [6.83]
Age	31.04 [4.34]	33.24 [4.43]	31.68 [4.73]	32.78 [4.46]	31.73 [4.97]	33.15 [4.57]	32.66 [4.90]	33.33 [4.46]	31.53 [4.63]	32.82 [4.56]
Other Demographic Characteristics										
Has a Partner	71%	89%	75%	80%	62%	76%	68%	89%	38%	73%
Race/Ethnic/National Minority	3%	5%	44%	52%	5%	6%	16%	13%	14%	14%
Working for Income	61%	37%	74%	57%	72%	43%	69%	43%	73%	51%
Informal Sector	22%	34%	18%	29%	11%	15%	47%	61%	51%	54%
Educational Attainment										
Elementary & Less	10%	25%	22%	42%	13%	18%	18%	26%	11%	14%
High School Incomplete	10%	19%	9%	11%	9%	16%	19%	35%	6%	14%
High School Complete	21%	26%	35%	32%	30%	42%	13%	15%	25%	31%
Some Tertiary & more	60%	31%	35%	15%	48%	24%	50%	24%	57%	40%
Other Work Characteristics										
Public Sector	27%	33%	21%	20%	15%	16%	18%	19%	17%	19%
Small-Firm	17%	21%	11%	10%	29%	26%	28%	43%	38%	37%
Work Intensity										
Part-Time	36%	52%	19%	27%	13%	20%	19%	36%	21%	34%
Full-Time	58%	41%	75%	69%	72%	71%	63%	52%	50%	46%
55&more hours	6%	6%	5%	5%	16%	9%	18%	12%	29%	21%
N Total	6,551	16,647	39,462	174,282	6,616	61,740	1,376	12,566	2,440	18,257

Notes: Prepared by the authors on the basis of: Permanent Household Survey (Argentina, 2004-2014), National Household Survey – PNAD (Brazil, 2006-2013), National Survey of Socioeconomic Characterization – CASEN (Chile, 2000-2011), National Household Income & Expenditure Survey (Mexico, 2008-2012), and National Household Survey – ENAHO (Peru, 2008-2013). Standard deviations in brackets. Self-Employed, zero-income workers and employers excluded.

II. Analytical Strategy

Estimating the Overall Motherhood Penalty

Our first goal is to establish the presence and size of the motherhood pay gap across the countries included. Therefore, we start by testing our Hypothesis 1. Our analysis estimate the wage penalty for motherhood using a traditional augmented wage equation that includes family variables as well as an indicator of informal employment. More specifically, we estimate a series of regression models of the form:

$$(1) \ln(\text{wage})_{ic} = \beta_0 + \beta_1 CH_{ic} + \beta_2 C_{ic} + \beta_3 F_{ic} + \beta_4 J_{ic} + u_{ic}$$

Where i indexes individual women, in country c . Additionally: $\ln(\text{wage})$ is the dependent variable, referring to the natural logarithm of the hourly wage of individual i in country c , CH is a vector of dummy variables indicating motherhood status, C is a vector of human capital variables (age and education attainment), F is a vector of family variables: partnership status, head of the household, and J is a vector of variables corresponding to job characteristics: work intensity and firm size.

However, a potential source of bias in any study on motherhood penalty refers to the possibility of differential selection of women into employment. That is, our estimations would be biased if working mothers conform –to some extent– a self-selected group in any of the countries under analysis. In order to control for potential bias due to self-selection of women into employment, we use a Heckman sample selection correction model (1979), which consists on assessing the probability of labor force participation as a function of a series of variables. This strategy is widely used in the literature on gender wage disparities. We use the following variables for controlling sample selection bias: marital status, age, education, whether there are children 6 or younger in the household, and the log of other family income besides the mother's (Budig et al., 2012; Harkness & Waldfogel, 2003; Mandel & Semyonov, 2005). In this paper, all results include a Heckman correction procedure¹⁷.

Assessing the Interplay between Informal Work and Motherhood Penalties

Next, we estimate a model that adds our measure for informality to the previous equation. This allows us to assess whether unregistered jobs contribute to explaining the motherhood penalty across

¹⁷ OLS results are available upon request.

the countries in our study (Hypothesis 2). Similarly, we present only results after applying a Heckman strategy for taking into account women's potential self-selection into paid-employment.

A third model includes an interaction term between informal job and motherhood. Our question of interest here is whether motherhood penalties -if identified- vary across women working in the informal versus the formal sector (Hypothesis 3). This approach has the following basic form:

$$(2) \ln(\text{wage})_{ic} = \beta_0 + \beta_1 CH_{ic} + \beta_2 C_{ic} + \beta_3 F_{ic} + \beta_4 J_{ic} + \beta_5 (CH)(\text{Informality}) + u_{ic}$$

Accounting for Self-selection into the informal sector

Yet, a potential higher penalty among women in the informal sector could be driven by self-selection of mothers opting for informal jobs. As we discuss above, this scenario is plausible. Often, low-paid and low-status informal jobs tend to offer more flexibility, particularly in terms of working schedules (i.e. domestic work). Therefore, mothers could self-select into informal jobs in order to better balance paid work with household responsibilities. This explanation would be aligned with a Compensating Wage Differentials argument (CWD). In that case, characteristics such as motherhood status and human capital factors could play a role as predictors of both informal labor and earnings. If we do not deal with a potential self-selection of mothers into informal jobs, we could be comparing very dissimilar workers.

We address this issue by matching women in the formal sector with those in the informal sector by a set of key characteristics. Previous research has used matching techniques in analysis of informality –generally with the goal of evaluating the wage gap between formal and informal workers (El Badaoui et al., 2010; Gasparini, Haimovich, & Olivieri, 2009; Maurizio, 2012; Pratap & Quintin, 2006). Within this framework, “informality” functions as the *treatment* of interest. Beyond factors that have been used in this strain of literature, we balance by motherhood, the main independent variable in our study. Specifically, we match working women in the formal and informal sector on the following covariates: the presence of children (2 groups), educational attainment (4 groups), whether the woman is head of the household (2 groups), ethnic/race/national minority (2 groups), and age (3 groups). As a result, we restrict the comparisons to similar working women.

We use the Coarsened Exact Matching (CEM) as matching strategy for our analysis¹⁸. This technique allows to match individuals across several characteristics of interest. Each key variable is coarsened using categories determined by the researcher (for example, 'Elementary and less', 'High School Incomplete', 'High School Complete' and 'Some Tertiary & more', are the categories chosen for educational attainment). These categories conform groups which are assigned to the same numerical value. Then, a matching algorithm is applied and unmatched observations are discarded. The procedure results in a set of grouped observations, each with the same values for our matching variables of interest (Iacus, King, & Porro, 2012) After the procedure is implemented, a weight is given to each observation and regular analysis could be conducted. A number of contributions have compared different matching methods available (including those based on propensity scores) and concluded that CEM offers better balance properties (Blackwell, Iacus, King, & Porro, 2009).

After implementing the CEM procedure, the 'multivariate imbalance statistic' (or measure of imbalance) was reduced to values close to zero for the five countries in our study. Then, after obtained a matched sample, we conducted a Heckman procedure in order to account for self-selection into the labor force, and then estimated equation 2. Finally, for evaluating the interaction of motherhood and informality, we present two sets of results. The first one represents the population level, and corresponds to our regular samples. The second one corresponds to results from our *balanced* samples. That is, this last set of results was obtained from a sample of similar women in terms of the 'matching covariates' mentioned above.

¹⁸ We use the cem routine available in Stata. For a detailed explanation on the technique: (Iacus, King, & Porro, 2012)

RESULTS

Our investigation aims to establish the presence and magnitude of motherhood penalties across the five countries in our analysis, as well as investigate the potential intertwine of motherhood and labor informality for explaining mother's labor compensation.

As a starting point, Table 1 shows weighted means and proportions comparing women by a dichotomous indicator of motherhood status. It reveals substantial differences across the two groups. As expected, mothers exhibit a less-favorable socioeconomic profile. In all countries, mothers earn less than non-mothers per-hour. We also confirm that women with children are overrepresented in the informal sector. Further, they show lower levels of human capital if measured by education attainment. Childless women are more likely to have tertiary education than mothers for all countries in our study. Interestingly, the proportion of women working (for pay) 55 and more hours per week is somewhat similar across the two groups, an additional factor of dissimilarity with industrialized countries.

Effects of Motherhood on Labor Income & the Role of Informality

Following our first objective, Table 4 contains the results for regressions using the Heckman approach to estimate a net motherhood penalty, controlling for potential self-selection into the labor force and a set of individual-level measures: age, family head, married/cohabiting, ethnicity/race/national minority, educational attainment, firm-size, and working hours. The first column shows results for our first model, with the mentioned covariates. For all countries, the sign and statistical significance of our motherhood variable indicate a pay penalty associated with being a mother. The penalty ranges from 26 percent in Chile to 13 in Brazil, and is statistically significant for all countries. Then, in order to assess our second hypothesis, column 2 includes results for re-estimating the previous model by adding a measure for work in the informal sector. This is our complete estimation. Similarly, we include only results after correcting for selection using the Heckman procedure. With the exception of Chile, the role of informal sector helps explaining the size of motherhood penalties for all countries analyzed. Yet, while reduced, motherhood penalties persist as large and statistically significant in in the 5 countries. In this complete model, the largest penalty remains on 26% for Chile, followed by 21% in Peru, while the lowest is 11% in Brazil. Further, the order of countries in terms of the penalty magnitude remains similar to the previous approach.

These results provide support for our first two hypothesis. That is, consistent with our expectations, we found evidence of a sizeable pay gap affecting mothers across the five countries analyzed (Hypothesis 1). Additionally, results in column 2 reveal that labor informality contributes to

explaining part of the motherhood penalty in 4 out of 5 countries in our study (Hypothesis 2). Other coefficients, including a substantial penalty corresponding to work in the informal sector, as well as large premiums for education across all countries, are along the lines of previous findings.

Testing the Interaction between Motherhood Penalties & Work in the Informal Sector

Having established the magnitude of motherhood penalties and the contribution of the unregulated sector to explain them, we turn to explore whether penalties vary across women in the formal and informal sector. This analysis corresponds to our third hypothesis. Table 5 shows the results of estimating our wage regression after including interactions between motherhood status and job in the informal sector. We construct interaction variables by multiplying a binary variable for motherhood, referred to whether a women has a child between 0-18 years old, with a binary variable for working in the informal sector (2 x 2 table).

For Argentina, Brazil, Chile and Mexico, the sign of our interaction term is the expected, suggesting larger penalties for women in the informal sector. Yet, the interaction term is not statistically significant for Chile and Mexico. Our interaction term is not significant for Peru either. Taken together, these results indicate that the motherhood penalty differs by informal employment status in two out of five countries in our study: Argentina and Brazil. When this association is significant, it has the expected direction. That is, in Argentina and Brazil mothers in the informal sector are indeed affected with larger penalties (hypothesis 3). Therefore, for these two countries, our study suggests that motherhood imposes an additional layer of vulnerability to women who are already unprotected. However, our expectation concerning the interplay between motherhood and informal work is only partially supported. In Chile, Mexico and Peru, the motherhood penalty does not seem to differ across mothers in the informal versus the formal sector.

Table 2. Effects of Motherhood on Women's Hourly Wage (ln), from Heckman selection models. Only women 25-40 years old, in urban areas, family heads or partners.

	Argentina		Brazil		Chile		Mexico		Peru	
	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman	Heckman
Mother	-0.201*** (0.0399)	-0.150*** (0.0390)	-0.125*** (0.00657)	-0.113*** (0.00643)	-0.263*** (0.00942)	-0.260*** (0.00944)	-0.172*** (0.0318)	-0.164*** (0.0312)	-0.223*** (0.0199)	-0.207*** (0.0190)
Informal Sector		-0.912*** (0.0428)		-0.500*** (0.00671)		-0.129*** (0.0105)		-0.444*** (0.0269)		-0.473*** (0.0146)
Minority: Race/Ethnicity/Nationality	-0.0960 (0.113)	0.0265 (0.111)	-0.109*** (0.00570)	-0.101*** (0.00558)	-0.0557*** (0.0148)	-0.0539*** (0.0148)	-0.118*** (0.0317)	-0.115*** (0.0310)	-0.0664** (0.0232)	-0.0289 (0.0222)
Education [Elementary & less]										
High School Incomplete	-0.00773 (0.0791)	-0.135 (0.0778)	0.223*** (0.0108)	0.158*** (0.0106)	0.130*** (0.0137)	0.123*** (0.0138)	0.102** (0.0316)	0.0723* (0.0309)	0.129*** (0.0261)	0.108*** (0.0250)
High School Complete	0.501*** (0.0769)	0.162* (0.0769)	0.323*** (0.00828)	0.217*** (0.00823)	0.371*** (0.0130)	0.354*** (0.0131)	0.407*** (0.0383)	0.326*** (0.0378)	0.324*** (0.0221)	0.252*** (0.0212)
Some College &+	0.939*** (0.101)	0.525*** (0.101)	0.998*** (0.0120)	0.856*** (0.0119)	1.238*** (0.0196)	1.216*** (0.0197)	0.837*** (0.0354)	0.728*** (0.0353)	0.791*** (0.0287)	0.608*** (0.0280)
Work Characteristics										
Small-firm	-0.352*** (0.0435)	-0.0863 (0.0444)	-0.0944*** (0.00869)	-0.00885 (0.00858)	-0.249*** (0.00836)	-0.223*** (0.00864)	-0.445*** (0.0247)	-0.297*** (0.0258)	-0.537*** (0.0141)	-0.352*** (0.0146)
Part-time	-0.0392 (0.0300)	0.120*** (0.0300)	0.162*** (0.00620)	0.310*** (0.00638)	0.307*** (0.00881)	0.329*** (0.00901)	0.456*** (0.0250)	0.546*** (0.0251)	0.269*** (0.0144)	0.322*** (0.0139)
55weekly hours &+	-0.548*** (0.0714)	-0.433*** (0.0703)	-0.346*** (0.0124)	-0.284*** (0.0122)	-0.312*** (0.0112)	-0.309*** (0.0113)	-0.334*** (0.0340)	-0.313*** (0.0333)	-0.378*** (0.0163)	-0.341*** (0.0156)
N	10,010	10,010	121,467	121,467	28,835	28,835	6,262	6,262	10,963	10,963

Notes: Dependent variable is the natural logarithm of hourly wages. Standard errors are shown in brackets. For each country, the first column shows results before adding a measure for informal work, and the second column shows results after including it. Self-Employed, zero-income workers and employers were excluded from the sample.

All estimates are weighted by sampling weights. All analysis include controls for age, family headship, year and within-country region.

Prepared by the authors on the basis of: Permanent Household Survey (Argentina, 2004-2014), National Household Survey – PNAD (Brazil, 2006-2013), National Survey of Socioeconomic Characterization – CASEN (Chile, 2003-2011), National Household Income & Expenditure Survey (Mexico, 2008-2012), and National Household Survey – ENAHO (Peru, 2008-2013).

* p<0.05, ** p<0.01, *** p<0.001.

Table 3. Effects of Motherhood on Women's Hourly Wage (ln) by interactions between Motherhood and Informal work. Only women 25-40 years old, in urban areas, family heads or partners

	Argentina, 2000-11 Heckman	Brazil, 2006, 13 Heckman	Chile, 2003- 11 Heckman	Mexico, 2008- 12 Heckman	Peru, 2008-13 Heckman
Motherhood	-0.122** (0.0400)	-0.103*** (0.00714)	-0.258*** (0.00994)	-0.117** (0.0424)	-0.233*** (0.0250)
Informal Indicator	-0.626*** (0.0607)	-0.458*** (0.0145)	-0.109*** (0.0246)	-0.364*** (0.0558)	-0.523*** (0.0345)
Mother x Informal Sector	-0.367*** (0.0702)	-0.0510** (0.0156)	-0.0238 (0.0266)	-0.0968 (0.0592)	0.0570 (0.0357)
N	10,010	121,467	28,835	6,262	10,963

Notes: Dependent variable is the natural logarithm of hourly wages. Standard errors are shown in brackets. Self-Employed, zero-income workers and employers were excluded from the sample. All estimates are weighted by sampling weights. All analysis include controls for age, family headship, year and within-country region.

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* p<0.05, ** p<0.01, *** p<0.001

Explaining larger penalties in the informal sector. A sorting effect?

Additionally, we wanted to explore whether larger penalties in the informal sector are driven by self-selection of mothers into informal jobs. As mentioned, this prediction would be aligned with a Compensating Wages Differential framework. Women would trade a floor of social security for flexibility in the informal sector, in order to better balance paid work with housework activities. In Table 4 we present estimates from the model shown in table 3, this time using a 'balanced sample' of similar women. Thus, table 3 presents results at the population level, while table 4 corresponds to comparisons made with similar women. As discussed, we constructed our balanced samples using the CEM method, on the basis of characteristics associated with informal work (including motherhood). This exercise did not result in marked differences in our coefficients of interest after balancing our samples. While the interaction term turns marginally significant for Argentina, the sign does not change for any of the countries examined. For both Brazil and Argentina, these results suggest that motherhood penalties are larger for women working in the informal sector, even when the comparison is made with similar workers. Interestingly, previous research found that wage penalties associated to

work in the informal sector tend to markedly decrease once a matching strategy is implemented (Pratap & Quintin, 2006). We do not find equivalent results at evaluating the interplay between motherhood and informality.

Table 4. Effects of Motherhood on Women's Hourly Wage (ln) by interactions between Motherhood and Informal work. Results on Balanced 'Matched' Samples. Only women 25-40 years old, in urban areas, family heads or partners

	Argentina, 2004-14. Heckman Balanced	Brazil, 2003-13 Heckman Balanced	Chile, 2003-11 Heckman Balanced	Mexico, 2008-12 Heckman Balanced	Peru, 2008- 13 Heckman Balanced
Motherhood	-0.0654 (0.0490)	-0.0762*** (0.00705)	-0.223*** (0.0196)	0.00142 (0.0577)	-0.166*** (0.0380)
Informal Indicator	-0.609*** (0.127)	-0.470*** (0.0215)	-0.0796 (0.0673)	-0.209* (0.0918)	-0.428*** (0.0488)
Mother x Informal Sector	-0.350* (0.146)	-0.0861*** (0.0237)	-0.0884 (0.0688)	-0.244* (0.0993)	0.0255 (0.0517)
N	10,010	121,467	17,311	6,207	10,890

Notes: Dependent variable is the natural logarithm of hourly wages. Standard errors are shown in brackets. Self-Employed, zero-income workers and employers were excluded from the sample. All estimates are weighted by sampling weights. All analysis include controls for age, family headship, year and within-country region.

Prepared by the authors on the basis of: Permanent Household Survey (Argentina, 2004-2014), National Household Survey – PNAD (Brazil, 2006-2013), National Survey of Socioeconomic Characterization – CASEN (Chile, 2003-2011), National Household Income & Expenditure Survey (Mexico, 2008-2012), and National Household Survey – ENAHO (Peru, 2008-2013).

* p<0.05, ** p<0.01, *** p<0.001

DISCUSSION

This study has examined the motherhood penalty in 5 middle-income Latin American countries, paying particular attention to the interplay of motherhood pay gaps with labor in the informal sector. We three main goals: a) to evaluate the presence and magnitude of motherhood pay gaps in Argentina, Brazil, Chile, Mexico and Peru; b) to assess whether informality plays a role at explaining those (potential) pay gaps; c) to explore whether a (potential) gap differs by employment status in the formal versus the informal sector. In addition, we sought to assess whether a potential larger gap among women in the informal sector could be driven by self-selection, a hypothesis aligned with a CWD argument. We present a number of new findings on this set of questions.

We have three major conclusions. First, there are strong motherhood penalties across the five countries in our study. That is, our first hypothesis was validated. The pattern of strong penalties was robust after controlling for individual-level factors as well as differential selection into paid labor. Mothers earn less than non-mothers in Argentina, Brazil, Chile, Mexico and Peru, a set of countries that offers important variation in factors such as female participation in the labor force and social spending. In our complete model, the unexplained pay gap ranges from 11 percent in Brazil to 26 percent in Chile.

Second, labor informality contributes at explaining motherhood penalties. We argued that informal employment is a key stratification marker in developing countries, and, more importantly, has critical consequences for women's employment. Indeed, we found that for all countries but Chile taking informality into account helps explaining the wage gap affecting mothers. Thus, we found support for our second hypothesis. Yet, while reduced, penalties persist as large and statistically significant in all countries included in our study. The pertinence of informal job status in our results supports the importance of evaluating regional-based factors that could affect women's retribution in the labor markets.

Third, we demonstrate that motherhood penalties differ by informal status in two out of five countries analyzed – Argentina and Brazil. Analysis in table 3 test the interaction between motherhood status and informal employment. For Argentina, Brazil, Chile and Mexico, the sign of our interaction term is the expected, although the coefficient is not statistically significant for the last two countries. Thus, our third hypothesis is only partially supported.

Moreover, our results do not support a Compensating Wage Differentials explanation for larger penalties among women in the informal sector. We used a matching strategy in order to explore this

possibility, meaning that larger penalties in the informal sector could be due to a potential sorting mechanism into informal employment. In other words, we sought to consider the notion of informal jobs as a “voluntarily” strategy of a segment of mothers. After implementing a Constrained Exact Matching (CEM) strategy, we tested the interaction between motherhood penalties and labor informality in samples of similar women. Motherhood penalties persist, while the coefficient for our interaction term has the expected sign and remains significant for Argentina and Brazil. That is, even when comparing similar women, our interaction term indicates larger penalties for mothers in the informal sector in these two countries. These results confirm an additional layer of vulnerability among women working in the informal sector of Argentina and Brazil. We are not able to assess whether mothers in the informal sector do enjoy greater flexibility at work, as it has been stated. In any case, if mothers are actually trading lower wages and the lack of social security in the informal sector for flexible hours, our results for Argentina and Brazil suggest they also face larger gaps in pay associated with their motherhood status.

Our study presents several avenues for future research. The most important question remains related to the mechanisms behind the cross-national variation found. Which factors explain not only the variation in motherhood penalties, but the differences across formal and informal sectors in the countries analyzed? We believe there are at least two salient starting points.

A first one is the role of workers’ collective organization. The strength of unions is highly dissimilar across Latin American countries. Furthermore, qualitative research has shown that unions could play a significant role at protecting working mothers in the LA region (for Uruguay, Batthayani, 2007). Equally important, in developing countries, unions protect *formal* workers. It is plausible then that unions could contribute to the gap between mothers with formal versus informal jobs, by limiting the motherhood penalty in the formal sector. While information is scarce on this topic, Argentina has the largest proportion of salaried workers unionized in the region (42% for salaried workers, and 32% of the total population employed), and a strong tradition of collective wage bargaining. Argentina is followed by Brazil in this respect, with 28% of salaried workers being union members (GTAS). In our results, these two countries show a negative interaction between motherhood and informality, meaning that women in the informal sector face larger family gaps. In contrast, only 12% of Chilean workers are unionized (Frías, 2010), while this proportion is around 6% for Peru (GTAS). According to the GTAS, an advocacy group affiliated to ILO, Argentina and Brazil are among the Latin American countries with the higher union density, whereas Chile, Mexico, and (particularly) Peru show some of the lowest proportions of unionized workers. Further research should explore this potential association in detail.

Second, differences in the between-countries gap across mothers in the formal and informal sector could be also partially explained by variations in prevalent family compositions. More specifically, this factor might have a role at explaining the motherhood penalties found in countries such as Mexico and Peru, where women in the informal sector do not suffer larger penalties if compared with women with formal jobs. Extensive research has found that individuals from disadvantaged groups are more likely to form extended families (Kreider, 2007; Sarkisian, Gerena, & Gerstel, 2007). Further, extended families could play a crucial role at providing mothers with more flexible childcare arrangements, which, in turn, are key for understanding women's labor force participation. In Latin America, family size and extended-family arrangements are also closely associated with socioeconomic level, being more prevalent among low-income families (ECLAC, 2004). While this associations exist for all the region, the ratio of family members between poor and rich families differ across countries. Thus, in Mexico, families in the lowest income quintile have almost three more members than families in the richest quintile (Sunkel, 2006). In general, within countries, extended families are consistently more prevalent among the poor. Yet, between nations, important differences arise, with a highest proportion of them in countries such as Mexico and Peru. Among the five countries included in this study, Peru has the highest proportion of extended families in urban areas (CEPAL, 2004). Given workers in socioeconomic disadvantage are more likely to be informal, a higher prevalence of kin support among working mothers in the informal sector could contribute to the results obtained for these two countries.

In connection to that, differences across countries in the age at first birth and its interplay with socioeconomic status could also contribute to cross-country divergent patterns in the motherhood penalty. In general, women with higher socioeconomic status tend to have children later in life. Moreover, the interaction between fertility decisions and educational attainment is particularly relevant. Birth rates for women with lower levels of schooling tend to pick at younger ages. In contrast, highly-educated women are likely to show a later entrance into motherhood. In Latin America, between-country differences in age at first childbirth by socioeconomic status are also important. For instance, in Argentina, the mean age of first childbirth for highly educated mothers is 28 years, versus 22 for women with low levels of schooling (Lupica & Cogliandro, 2013). In Peru, the distance between the two extremes is 9 years, from 27 for the highly educated to 18 among women with the lowest level of schooling (Aramburú & Bustinza, 2007). One could presume that Peruvian mothers in the informal sector are more likely to have older children, who could in turn take responsibility for some of the housework usually carried out by mothers. In other words, older children could mitigate motherhood penalties, particularly for women in the informal sector. Therefore, cross-national differences in the mean age at first child by socioeconomic status could help explaining the results obtained.

Finally, labor markets characteristics at the country-level are also likely to influence the size of motherhood penalties. Thus, while labor regulations are remarkably similar across the region, other factors diverge and could be taken into account in future research. For instance, for the specific case of Chile, a number of scholars have pointed out the lack of part-time employment as a source of the lower levels of female labor force participation in this country (Rau Binder, 2008). The lack of part-time opportunities could also result in a larger proportion of mothers forced to accept full-time arrangements while unable to exert the amount of effort expected for those positions. This scenario would lead to a within-job motherhood penalty, which has been proven substantial for other contexts (for Norway, Petersen, Penner, & Geir, 2010).

Our study does have methodological limitations. First, our analysis excluded women who are self-employed, a group that is substantial across the region and particularly significant in Mexico and Peru. It is worth noting that in developing countries the self-employed are usually the most vulnerable segment of workers. Future research should work on theoretical frameworks that could accommodate motherhood penalties within this group. Moreover, we work only with cross-sectional data, due to data limitations and the goal of obtaining comparable results. Unfortunately, large household surveys for most of Latin American countries are not designed to follow respondents over time. Therefore, important measures such as detailed job history information are lacking from our analysis. Thus, a next step in our research will involve working with the available panel data, which, although restricted to a short period of time, could potentially provide additional insights on this matter. Moreover, our data sources do not provide information on use of time. Hence, we are not accounting for intra-household division of labor, a factor that could also affect the size of motherhood penalties (Kuhhirt & Ludwig, 2012). Future research should explore the available sources on use of time in connection to motherhood penalties. Finally, it is certainly possible that unobserved factors affect women's decision to work in the informal sector. In that case, our matching method could not accurately balance the samples of women in terms of relevant characteristics for our question of interest.

Despite these limitations, this study advances the literature on gender and labor markets in non-industrialized countries. This paper addresses the motherhood penalty in a set of middle-income, non-industrialized countries, for which contributions on this regard are scarce. Equally important, we analyze the role of labor informality in mothers' labor outcomes. While labor informality is a heavily investigated topic in Latin America, few contributions tackle its interplay with gender. We find that informal labor contributes at explaining motherhood penalties, and at least in two countries, shapes their impact. These results highlight the importance of taking into consideration specific traits of the labor markets we investigate. While family-friendly policies are key to the understanding of

motherhood penalties in developed countries, their explanatory power is fairly limited in developing societies.

Moreover, we provide results for a group of countries that, taken together, comprise around 67% of the total population in the Latin American region. The countries selected for this study provide high variability in critical aspects such as female labor participation, rates of informality, and social spending. Our findings indicate that across countries representing a diversity of socioeconomic features, a sizeable motherhood penalty affects working mothers if compared to childless women. By displaying a general picture for these countries, we expect to contribute to a broader discussion of disadvantages faced by mothers in non-industrialized societies.

Appendix

Household Surveys used for this study

Country	Survey Name	Years
Argentina	Encuesta Permanente de Hogares, EPH	2004-2014
Brazil	Pesquisa Nacional por Amostra de Domicilios, PNAD	2006-2013
Chile	Encuesta de Caracterización Socioeconómica Nacional, CASEN	2003-2011
Mexico	Encuesta de Ingresos y Gastos de los Hogares, INIGH	2008-2012
Peru	Encuesta Nacional de Hogares, ENAHO	2008-2013

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