

An Empirical Analysis of Compulsory and Voluntary Remittances Among Domestic Workers in Tunisia*

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Abstract

We use a unique data set, constructed from a survey we carried in Tunisia, to contrast the determinants of compulsory and voluntary remittances in a sample of domestic workers in Tunisia. Compulsory remittances originate essentially from those who are younger than 18, and who remit their full wages to their father, or their brothers. We specify remittances functions which distinguish between compulsory and voluntary remittances. Our estimates indicate that compulsory remittances increase with the number of female children who are younger than 18 in the domestic worker's family, but they are independent of the number of young males. However, voluntary remittances increase with the number of a domestic worker's young brothers. We find high income elasticities of voluntary remittances because most of the domestic workers are quite young and have no direct dependents. Finally, the determinants of the decision to remit differ from those of the amount remitted. Consequently, inferences based on the standard Tobit model are inappropriate.

Keywords: Domestic Workers, Remittances, Child Labor, Tunisia

JEL Classification:

1 Introduction

The International Labor Organization defines child domestic workers (CDW) as children under the age of 18 who do domestic chores in households other than their own. CDW are predominantly females and may live in their employers' house. Some receive wages which they often remit in full to their parents (Innocenti Digest 1999). Children work as domestic workers because on one hand their poor parents send them work either to earn wages or in exchange of room and board. On the other hand, the increased labor market participation of urban adult females feeds the demand for CDW. The latter are a low cost substitute to female household heads who usually perform household chores (Pradhan 1995, Sharma, Thakurathi, Sapkota, Devkota and Rimal 2001).

Our objective is to contrast compulsory remittances, defined as a domestic worker's wage share which an employer remits directly to her parents, and voluntary remittances. We ask how the characteristics of a domestic worker, and that of her family, affect remittances. Our research sheds light on the reasons why some parents send their children to work as domestic workers, and allows us to investigate for altruism, insurance or inheritance motives. We differ from the remittances literature by (i) distinguishing between compulsory and voluntary remittances, and (ii) using generalizations of the standard Tobit model to distinguish between the decision to remit and the amount remitted. We use data from a survey we conducted among domestic workers in Tunisia to document the market for CDW. Focusing on Tunisian domestic workers allows us to study the determinants of compulsory and voluntary remittances in a group which performs similar tasks. Moreover, to our knowledge, CDW have not been studied previously in Tunisia.

In our sample on average 68 per cent of wages are remitted to the domestic worker's father or sister. Nearly all CDW remit their full wages while older domestic workers remit 43 per cent on average. Using the sum of compulsory and voluntary remittances we obtain results which are similar to the literature, with however a greater estimated income elasticity of remittances. This may arise because many domestic workers are young, have weak (no) bargaining power vis-a-vis their parents, and also receive non-monetary benefits. Aggregate remittances are lower if a domestic worker is married, or if her employer sends gifts to her parents.

Compulsory remittances are increasing in the number of the domestic worker's young sisters. This may arise because young females depend more on their parents' income than young males who can either participate in the local labor market. Moreover, the determinants of the decision to remit differ from those of the amount remitted. For instance, the number of sisters who are younger than 18 increases (decreases) the likelihood of compulsory (voluntary) remittances but does not influence the amount remitted. On the other hand voluntary remittances are increasing in the number of brothers younger than 18 and in the domestic worker's wages.

The remainder of the paper is organized as follows. We briefly review the child domestic worker and remittances literatures in section 2. Section 3 describes the market for domestic workers and the main characteristics the survey in Tunis. We discuss the remittances specifications in section 4. The estimates of the wage equation, as well as the aggregate, compulsory and voluntary remittances are discussed in section 5. Finally, section 6 concludes. All tables and likelihood functions are in the appendix.

2 Literature Review

Our analysis draws from two related literatures: (i) child domestic workers, which we review first, and (ii) intra-family remittances, which we discuss afterwards. The child labor literature provides empirical evidence that credit-constrained parents send their children to work so as to supplement the household income (Ranjan 2001). In this case, the decision to make a child work is made by the parents, and the child's income is compounded with that of other family members (Basu and Van 1998, Dessy and Vencatachellum 2002) .

Many children work in the informal sector which includes domestic work. A large literature documents CDW as being a common feature in most developing countries (Innocenti Digest 1999). A few stylized facts on CDW hold across most developing countries. First most live with their employer. This is reflected by the nouns which describe CDW in different countries. For example, they are known as *bonnes couchantes* (french for sleep in maids) in Tunisia, *rest avek* (creole for stay with) in Haiti, *Bandha* (tied down) in Bangladesh, *vidomegon*¹ in Benin (a font word for a young female who lives with family members), and *puerta cerrada* (spanish for closed door servant) in the Dominican republic.

Second, most CDWs are females who migrate from poor rural regions to large cities to find employment. In the following countries the share of female CDW is as follows: Bangladesh 83 per cent, Latin America 100 per cent, and 95 per cent in Togo. One exception is Nepal where Sharma *et. al.* (2001) find more boys than girls in their Kathmandu sample. In that same study, the authors report that affluent households are the main employers of CDW, with at least one full time employed adult. Pradhan (1995) reports that 19 per cent of urban nepalese

¹Vidomegons are not domestic workers in its strict definition. They are young females who have been sent to work with family members who live in town because of their parents' budget constraints.

households employ CDW, and that many CDW migrate from poor regions of the country to major urban areas to find employment. In Thailand, Bangkok is the main destination of child economic migrants (Phlainoi 2002).

Third, child domestic work includes work for cash, for accommodation or rations, or any combination of these (Budlender and Bosch 2002). One important characteristic shared by many CDWs is that they either receive no wages, or a large share of their wage is remitted directly to their parents by the employer (Innocenti Digest 1999). For example in Rwanda, CDW pay is generally sent home to pay for their siblings school fees. In a Bangladesh survey all the wage of 45 per cent of the domestic workers were given over to parents or guardians, while about 25 per cent received no wages at all. In Kenya, 78 per cent of child domestics were also only paid in kind. Finally, In Haiti, a law allows a child to receive room and board in exchange of supplying domestic services to the household. The CDW wage share which is sent back to their parents is to some extent akin to ‘compulsory’ remittances. According to the aforementioned evidence these remittances depend on the parents’ income, the presence of siblings in their family and the characteristics of the region they originate from.

Indeed, as summarized in Table 1, intra-family private remittances account for a significant share of a household income in developing countries where remittances usually flow from the young to the elders (Knowles and Anker 1981, World-Bank 1994). Since Lucas and Stark (1985), empirical tests of the determinants of remittances have grown quickly to identify the motives for private transfers.² These span old age security (Cox and Jimenez, 1990), which may be enforced through the demonstration effect (Cox and Stark 1994), health services (Kochar 1996),

²See for example Stark and Lucas (1988) for Botswana, Cox, Eser and Jimenez (1998) for Peru. Some studies have investigated the determinants of remittances in industrialized countries where private transfers account for a smaller share of household income (Cox 1987)

education of younger siblings, investment (Adams 1998), insurance or inheritance (de la Brière, de Janvry, Lambert and Sadoulet 1997) and last but not least altruism (Becker 1993).

Except for altruism, intra-family transfers may arise because of incomplete markets, or as payment for services where the family has a comparative advantage over the market (Ray 1998). For example, public health services are usually of poor quality and only a few can afford expensive private health care. Similarly, credit market constraints, especially in rural regions can be alleviated by intra-family transfers from urban migrants (Gersovitz 1988), a group which includes many CDW. These remittances, according to Adams (1998), allow rural farms to accumulate assets. Another example of risk pooling are marriages between members of villages who face uncorrelated weather patterns so as to allow for consumption smoothing (Rosenzweig and Stark 1989).³

In a recent study, de la Brière, de Janvry, Lambert and Sadoulet (2002) test for insurance and inheritance motives for remittances. On one hand, they predict that the migrants' and their families relative risk is what matters when remittances arise for insurance motives. On the other hand, migrants are motivated by inheritance if their remittances increase with their parents' wealth, the probability of inheriting, and the migrants' wealth. Note however the same positive correlation between a migrant's income and remittances arise if the migrant is altruistic. The authors acknowledge this identification problem citing data limitation as a reason why they cannot discriminate between altruism and insurance motives (de la Brière et al. 2002, footnote 1, p.310).

³See also (Paulson 1996) for another study of migration cum insurance.

3 The Market for Domestic Workers in Tunis

This section reviews the market for domestic workers in Tunisia and describes some key variables in the survey. The demand for maid arises in the main cities of Tunisia, especially greater Tunis. The survey was conducted from February to April 1998 in Tunis, the capital and economic hub of Tunisia. As the largest city (see Table 2) it acts as a magnet for rural migrants (Hay 1980). Internal migration is relatively easy in Tunisia because of short distances (last column in Table 2) and a well-developed transport network. Given the nature of the study, we focused on the residential parts of Tunis.⁴ We also interviewed domestic workers in Carthage which is located 30 kilometers from Tunis, and is one of the wealthiest residential area of the country.

Someone can recruit a domestic worker through (i) a *samsar*, (ii) a *cheikh*, or (iii) by visiting villages and scouting for an employee. *Samsar* is arabic for intermediary and is the most common means of finding a CDW. A *samsar* deals in different types of activities, one of which is to find domestic workers for urban households. The second way is through a *cheikh* who is a village elder who knows most families in the region. The *cheikh* used to play an important mediation role but with increased urbanization his role has weakened over the past years. The *cheikh* knows different families in villages who are seeking employment for their daughters, and also acts as an intermediary between the employer and the domestic worker's family. Once an agreement is reached, a young domestic worker moves to her employer's house where she is provided with room, board, and wages, in exchange of household services. The latter range from household chores to grocery shopping and nanny services.

⁴These areas are Cité Olympique, El Manar, El Menzah V and VI, La Marsa and Notre-Dame.

The questionnaire was implemented by two native local arabic speakers. Each domestic worker was interviewed at her employer's residence and her answers were checked for consistency with the employer. It was not possible to use random sampling techniques to obtain a sample of domestic workers for two main reasons. First there is no documentation on the population of domestic workers in Tunisia. Employers do not register their domestic workers with an agency and there is no record of domestic workers' employment history. Moreover, CDW is illegal in Tunisia because by law children younger than 16 must attend school.

Second, interviewing domestic workers, especially young ones, is difficult because many live with their employers who are reluctant to have them interviewed. Hence, we conducted door-to-door interviews starting with domestic workers whom the interviewers know. Afterwards the employers, or the domestic workers, referred the interviewers to other domestic workers. It is likely that this interviewing technique yields employers who share the same geographical and income background. However, as will be clear in what follows, the data fits both our expectations on the market for domestic workers in Tunis, and has similar characteristics as those found in other countries.

Most domestic workers in our sample migrated from the north west of Tunisia (see Table 4). This is the poorest region of the country as illustrated by the percentage of the population linked to the Société Nationale d'Eau (SONEDE), the national water company. Families which are not connected to the water supply system are usually poor because the water distribution system is quite extensive and affordable in Tunisia. Only those who cannot afford the connection will choose not to. Hence, one would expect relatively more migrants in Tunis to originate from that part of the country.

Even if the average domestic worker is 19 years old, and the median age equals 18, twenty five percent of them are under 14 years old. More than 78 per cent of all maids held their first full time job by age 16, while 40 per cent were already working as maids by age 12. Hence, more than three quarter of our sample started by being child workers. As the maids are young, and held their first time job when they were even younger, means they either never attended school or dropped out of school at an early age. This explains why 67 per cent of them are illiterate. Similarly, given that many domestic workers are young, 81 per cent are single, among whom 4 per cent divorced. Those who are married report participating in the labor market to supplement their husband's income. All single domestic workers, and half of those who are married, have no children.

The domestic workers in our sample receive an average monthly wage of 95 Tunisian Dinars (TD). This number is lower than the three minimum wages which were in place during the survey: (i) 170.352 TD per month for a work-week of 48 hours, (ii) 149.237 TD per month for a work-week of 40 hours, and (iii) a minimum daily wage of 5.061 TD for agricultural workers.⁵ However, 80 per cent of domestic workers live with their employer where they receive room and board. Moreover, almost every maid stated that her medical expenses are covered by her employer, which is not the case for casual, or even permanent, workers in the Tunisian private sector. Once those other benefits are taken into account there is reason to believe that a domestic worker is not worse off than a minimum wage worker. As can be seen in Table 3, a domestic worker's average wage is increasing in her age indicating that experience is remunerated.

One interesting characteristic of many domestic workers' employment contract is that part of their wages is remitted directly to their parents. Note that once the wage share which must

⁵In 1998 one tunisian dinar was worth one US dollar.

be transferred is agreed upon, the employer remits it directly to the CDW parents. These compulsory remittances average 43 TD per month (46 per cent of wages) in our sample. While 43 per cent of all domestic workers retained their their full wage, 39 per cent were compelled to remit all their wages, and 15 per cent transferred 50 to 100 per cent. Compulsory remittances are decreasing in the domestic worker's age (see Table 3).

A domestic worker earns 52 dinars on average net of compulsory remittances. She can voluntarily remit part of her net wages to her parents. Twenty-five per cent of domestic workers with positive disposable income voluntarily remit of all of it to their family. Consequently, when one aggregates compulsory and voluntary remittances, slightly more than 60 per cent of all domestic send their full wages to their parents. On average, domestic workers with positive disposable income remit 38 TD per month, which is, as expected, less than compulsory remittances. Only 3 domestic workers with positive net wages do not send voluntary remittances. However, both parents of all three of them are dead, and they all send compulsory remittances.

When we consider the aggregate of compulsory and voluntary remittances, a domestic worker remits on average 61 TD, which represents 68 per cent of her wage. This number is more than twice that which is reported in other studies where remittances average 30 per cent of the sender's income (Table 1). The relative importance of such transfers can be explained by the fact that many domestic workers are given room and board by their employers and they do not incur health or clothing expenses. Moreover, many are too young to have direct dependents while this is not the case in other remittances studies which consider adult migrants. The next section derives specifications for both compulsory and voluntary remittances which control for the censored nature of the data.

4 Specification of the remittances functions

Remittances are censored because they are observed only if the net expected benefits are positive. However, as discussed previously, compulsory remittances arise because parents decide to send their children to work, while voluntary remittances are motivated by insurance, inheritance or altruism. We now present specifications which allow for such differences.

Let R_i^* denote the benefits which domestic worker i derives from sending remittances. These benefits differ if remittances are compulsory (CR_i) or voluntary (VR_i). As is standard in the remittances literature since Lucas and Stark (1985), we assume that the benefits which domestic worker i derives from remittances is a linear function of exogenous variables X_i and the log of wages w_i :

$$R_i^* = X_i\beta_1 + \delta_1 w_i + \varepsilon_{1i} \quad (1)$$

where ε_{1i} is an IIN($0, \sigma_1^2$) error term, β_1 is a vector of parameters and δ_1 is a parameter. However, we do not observe the benefits from sending remittances but only zero or positive remittances according to the following Tobit rule:⁶

$$R_i = \begin{cases} R_i^* & \text{if } R_i^* > 0 \\ 0 & \text{if } R_i^* \leq 0 \end{cases} \quad (2)$$

The parameters in (1) can be estimated by maximum likelihood.

One important limitation of the standard Tobit specification (2) is that the decision to remit and the amount remitted are determined by the same mechanism. In particular, in the Tobit model: (i) $\frac{\partial \text{Proba}(R>0|\mathbf{X})}{\partial X}$ and $\frac{\partial E(R|\mathbf{X}, R_i^*>0)}{\partial x}$ are of the same sign, and (ii) the relative

⁶Note that (2) is also known as a type 1 Tobit model (Amemiya 1985).

partial effects of any two continuous explanatory variables on the conditional probability that remittances are positive and the expected remittances conditional on remittances being positive are equal.⁷ Those assumptions may not be appropriate for the study of compulsory and voluntary remittances.

For example, suppose we are interested by the effect of age on compulsory remittances. As the maid gets older, age may have opposite effects on the probability of observing compulsory remittances and the amount of compulsory remittances. On one hand, a domestic worker has more bargaining power vis-a-vis her parents, and is less likely to send compulsory remittances. On the other hand, she acquires human capital which increase the wage which is remitted in full to her parents (see section 3). In this case, age has opposite effects on the probability of observing compulsory remittances and on the amount remitted, and the implications of the standard Tobit model are violated.

We therefore investigate two alternatives to a standard tobit model: (i) Gragg (1971) two-tiered model and (ii) a type 2 Tobit model. Both alternatives distinguish between the decision to remit, and the determinants of the amount remitted conditional on remittances being positive. There is a long running debate on the relative merits of each approach which consists in comparing the predictive power of the two approaches using Monte Carlo methods (Leung and Schmidt 1996, for example)). While not attempting a Monte Carlo study of both models, we argue that the type 2 Tobit model is more appropriate for compulsory remittances, and Cragg's model is more suitable for voluntary remittances for the following reasons.

⁷For any two continuous variables x_j and x_h Wooldridge (2002) shows that these partial effects equal to the ratio of the parameters β_j/β_h .

Indeed, Wooldridge (2002) emphasizes that a type 2 Tobit specification accounts for sample selection and not an optimal choice of zero (voluntary) remittances. Our data shows that a CDW remits her full wage to her family. It can then be argued that parents choose whether to send the young girl to work as a domestic. The child has no say in the parent's choice and has no control over her wages, which is in line with the child labor literature (Basu 1999), and is confirmed by an analysis of the remittances data. Our sample of domestic worker neatly divides itself in two distinct groups, where the domestic workers either send compulsory or voluntary remittances, but very few both. Hence, the sub-sample of CDW can be considered as a self-selected sample of the larger sample of domestic workers. It is therefore more appropriate to specify a type 2 Tobit as the appropriate empirical specification of compulsory remittances.

However, in the case of voluntary remittances, zero voluntary remittances can be viewed as corner solutions of problem faced by a domestic worker who decides to send remittances (Compare Figures 1 and 2 for compulsory and voluntary remittances respectively). If the benefits from doing so are too low, she may choose, for example, not to purchase insurance from her family or to increase her likelihood of obtaining an inheritance. Since Cragg's two-tiered model does not involve any sample selection, or selectivity bias, we use it as the appropriate modelling tool for voluntary remittances.

Cragg (1971) augments (2) by a dummy variable D_i^* which captures the decision to remit:

$$D_i^* = X_i\beta_2 + \delta_2 w_i + \varepsilon_{2i} \quad (3)$$

where ε_{2i} is a mean-zero normally distributed error term with variance σ_2^2 . In this case, remittances are given by the following rule:

$$R_i = \begin{cases} R_i^* & \text{if } D_i^* > 0 \text{ and } R_i^* > 0 \\ 0 & \text{if } D_i^* \leq 0 \end{cases} \quad (4)$$

Note that we observe $R_i = R_i^*$ only if both (i) the domestic worker wants to remit ($D_i^* > 0$) and (ii) those remittances are positive ($R_i^* > 0$). Condition (ii) emphasizes that Cragg's two-tiered model is appropriate for situations with corner solutions (Blundell and Smith 1994). As shown in Appendix A.2, Cragg's model imbeds the standard Tobit model, and we can use the Likelihood ratio test, proposed by Lin and Schmidt (1984), to test between the two specifications.

The type 2 Tobit differs from the standard Tobit in that D_i^* is given by (3), R_i^* is as in (1), but the observation rule is as follows:

$$R_i = \begin{cases} R_i^* & \text{if } D_i^* > 0 \\ 0 & \text{if } D_i^* \leq 0 \end{cases} \quad (5)$$

D_i^* is the latent variable for the selection rule and is assumed to normally distributed.

5 Results

We first discuss the estimates of the wage equation in section 5.1 so as to identify the characteristics which are sought after by domestic workers employers. We then study the determinants of the aggregate compulsory and voluntary remittances in section 5.2 as a basis for compari-

son with the remittances literature. Finally we estimate the determinants of compulsory and voluntary remittances separately in sections 5.3 and 5.4 respectively.

5.1 Wage Equation

We specify a Mincerian wage equation with exogenous variables which measure a domestic worker's skills, experience and account for other employment benefits as in (Mincer 1974, Michaud and Venctachellum 2002). We proxy a domestic worker's experience by her age, or tenure with her employer. A domestic worker's tenure captures household specific knowledge which may be quite important for domestic work. For instance, the employer of a new domestic worker may not know whether she can be trusted with some tasks (e.g. grocery shopping). After some time the employer observes the domestic worker's ability and may allocate more tasks to the her, in which case, her wages should increase if she is paid at her marginal product.

As mentioned in section 3, many domestic workers enjoy non monetary benefits in addition to her wages such as room and board. Moreover, 89.4 per cent of domestic workers in our sample report that their employer pay for their health expenses. We therefore also include two explanatory variables in the log-wage equation (i) a dummy variable which equals 1 if the domestic worker lives with her employer, and (ii) another dummy variable which equals 1 if the employer sends gifts to domestic worker's parents. *Ceteris paribus*, a domestic worker's wages should be lower (i) when she lives with her employer than when she pays for her own housing and (ii) when her employer gifts sends gifts to her parents.

Table 5 reports the estimates for the two specifications which are are consistent with most of the theoretical predictions discussed above. The model fits the data well with an adjusted

R-square of 0.50 and 0.60 for models (1) and (2) respectively. Wages are concave in the domestic worker's age, or tenure, indicating that experience is remunerated at a diminishing rate. A domestic worker who was the one who decided to work earns lower wages. The literacy variable has a weak negative effect on wages in the first specification while theoretically human capital should be positively remunerated. However, this counter intuitive result vanishes when a domestic worker's experience is measured by her tenure rather than her age. In this case, literacy is not significant which may reflect the nature of domestic work which is not human capital intensive. Moreover, in the second specification, a domestic worker's co-residence with her employer has also a negative impact on her wages, as expected.

5.2 Aggregate remittances

For the sake of comparison with the remittances literature we start by investigating the determinants of the sum of compulsory and voluntary remittances which is positive for all those in our sample. We can then specify a log-linear aggregate remittances equation as in Lee, Parish and Willis (1994) with explanatory variables as discussed in section 2. These variables include the domestic worker's wages, proxies for her family's needs, as well as a measure of her independence from her family.

Table 7 reports the ordinary least squares estimates of the aggregate remittances equation. As expected, the income elasticity of remittances is positive, statistically significant, and equals 0.90. This estimate is higher than for studies of voluntary remittances reported in the literature. For instance Lucas and Stark (1985) report elasticity estimates of 0.25 to 0.73 depending on the sender's income. This higher estimate may arise for a number of reasons. First, more than fifty percent of our sample may be considered as child domestic workers who must remit all their

wages to their parents. Second, we underestimate many domestic workers' income by using their wages, while many receive non-monetary benefits. Third, most domestic workers have no direct dependents which means that they can afford to remit a large share of their wages.

Our estimates indicate that aggregate remittances decrease with a domestic worker's age in our sample.⁸ This finding is in line with the well-documented result that remittances flow from the young to the old in developing countries. Remittances are also lower if the domestic worker decided to seek employment herself. This indicates that a domestic worker who is relatively autonomous from her family remits less than otherwise and that remittances may in part include an insurance component. Married domestic workers also send less remittances. This result may arise either because a married domestic worker has access to other insurance mechanisms or she has to incur additional household expenses which reduces her disposable income.

We also find that aggregate remittances do not depend on the household ownership status of the domestic worker. This result may arise in part because the variance of the wealth measure is too small as only poor families send their children to work. The number of young children in the family has a positive incidence on aggregate remittances which may indicate that a domestic worker cares about the welfare of the different family members. Finally, as in Agrawal and Horowitz (1999), the relative poverty of the region from which the domestic worker migrated is not statistically significant.

⁸Using the parameter estimates for the quadratic specification of the wage variable reported in Table 7, we find that remittances would start increasing after 50 years old. In our sample there are only two domestic workers who are older than 50. However, only the one who is 51 years old can be used in the estimation because there are missing observations for the other one. Given the confidence interval around the estimates, we conclude that remittances are decreasing in a domestic worker's age in our sample.

5.3 Compulsory remittances

Following the discussion in section 4 we estimate a standard and a type II Tobit models. The estimates are reported in Table 8. Note that a domestic worker's wages is not included as an explanatory variable because compulsory remittances pertain to domestic workers whose wages are remitted in full to their parents.

The standard Tobit estimates indicate that *ceteris paribus* compulsory remittances are increasing in a domestic worker's age until 19 years old and then start declining. Nineteen years is the median age of domestic workers in our sample, and is one year older than the formal definition of child domestic workers. Compulsory remittances increase at first with age because wages are increasing in age and CDW remit their wages in full to their parents. They fall after 19, because older domestic workers have a greater say in the allocation of their wages. As she gets older, her bargaining power and reservation utility increases. In effect, having worked in Tunis, she has acquired experience, has a good knowledge of the city and may find a different job. Moreover, family ties may weaken as time goes by. Some domestic workers also report saving part of their income for expenses incurred when they get married. For all these reasons, compulsory remittances fall as a domestic worker gets older.

The first important difference between the estimates of the standard and type II Tobit models is the latter reveals that age does not affect the probability of observing compulsory remittances but only the amount remitted. A young domestic worker who starts with some compulsory wage share being sent to her parents cannot decide to have them stopped. However, she may be able to negotiate with her parents to retain a greater share of her income. Consequently, when we use the Type II Tobit model, compulsory remittances start falling for maids who are older than 32 years old, which is greater than the estimate obtained from the standard Tobit model (19

years). This occurs because the standard Tobit averages the effect of age on the probability of observing compulsory remittances and on the amount remitted.

A second difference is that a domestic worker's relative independence, as measured by whether or not she is the one who decided to seek employment, has a negative effect on the probability of observing compulsory remittances but not the amount remitted. This indicates that those domestic workers have a greater bargaining power vis-a-vis their parents who cannot compel them to remit their wages. An independent domestic worker keeps her wages and voluntarily decides to send remittances.

One interesting result is the asymmetric impact of male and female children who are younger than 18 on compulsory remittances in both the standard and Type II Tobit models. The presence of young males in the family has no effect on either the probability of observing compulsory remittances or the amount which is remitted. However, the number of sisters who are younger than 18 increases compulsory remittances in the standard Tobit specification. When we take the analysis one step further and estimate the type II Tobit model, the estimates indicate that the number of sisters who are younger than 18 increase the likelihood of compulsory remittances but does not affect the amount remitted.

This result may arise because young girls who stay with their parents do not provide monetary contributions to the household's income. Consequently, they must be supported either directly or indirectly by the household head. The latter consequently sends one of the daughters out to work as a domestic worker.⁹ The same does not hold for young males who may find paid employment in their villages to support the household, or their parents may perceive that the

⁹An important question is the choice of which child is sent to work. Our data does not allow us to answer this question which is left for future research.

future benefits of keeping them at school are high. Finally, our estimates indicate that contrary to our expectations, compulsory transfers are independent of the fact that the maid originates from the poorest part of the country. We now move to the determinants of voluntary remittances.

5.4 Voluntary remittances

Contrary to the specification of the determinants of compulsory remittances, we now include a domestic worker's wages as an explanatory variable of voluntary remittances. The results are reported in Table 7. Higher wages increase voluntary remittances but does not affect the likelihood of observing positive voluntary remittances. We use these estimates to calculate the elasticities of remittances with respect to wages, as explained in the appendix, which equal 0.57 and 0.98 respectively in the Tobit and Cragg's models respectively. These estimates are much higher than those reported in the literature for the reasons given in section 5.2 and question the ordinary least square or standard Tobit estimates.

There are some differences between the determinants of compulsory and voluntary remittances. First, in Cragg's specification, voluntary remittances are independent of the number of young sisters, while it increases with the number of brothers. Recall that the opposite holds for compulsory remittances. One possible explanation is as follows. Recall that it is the domestic worker herself who chooses the amount of voluntary remittances, while compulsory remittances are decided by her parents. The domestic worker may send more remittances when there are young brothers who may help her when they grow up, and when their parents pass away.

Second, the likelihood that a domestic worker sends remittances voluntarily increases if she decided to join the labor market, while this is not the case for compulsory remittances. Moreover,

this variable has an asymmetric impact on the decision to send voluntary remittances and the amount which is remitted. Once again, focussing only on the standard Tobit model would yield inconsistent parameter estimates. Third, the amount of voluntary remittances is lower if the domestic worker is married while it did not matter for compulsory remittances.

There are also some similarities between the determinants of compulsory and voluntary remittances. The fact that the parents own their place of residence, or live in one of the poorest regions of the country, are not statistically significant. This may arise because all domestic workers' parents in our sample are poor irrespective of their place of residence.

6 Conclusion

This paper contrasts the determinants of compulsory remittances, defined as the wage share which an employer sends back to the employee's parents, and voluntary remittances. We use data from a unique survey which we conducted on 500 domestic workers in Tunis. We find that all domestic workers in our sample are females and that close to half of them are younger than 18, and fall in the child domestic workers category. Contrary to other child domestic workers in other countries (Innocenti Digest 1999) all of those in our sample are remunerated. However, 70 per cent of them remit all their wages directly to their parents.

Our estimates indicate that the family gender composition has an asymmetric impact on compulsory transfers which are levied by the parents and voluntary remittances which are sent by the domestic worker. Compulsory remittances are increasing in the number of young females in the domestic worker's family, but voluntary remittances are increasing in the number of young brothers and independent of the number of young sisters. Moreover, the determinants of the

decision to remit differ from the amount which is remitted. It appears therefore that parents who send their young daughters to work retain full control of her wages.

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A Appendix

A.1 Likelihood functions

Standard Tobit model The likelihood function for (2) has the familiar discrete and continuous parts:

$$L_{\text{Tobit}} = \prod_0 [1 - \Phi((X_i\beta_1 + \delta_1 w_i)/\sigma_1)] \prod_1 \sigma_1^{-1} \phi[(R_i - X_i\beta_1 - \delta_1 w_i)/\sigma_1] \quad (6)$$

where Φ and ϕ are the standard normal cumulative and probability density functions respectively.

Cragg two-tiered model Assume that the probability a domestic worker decides not to remit is given by a probit with parameters (β_1, δ_1) , and a variance which is normalized to 1:

$$\text{Proba}(R_i = 0) = 1 - \Phi(X_i\beta_1 + \delta_1 w_i). \quad (7)$$

Assume also that the probability of the amount remitted, conditional on it being positive, is given by a normal distribution $N(X_i\beta_2, \sigma_2)$ truncated at zero. Under those two assumptions, the likelihood function for Cragg's two-tiered model (1), (3), and (4) equals:

$$\begin{aligned} L_{\text{Craag}} &= \prod_0 \text{proba}(R_i^* < 0) \prod_1 \text{proba}(R_i^* | R_i^* > 0) \cdot P(R_i^* \geq 0) \\ &= \prod_0 [1 - \Phi(X_i\beta_1 + \delta_1 w_i)] \prod_1 \frac{\sigma_2^{-1} \phi[(R_i - X_i\beta_2 - \delta_2 w_i)/\sigma_2]}{\Phi[(X_i\beta_2 + \delta_2 w_i)/\sigma_2]} \cdot \Phi(X_i\beta_1 + \delta_1 w_i) \end{aligned} \quad (8)$$

The standard Tobit model is a special case of Cragg's model if $\beta_1 = \beta_2/\sigma_2$, $\delta_1 = \delta_2/\sigma_2$ and $X_{1i} = X_{2i}$.

Type 2 Tobit Using (1), (3) and (5), the likelihood function of the type 2 tobit equals:

$$\begin{aligned} L_{\text{type2}} &= \prod_0 \text{proba}(D_i^* \leq 0) \prod_1 \text{proba}(R_i | D_i^* > 0) P(D_i^* > 0) \\ &= \prod_0 [1 - \Phi(X_{1i}\beta_1 + \delta_1 w_i)] \prod_1 (\sigma_2^{-1} \phi[(R_i - X_{2i}\beta_2 - \delta_2 w_i)/\sigma_2]) \cdot \Phi(X_{1i}\beta_1 + \delta_1 w_i) \end{aligned} \quad (9)$$

A.2 Specification tests

Cragg's two-tiered model Lin and Schmidt (1984) derive a likelihood ratio test (LR) for Cragg's two-tiered model against the standard Tobit model (Greene 2000, p.915) as follows:

$$\text{LR} \equiv -2[\ln(L_{\text{Tobit}}) - (\ln(L_{\text{Probit}}) + \ln(L_{\text{TR}}))] \quad (10)$$

where L_{Tobit} is from (6), L_{Probit} is the likelihood for the probit estimates of voluntary remittances coded as a binary variable, and L_{TR} is the likelihood for the truncated regression model of positive voluntary remittances fitted separately. The sum $L_{\text{Probit}} + L_{\text{TR}}$ corresponds to the unrestricted model. As usual (10) is asymptotically distributed as a chi-squared with the number of degrees of freedom equals the number of explanatory variables. Substituting the different estimated log likelihoods for our specifications into (10) gives:

$$-2[-996.07 - (-107.15 - 796.90)] = 184.9 \quad (11)$$

As the critical 1 per cent chi-squared equals 14.7, we therefore strongly reject the standard Tobit model.

A.3 Elasticities

In the standard Tobit model, δ represents the marginal effect of the log of wages on R_i^* . However, if one is interested in R_i , it can be shown that

$$\frac{\partial E[R_i|x_i, w_i]}{\partial w_i} = \delta \cdot \Phi\left(\frac{\beta x_i + \delta w_i}{\sigma}\right)$$

since

$$E[R_i|x_i, w_i] = P(R_i^* > 0|X, w) \cdot E[R_i|x_i, w_i, R_i^* > 0]$$

This can be decomposed into two effects. A change in wages will affect the conditional mean of R_i^* in the positive part of the distribution (intensive margin), and it will affect the probability that the observation will fall in that part of the distribution (extensive margin) :

$$\begin{aligned} \frac{\partial E[R_i|x_i, w_i]}{\partial w_i} &= \frac{\partial P(R_i^* > 0|X, w)}{\partial w_i} E[R_i|x_i, w_i, R_i^* > 0] + P(R_i^* > 0|X, w) \frac{\partial E[R_i|x_i, w_i, R_i^* > 0]}{\partial w_i} \\ &= \frac{\delta}{\sigma} \phi\left(\frac{\beta x_i + \delta w_i}{\sigma}\right) \left[\beta x_i + \delta w_i + \sigma \left(\frac{\phi((\beta x_i + \delta w_i)/\sigma)}{\Phi((\beta x_i + \delta w_i)/\sigma)} \right) \right] + \\ &\quad \Phi((\beta x_i + \delta w_i)/\sigma) \cdot [\delta \cdot \{1 - \lambda(c) [(\beta x_i + \delta w_i)/\sigma + \lambda(c)]\}] \end{aligned} \quad (12)$$

where $\lambda(c) \equiv \frac{\phi(c)}{\Phi(c)}$ is evaluated at $c = (\beta x_i + \delta w_i)/\sigma$

A.4 Tables

Table 1: Some Stylized Facts on Remittances in Selected Countries[†]

Country	Remittances as a % of		Year of survey	Source
	recipient's income	sender's income		
Mexico	33 to 39			Stark, Taylor and Yitzhaki (1988)
Salvador	14 to 22			Funkhouser (1992)
Pakistan	5 to 12			Adams (1998)
Kenya		21	1971	Johnson and Whitelaw (1974)
Nicaragua	\$US56–\$US79		1989	Funkhouser (1992)
Dominican Republic*			1994	de la Brière et al. (1997)
Males		33		
Females		22		
Western Kenya		7	1988	Hoddinott (1994)
India (Delhi)			1975-76	Banerjee (1984)
Urban migrants		14		
Rural migrants		23		
Columbia	16	6		Cox and Jimenez (1998)

[†]Numbers are rounded to the closest integer. Remittances are percentages unless otherwise specified. *The shares are calculated using information provided on page 10 of de la Brière et al. (1997).

Table 2: 1994 Tunisia Census

District	Gouvernorat	Percentage			Distance from Tunis
		Population	Sonede	STEG	
	Tunis	10	93	96	...
	Ariana	6	86	92	...
	BenArous	4	85	90	...
Tunis		21	89	94	...
	Nabeul	7	64	88	67
	Zaghouan	2	47	63	57
	Bizerte	6	66	82	64
North – East		14	63	83	...
	Beja	3	51	78	105
	Jendouba	5	36	75	139
	Kef	3	46	72	175
	Seliana	3	40	69	140
North – West		14	43	74	...
	Sousse	5	84	92	140
	Monastir	4	89	94	165
	Mahdia	4	48	77	160
	Sfax	8	65	89	270
East – Central		21	71	88	...

Source: Recensement général de la Tunisie, 1994.

Table 3: Descriptive statistics of the maids

Maid's age						
In years	-14	[14...15[	[15...16[	[16...17[	[17...18[	18+
Number of maids	79	44	32	26	51	265
As a percentage of maids	16	9	6	5	10	53
Compulsory remittances						
Percentage of wages	0	]0...25]	]25...50]	]50...75]	]75...100]	100
Number of maids	79	44	32	26	51	265
As a percentage of maids	16	9	6	5	10	53
Job search						
Employment found through	Parents	Sibligs	Relative	Friend	Own	Obs
Number of maids	57	133	123	21	81	417
As a percentage of maids	14	32	30	5	20	100
Variable	Mean	Median	Std-dev	Min.	Max.	Obs.
Age in years	19	18	6.35	9	53	497
Monthly wage in Dinars*	95	90	26.9	35	210	497
Compulsory remittances in Dinars	40	20	43	0	150	417
Voluntary remittances when net wage is positive						
In Dinars	37	30	21	0	110	194
As a % of Net Wage	40	33	24	0	100	194
Total transfers						
In Dinars	61	60	29	5	150	350
As a % of gross wage	0.68	0.89	0.34	0.06	1.0	350
Number of brothers	1.712	2.0	1.376	0	7	172
Number of brothers below 18	0.579	0	0.972	0	7	480
Number of sisters	1.392	1.0	1.216	0	7	480
Number of sisters below 18	0.625	0	0.89	0	4	194
Literacy	33	...	...	...	...	...

* At the time of the survey 1 Tunisian Dinar was worth 1 U.S. Dollar.

Table 4: Descriptive statistics of the maid's family

District	Gouvernorat	Number of maids	As a percentage of maids in the sample				Avg. number of children per family
			Owner	Gourbi	SONEDE	Agric	
	Tunis	12	42	17	25	8	4.3
	Ariana	32	59	0	56	25	4.0
	Ben Arous	12	50	0	92	33	4.3
	Nabeul	34	62	6.7	65	21	4.1
	Zaghouan	41	61	20.5	78	17	4.1
	Bizerte	18	61	0.0	44	11	4.1
	Beja	57	61	15.2	63	10	3.8
	Jendouba	109	60	16.3	69	14	4.5
	Kef	63	62	16.4	75	11	4.1
	Siliana	28	0.4	10.0	71	27	4.0
	Sousse	7	43	0	57	27	n.d.
	Monastir	4	25	0	75	0	4.0
	Mahdia	4	50	0	75	0	3.3
	Sfax	0	0	0	0	0	0.0
Tunisia		453	59	12.4	66	16	4.2

Table 5: Determinants of a domestic worker's wages

		Dependent variable: Logarithm of monthly wages	
Explanatory variables		Model 1	Model 2
Human capital			
Age		0.05 *** (6.59)	
Age squared divided by 100		-0.04 *** (2.73)	
Tenure with current employer			0.07 *** (12.29)
Tenure squared (divided by 100)			-0.17 *** (5.65)
Dummy variable equals 1 if the domestic worker is literate		-0.04 * (1.66)	-0.01 (0.33)
Domestic worker's autonomy			
Dummy variable equals 1 if the domestic worker decided to work		-0.10 *** (3.89)	0.00 (0.14)
Non monetary benefits			
Dummy variable equals 1 if the domestic worker lives in the employer's house		0.00 (0.19)	-0.05 ** (2.02)
Dummy variable equals 1 if the employer sends gifts to the maid's family		0.01 (0.38)	0.01 (0.29)
Constant		3.81 *** (41.33)	4.31 *** (132.25)
Number of observations		310	310
R-square		0.51	0.61
Adjusted R-Square		0.50	0.60

Table 6: Determinants of the logarithm of aggregate transfers

		Dependent variable: logarithm of the sum of compulsory and voluntary remittances	
Explanatory variables			
Human capital			
Age		-0.10 *** (3.97)	
Age squared divided by 100		0.10 ** (2.13)	
Domestic worker's autonomy			
Dummy variable equals 1 if the domestic worker is married		-0.56 *** (8.57)	
Dummy variable equals 1 if the domestic worker decided to work		-0.46 *** (7.25)	
Dummy variable equals 1 if the domestic worker does not know whether she will inherit from her parents		0.04 (0.61)	
Recipients' needs			
Number of the domestic worker's brothers who are younger than 18		0.14 *** (3.31)	
Number of domestic worker's sisters who are younger than 18		0.11 ** (2.42)	
Dummy variable equals 1 if the domestic worker's parents live in the North West of Tunisia		-0.03 (0.51)	
Dummy equals to one if the maid's parents own their place of residence		0.09 (1.43)	
Income effect			
Logarithm of wages		0.90 *** (6.80)	
Constant		1.31 ** (2.07)	
Number of observations		310	
R-square		0.55	
Adjusted R-Square		0.53	

Absolute T-ratios corrected for heteroscedasticity are in parentheses under the point estimate. At the 1%, 5% and 10% level, the critical T equals 2.58, 1.96 and 1.64 respectively. (***) [**] (*) indicates that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively

Table 7: Determinants of a domestic worker's monthly voluntary remittances
 Dependent variable: monthly voluntary remittances

Explanatory variables	Standard Tobit	Craag	
		Probit	Truncated
Human capital			
Age	15.24 *** (3.93)	0.51 (1.57)	-17.65 (1.48)
Age squared divided by 100	-25.67 *** (3.69)	-0.71 (0.78)	21.69 (0.99)
Domestic worker's autonomy			
Dummy variable equals 1 if the domestic worker is married	-14.97 (0.80)	0.49 (1.06)	-78.34 (1.38)
Dummy variable equals 1 if the domestic worker decided to work	17.07 (1.19)	1.45 *** (3.35)	-57.30 (1.63)
Dummy variable equals 1 if the domestic worker does not know whether she will inherit from her parents	8.93 (0.94)	0.13 (0.59)	27.64 (0.70)
Recipients' needs			
Number of the domestic worker's brothers who are younger than 18	16.54 *** (2.73)	0.05 (0.23)	45.51 *** (3.02)
Number of domestic worker's sisters who are younger than 18	-14.71 ** (2.27)	-0.36 ** (2.19)	-8.93 (0.32)
Dummy equals to one if the maid's parents own their place of residence	-5.23 (0.55)	-0.29 (1.11)	-21.01 (0.56)
Dummy variable equals 1 if the domestic worker's parents live in the North West of Tunisia	-13.92 * (1.84)	-0.26 (1.11)	-27.10 (1.44)
Income effect			
Logarithm of monthly wages	53.39 ** (2.09)	0.46 (0.58)	162.4 * (1.92)
Constant	-422.9 *** (4.19)	-8.42 ** (2.43)	-475.7 (1.35)
Number of observations		310	
Log likelihood	-976	-884	

Table 8: Determinants of a domestic worker's compulsory remittances
 Dependent variable: monthly compulsory remittances

Explanatory variables	Standard Tobit	Type II Tobit	
		Probit	Truncated
Human capital			
Age	10.88 (0.95)	-0.48 (1.59)	15.46 (2.76)
Age squared divided by 100	-57.45 * (1.75)	0.65 (0.75)	-44.22 (2.32)
Domestic worker's autonomy			
Dummy variable equals 1 if the domestic worker is married	-48.77 *** (3.27)	-0.85 (2.22)	-1.55 (0.05)
Dummy variable equals 1 if the domestic worker decided to work	-69.91 *** (4.55)	-1.23 (2.83)	-14.50 (1.28)
Dummy variable equals 1 if the domestic worker does not know whether she will inherit from her parents	-15.39 * (1.85)	-0.40 (1.60)	-0.59 (0.15)
Recipients' needs			
Number of the domestic worker's brothers who are younger than 18	6.23 (0.98)	0.05 (0.28)	-0.88 (0.26)
Number of domestic worker's sisters who are younger than 18	21.87 *** (4.02)	0.67 (4.08)	1.67 (0.41)
Dummy equals to one if the maid's parents own their place of residence	17.48 * (1.87)	0.50 (1.80)	2.84 (0.62)
Dummy variable equals 1 if the domestic worker's parents live in the North West of Tunisia	6.99 (0.86)	0.37 (1.59)	-0.50 (0.14)
Income effect			
Constant	-0.4 (0.00)	5.91 (2.27)	-47.6 (1.05)
Number of observations		310	
Log likelihood	-883	-749	

Absolute T-ratios corrected for heteroscedasticity are in parentheses under the point estimate. At the 1%, 5% and 10% level, the critical T equals 2.58, 1.96 and 1.64 respectively. (***) (**) (*) indicates that the coefficient is statistically different from 0 at the 1%, 5% and