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Safojan, Romina

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**THE EFFECT OF EXPORTS ON LABOR INFORMALITY:  
EVIDENCE FROM ARGENTINA**

By

Romina Safojan

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# The Effect of Exports on Labor Informality: Evidence from Argentina\*

Romina Safojan<sup>†</sup>

January 24, 2019

## Abstract

This paper explores the causal impact of exports on the share of informal labor in the Argentinean manufacturing sector. Using an instrumental variable approach to address potential endogeneity concerns, I show that an exogenous 10 percentage points increase in export intensity induces a reduction of the informality rate of 2.2 percentage points. Then, I explore the channel through which exports affect informality. By differentiating exports according to the income group of their destinations, I find that the aggregate effect of exports is explained by the sales to high-income countries. Moreover, the effect is partially explained by an increase in the complexity of the tasks performed in the jobs. Overall, the evidence suggests that under an increase in the demand of higher quality exports, the manufacturing firms increase their productivity by reducing their share of informal workers.

**JEL Classification:** F16, F66, J24, J46.

**Keywords:** Exports, Labor Informality, Productivity, Task Complexity, Argentina.

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<sup>†</sup>Tilburg School of Economics and Management, Tilburg University. E-mail: [r.safojan@tilburguniversity.edu](mailto:r.safojan@tilburguniversity.edu)

# 1 Introduction

Informal employment, understood as jobs outside the formal labor legislation and social protection schemes, is one of the leading policy issues in developing countries. It represents a major problem in terms of social protection, due to the lack of recognition of labor rights and insurance against changes in labor market conditions. Moreover, labor informality affects tax revenues since it undermines government tax collection and, therefore, the provision of public goods (Johnson, Kaufmann and Shleifer, 1997). In Latin America, labor informality remains a pervasive characteristic of labor markets, representing 20 to 75 percent of total employment (Gasparini and Tornarolli, 2009). Between 1990 and 2001, this region has more than doubled its exports.<sup>1</sup> This expansion is partially due to a process of trade liberalization, the increase in world trade and the implementation of specific policies to promote exports. Despite the evidence on the effects of international trade on local labor markets, the research on its effects on informal employment is scarce.

Exports may affect informal employment in different directions. On the one hand, price competition to enter and succeed in foreign markets may induce firms to hire informal workers to reduce labor costs. Informal employment allows these firms to diminish the impact of shocks by hiring more flexible inputs and/or by choosing different degrees of formality (Acosta and Montes-Rojas, 2014; Bacchetta, Ernst and Bustamante, 2009; Goldberg and Pavcnik, 2003). On the other hand, a positive demand shock in the country of destination may induce a reallocation of workers towards more upgraded products. This may be specially important when the demand is from rich countries which tend to import more high-quality products (Hallak, 2006). As a consequence, we may observe a higher turnover coming from increasing on the job training, or more workers being hired formally, since most informally employed workers tend to be low-skilled. Using data for the Argentinean manufacturing sector for the period 1997-2001, this paper examines the effect and mechanisms through which exports affect labor informality.

Argentina constitutes a good case study to analyse the effect of interest in developing economies for many reasons. First, labor informality in manufacturing sector is high, representing 33 percent of total salaried employment.<sup>2</sup> Second, the manufacturing sector represents a significant proportion of total Argentinean exports, accounting for 66 percent

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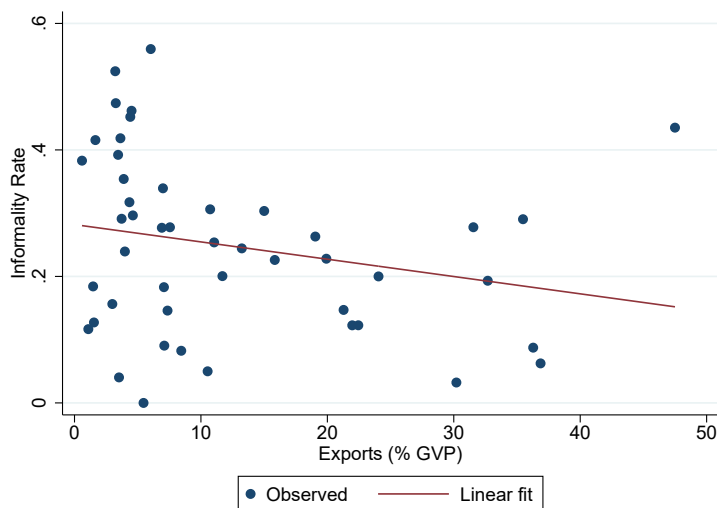
<sup>1</sup>Source: *World Development Indicators* (WDI), The World Bank data, exports of goods and services measured at constant 2005 US\$.

<sup>2</sup>Own calculations based on Encuesta Permanente de Hogares (EPH) data for the period 1997-2001, using the *Legalistic* definition of informality described in Section 2 for salaried workers.

of total exports and 24 percent of total registered employment, on average for 1997-2001, with a high variability across industries. Third, the national micro-level household and labor force survey enables me to explore changes in employment jointly for formal and informal workers and to control for individual characteristics, using a repeated cross-section. Finally, this dataset also measures the complexity of jobs at the worker level, providing a unique opportunity to evaluate the changes in labor productivity from labor reallocation between formal and informal employment.

Figure 1 shows the relationship between the mean of exports, as a share of production, and the informality rate by industry in the Argentinean manufacturing sector for the period of analysis. The linear regression of the informality share on exports indicates a significant negative correlation of -0.18. In order to identify the causal effect of exports on labor informality, I exploit the cross-sectional and time variability of direct exposure to exports' demand shocks across manufacturing industries. Following an instrumental variable approach to address potential concerns about endogeneity and self-selection, I propose a novel instrument for exports.

Figure 1: AVERAGE INFORMALITY RATE AND EXPORTS IN MANUFACTURING INDUSTRIES, ARGENTINA (1997-2001)



*Note: Each observation corresponds to a manufacturing industry at 3-digits of the International Standard Industrial Classification (ISIC), Rev. 3. Labor informality Rate is computed based on the Legalistic definition on salaried workers. Exports is computed as the share of the gross value of the production (GVP) of each industry. The solid line is the regression of the informality rate on exports. Source: Own calculations based on Ministry of Industry, and Encuesta Permanente de Hogares (EPH) data of Argentina.*

The instrument exploits the within-industry exogenous variation of Argentinean manu-

facturing industries' exports over time driven by a foreign shock, generated by the change in real income in importing countries. The relevance of this instrument to explain the changes in exports can be justified from gravity models, where countries' GDP has been shown to be one of the main determinants of bilateral trade (see, for instance, [Head and Mayer \(2014\)](#)). Also, the GDP of importing countries is expected not to have any direct effect on the labor force composition of Argentinean manufacturing industries. Nevertheless, potential common shocks to GDP or common trends of foreign and domestic sectors may violate the exclusion restriction. Thus, I construct this instrument as a weighted average of the GDP of importing countries orthogonal to Argentina's GDP. Estimation results show that an exogenous increase of exports of 10 percentage points reduces by 2.2 percentage points, on average, the probability of job informality in the Argentinean manufacturing sector.

In addition to exploring the short-term changes in labor force composition in the manufacturing sector, I identify the mechanisms behind the effect. Two pieces of evidence link this effect on informality to changes in labor productivity in the industries.

Exporting to high-income countries induces firms to increase productivity and to demand higher skills compared to exporting to other destinations (see, for example, [Marin, 1992](#), and [De Loecker, 2007](#), for developed countries, and [Park et al., 2010](#), and [Brambilla, Lederman and Porto, 2012](#), for developing ones). Furthermore, [Hallak \(2006\)](#) shows that a quality-driven demand effect on the bilateral trade operates through the relationship between income and the aggregate demand for quality. Accordingly, richer countries import relatively more from countries that produce higher quality products. If this 'productivity channel' partially explains the effect of exports on labor informality, we should observe two facts. First, increasing exports to high-income destinations should reduce informality. Second, for low-income countries this effect should be significantly smaller. Consistently with this explanation, I find that the aggregate negative effect of exports on the informality rate is due to sales to high-income destinations, which significantly decreases by around 3.8 percentage points when the export intensity to these countries rises by 10 percentage points. This evidence is in line with the idea that a foreign demand shock may induce industries to increase their productivity by reducing the share of informal (usually less skilled) workers.

Increasing complexity of the tasks performed in the jobs may lead to an increase in labor productivity in the industries. Therefore, I estimate the indirect effect of exports on an industry's informal share that comes through task complexity changes. I do this in three stages. First, I compute the predicted value of exports driven by the exogenous demand shock in a first stage. Then, I use this variable as an instrument for an indicator of performing

high complexity tasks in the job in a regression of task complexity on labor informality. An increase in 10 percentage points in the export intensity reduces the informality rate by approximately 1.8 percentage points through an increase in the average complexity of the tasks performed by the labor force. Thus, the increase in the complexity of the tasks explains 79 percent of the total effect. Overall, the two results (i.e. on exports destinations and task complexity) suggest that under an increase in the demand for higher quality exports, the manufacturing firms reduce the share of informal labor force as a mean of increasing their productivity.

Previous studies have assessed the effects of globalization on domestic labor markets. In particular, [Acemoglu et al. \(2016\)](#); [Autor, Dorn and Hanson \(2015\)](#), and [Autor et al. \(2014\)](#) show that international competition from Chinese imports reduce US manufacturing industries' wages and employment. [Pierce and Schott \(2016\)](#) find similar evidence from a US tariff elimination on Chinese imports on employment. Moreover, globalization affects workers' composition within industries. For example, [Hummels et al. \(2014\)](#) show, using matched employee-employer data, that exporting increases the wages of all skill-types of workers while the effect of offshoring on wages differs by task characteristics and skills. [Ottaviano, Peri and Wright \(2013\)](#) find that offshoring relocates natives into more communication-intensive tasks. This paper complements these studies by exploring additional employment and task complexity compositional changes from international trade, focusing on a developing economy where labor informality is a salient feature and an alternative margin of adjustment of industries to certain shocks.

Trade reforms may have adverse effects in terms of replacing formal jobs with informal ones ([Goldberg and Pavcnik, 2003](#)). Research papers have increasingly studied the effects of trade reforms on employment composition mostly focusing on trade liberalizations, but the empirical evidence is mixed.<sup>3</sup> However, since trade liberalization affects simultaneously exports and imports through the elimination of trade barriers and tariff reduction, this does not allow the identification of both effects separately. [McCaig and Pavcnik \(2018\)](#) show in a low-income country that US tariffs reduction from a Bilateral Trade Agreement as a plausible export shock, promotes workers' reallocation out of (informal) microenterprises towards for-

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<sup>3</sup>[Acosta and Montes-Rojas \(2014\)](#) and [Cruces, Porto and Viollaz \(2013\)](#) find that trade openness increased labor informality in Argentina. Based on internationally comparable data, [Fiess and Fugazza \(2010\)](#) obtain mixed results depending on the country and econometric framework. [Bosch, Goni and Maloney \(2012\)](#); [Menezes-Filho and Muendler \(2011\)](#), and [Goldberg and Pavcnik \(2003\)](#) find little evidence of a significant impact of trade policy changes on informality in Brazil and Colombia. [Aleman-Castilla \(2006\)](#), and [Paz \(2014\)](#) show that a decline in trading partners' import tariffs leads to a decrease in manufacturing informality in Mexico and Brazil, respectively.

mal and more productive establishments. Nevertheless, the limited empirical evidence does not yield strong conclusions concerning the link between international trade and informality in a developing economy. Also, it does not provide any prediction on how exports represent a distinct effect through its effect on productivity. In this paper I provide consistent evidence on the relationship between exports and labor informality in a developing country and show that only exports to high-income countries are relevant to reduce informality. Considering that, unlike trade liberalizations, multiple policies might be implemented to stimulate exports, it is a major concern to understand the potential effects that changes in exports generate on labor informality.

Finally, this paper is also related to the literature that has studied the determinants of labor informality. Some studies emphasize the role of labor market regulation and taxation as the main determinants (De Soto, 1989; Almeida and Carneiro, 2012, among others), while Fields (1990) and Maloney (2004) highlight the issue of voluntary informal employment, identifying a segmentation within informal labor. Despite the dynamics in labor markets given by the expansion of world trade, decent working conditions have not improved at the same rate and the informality in developing countries remains persistently large (Bacchetta, Ernst and Bustamante, 2009). Thus, investigating how exports affect labor informality and the potential channels behind would help to understand in more depth this multifaceted phenomenon.

The remainder of this paper is organized as follows. Section 2 introduces the data sources and descriptive statistics. Section 3 describes the empirical strategy and presents and discusses estimation results for the effects of exports on labor informality. Section 4 presents evidence on the transmission mechanisms of exports. Section 5 concludes.

## 2 Data and Descriptive Statistics

In this section I briefly describe the data sources and relevant definitions used for the empirical analysis. Moreover, I present statistical evidence on Argentinean manufacturing industries related to exports and informal employment, the characteristics of formal and informal workers and the task complexity of the jobs that they perform.

The measurement of labor informality is difficult to implement empirically. Ideally, matched employee-employer data would allow to perform a more detailed analysis taking into account not only workers' observable characteristics but also firms' ones. However, one of the main limitations for Argentina (and, indeed, most countries) is that this administra-



tive data identifies only registered (formal) workers in formal registered firms. This makes it necessary to focus on the industry level to analyze labor informality related issues. The main source of data I use in the analysis is the national micro-level household and labor force survey *Encuesta Permanente de Hogares* (EPH), carried out by the Argentinean national institute of statistics, *Instituto Nacional de Estadísticas y Censos* (INDEC).<sup>4</sup> It is a repeated cross-section with a rotating panel structure. This survey only covers large urban agglomerates, having an approximate coverage of 60 percent of the total population. I consider all the urban agglomerations (28).<sup>5</sup> One important feature of this survey is that it provides information at the individual-level relevant to identify the informality status of the workers and their industry of employment, aggregated at 3-digits level, according to the international Standard Industrial Classification (SIC). This industry disaggregation provides enough degrees of freedom to the empirical estimation analysis.

There are two main standard definitions to classify a worker as informal: ‘Legalistic’ and ‘Productive’ (ILO, 2013). In the former definition, an individual is working informally if her/his job is not recognized or regulated by the existing legal framework. Consistently with the literature on informality, I construct an indicator of informality status based on whether the worker is registered in the social security system (i.e. if (s)he does not have the right of a pension associated with the occupation). Then, according to the ‘Productive’ definition, a worker is classified as informal if (s)he works at a firm with low capital endowment, low productivity, unskilled or marginal small-scale jobs. In practice, this definition is implemented by considering the type of employment and firm size, and the educational level of the worker. Following Gasparini and Tornarolli (2009), a worker is informal if (s)he is a salaried employee in a ‘small’ private firm, or an ‘unskilled’ self-employed.<sup>6</sup> Compared to the legalistic definition, this definition focuses more on the characteristics of the firm rather than the coverage of workers by labor laws.

Both definitions give broadly similar measures of the informality rate in Argentina.<sup>7</sup>

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<sup>4</sup>Similar surveys have extensively been used as the main source of data by previous empirical analyses on labor informality. More information of the EPH is in data Appendix A.

<sup>5</sup>The EPH has a 100 percent coverage of only Buenos Aires agglomerate (Capital City and Great Buenos Aires), the main statistical region, which accounts for more than 50 percent of total GDP and around 34 percent of Argentinean population. As a robustness check, I pursued the empirical analysis on Buenos Aires alone with similar results.

<sup>6</sup>Accordingly, a worker is ‘unskilled’ if the educational level is lower than tertiary or superior education. The firm is ‘small’ if it has 5 or fewer employees. The underlined assumption is that most salaried workers in small-size firms operate using primitive and low productive technologies.

<sup>7</sup>Despite depending on the definition the same salaried worker may be classified simultaneously as formal/informal, the overlap between classifications is more than 76 percent.

While we may be interested in analysing the effect of export on labor informality for all the remunerated jobs (i.e. both self-employed and salaried), self-employed workers have different motivations and skills to salaried workers (see, for example, [Perry et al., 2007](#); [Blanchflower and Oswald, 1998](#)). Hence, I focus only on salaried workers abstracting from the decision of working as self-employed (see [Dix-Carneiro and Kovak, 2017](#); [Meghir, Narita and Robin, 2015](#); [Paz, 2014](#); and [Arias et al., 2018](#)). I use the legalistic measure of informality since it is more related to workers' characteristics rather than employer and based on the compliance of employers with local labor regulations. Then, I leave the productive definition for the analysis of robustness of the results to an alternative definition of informality. Still, considering only salaried workers misrepresents remunerated jobs in Argentina.<sup>8</sup> Moreover, we may lose one important dimension of adjustment of the labor market given by the transitions to/from self-employment. To address these potential concerns, I also consider self-employed workers as a robustness analysis, using the productive measure of informality.<sup>9</sup>

In this paper I combine the EPH survey with administrative data of Argentinean manufacturing industries for the period 1997-2001. The time span was selected because of specific features of the Argentinean economy. First, in this period, macroeconomic conditions, in particular exchange rate and inflation, were relatively stable.<sup>10</sup> Second, by 1997, the economy had already mostly adjusted to the trade liberalization process initiated in 1990.<sup>11</sup> This makes it simpler to identify the effect of exports independently of the effect of a particular trade policy. Finally, during this period some Argentinean exports were affected by a negative demand shock, explained by the devaluation of the Brazilian national currency at the beginning of the year 1999. This provides a significant source of variation across industries on the explanatory variable, that is necessary for the proper identification of the effect I want to estimate.

Labor informality in the Argentinean manufacturing sector is 33.3 percent on average for the period 1997-2001.<sup>12</sup> In order to understand the differences in terms of observable

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<sup>8</sup>Self-employment represents 14 percent of manufacturing sector employment, while salaried workers a 79 percent. The remaining 7 percent are employers and workers without a salary. If instead we consider all the sectors of the economy, self-employment constitutes even a higher share (around 21 percent), while for salaried workers it is reduced to 73 percent.

<sup>9</sup>The legalistic measure of informality using the EPH data is only applicable to salaried workers.

<sup>10</sup>I limit the period until 2001, since in January 2002 Argentina has devaluated its currency Peso and has reformed the exchange rate regime that became fully floating.

<sup>11</sup>A gradual trade liberalization process has already begun in 1988 but from 1990 to 1994, Argentina has implemented a broad liberalization process that included a regional trade agreement (i.e. the Mercosur, 'Common Market of the South').

<sup>12</sup>According to the productive measure on salaried workers, informality is around 21.7 percent, while

characteristics between formal and informal salaried workers, I report in Table 1 the main relevant summary statistics of the control variables used for the estimation. This table considers the pooled sample of manufacturing sector workers for the five years of analysis, applying individual sampling weights for the computations. The sample includes 25,793 full-time (i.e. more than 20 hours worked) paid workers, considering the characteristics of the main job. I restrict the analysis only to individuals of working age (i.e. between 15 and 65 years old). Even though the distribution of these two groups overlaps in terms of the observable characteristics, a test of differences in means reveals a significant difference between the means in terms of these variables.

Table 1: DESCRIPTIVE STATISTICS BY INFORMAL EMPLOYMENT STATUS

| Variable             | Formal<br>(1)     | Informal<br>(2)   | Total<br>(3)      | t-stat.<br>(4) |
|----------------------|-------------------|-------------------|-------------------|----------------|
| Male                 | 0.811<br>(0.003)  | 0.650<br>(0.005)  | 0.757<br>(0.003)  | 6.07*          |
| Age                  | 36.98<br>(0.086)  | 32.23<br>(0.138)  | 35.40<br>(0.075)  | 14.64*         |
| Married              | 0.685<br>(0.003)  | 0.488<br>(0.006)  | 0.620<br>(0.003)  | 16.20*         |
| Primary Incomplete   | 0.065<br>(0.002)  | 0.085<br>(0.003)  | 0.072<br>(0.002)  | -3.01*         |
| Primary Complete     | 0.294<br>(0.003)  | 0.336<br>(0.005)  | 0.308<br>(0.003)  | -3.51*         |
| Secondary Incomplete | 0.223<br>(0.003)  | 0.280<br>(0.005)  | 0.242<br>(0.003)  | -6.02*         |
| Secondary Complete   | 0.222<br>(0.003)  | 0.168<br>(0.004)  | 0.204<br>(0.003)  | 7.01*          |
| Higher Incomplete    | 0.117<br>(0.002)  | 0.098<br>(0.003)  | 0.111<br>(0.002)  | 2.78*          |
| Higher Complete      | 0.079<br>(0.002)  | 0.034<br>(0.002)  | 0.064<br>(0.002)  | 6.27*          |
| Head of Household    | 0.631<br>(0.004)  | 0.381<br>(0.005)  | 0.548<br>(0.003)  | 19.87*         |
| Adult-Eq. Income     | 445.08<br>(3.597) | 318.24<br>(3.656) | 402.88<br>(2.733) | 8.89*          |
| Children Under 14    | 1.05<br>(0.009)   | 1.24<br>(0.017)   | 1.11<br>(0.008)   | -5.36*         |
| Observations         | 17,756            | 8,037             | 25,793            |                |

*Note: Columns (1)-(3) report Means, calculated considering the individual sampling weights; Standard Errors in parentheses. Using the Legalistic definition of labor informality (only salaried workers) for the period 1997-2001. Male, married and head of household are indicator variables. Educational level dummies are the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Column (4) reports the t-statistic of the tests of difference in means between formal and informal workers using clustered robust standard error at the 3-digits industry-year level, calculated using the individual sampling weights. Significance level: \*  $p < 0.01$ . Source: Own calculations based on EPH data.*

considering all remunerated jobs it is approximately 33.2 percent.

Regardless of the informality status, most workers in the manufacturing sector are male. Workers informally employed are on average significantly younger than those formally employed. This might indicate a stepping-stone role of informal jobs such that the young decide to enter in the labor market as informal salaried workers and later become formal or self-employed.<sup>13</sup> In addition, informal workers are significantly less skilled than formal ones in terms of their educational level, most of them with completed primary or incompleting secondary education. The higher variability in the educational achievement of formal employees compared to informal ones may reflect the fact that they are employed in all kinds of occupations (including the ones of informal workers), with different education requirements. On the contrary, workers may be hired informally in a limited range of occupations and with lower educational requirements. Moreover, working informally may be a way of complementing household's income. In line with this possibility, we observe that while most formal workers are heads of households, informal workers are not, and adult-equivalent income is significantly lower, on average, for the informal workers. Furthermore, entering informality may be associated to gains in terms of flexibility to attend family life, as highlighted by [Perry et al. \(2007\)](#), for instance. Consistently, a higher proportion of the informal workers are female with more dependent children, on average, than formal workers.

One distinctive feature of the EPH is that it also identifies the task complexity of a worker's main occupation. Considering the job of the worker, this variable is based on typical characteristics of the work process and the actions delegated by this task. Thus, the task complexity variable reflects the characteristics of the job and not of the worker, classifying the complexity of the occupation and not the educational level of the workers. The task complexity measure is disaggregated in four categories, in increasing level of complexity: low-skilled, operative, technical, and professional tasks (see [Appendix A](#) for more details). Based on this classification, I construct an indicator variable of whether the worker is performing a high complexity task (or not). Accordingly, the individual's occupation task is highly complex if it is technical or professional, and lowly complex otherwise. I use this variable to determine how much of the effect of exports on informality is explained by a change in the level of task complexity in workers' occupations.

Another relevant variable for the analysis is the export value, as a share of the gross value of the production (GVP), at the manufacturing industry level. This variable captures the export-intensity of the industries. The *Centro de Estudios para la Producción* (CEP), Ministry of Industry of Argentina, reports official data on the export share by manufacturing

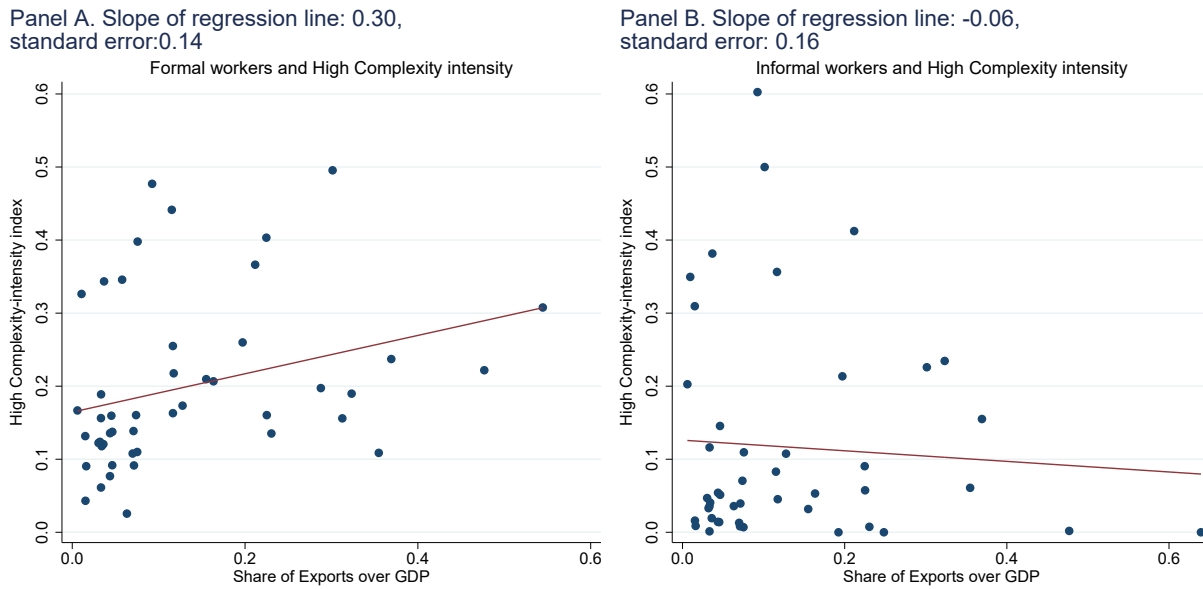
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<sup>13</sup>Transition dynamics of the labor force in [Appendix B.3](#) provide additional evidence of this point.

industry. While this information is measured by quarter, I recalculate it as an annual average measure. The disaggregation of this variable by industry is based on the ISIC (Revision 3) industrial classification, but with a lower level of disaggregation depending on the relevance of each sector to the Argentinean economy.<sup>14</sup>

The panels of Figure 2 plot the high complexity intensity of the task performed in the occupations by formal and informal workers in manufacturing industries as a function of the share of exports over GVP by industry on average over 1997-2001.

Figure 2: AVERAGE TASK COMPLEXITY AND EXPORTS (ACROSS MANUFACTURING INDUSTRIES) BY INFORMALITY STATUS



*Note: Each observation corresponds to a manufacturing industry at 3-digits SIC level. High Complexity Intensity index captures the share of workers performing technical or professional tasks in the manufacturing industry over 1997-2001. Labor informality is based on the Legalistic definition on salaried workers. The solid line is the linear prediction for the High Complexity Intensity index. Source: Own calculations based on Ministry of Industry, and Encuesta Permanente de Hogares (EPH) data of Argentina.*

Informal workers are more represented in occupations characterized by low complexity tasks while formal workers are more commonly employed in occupations of high complexity. Moreover, informal workers are employed in industries with a lower share of exports compared to the formal ones. As we see from the two panels, there is a positive significant correlation

<sup>14</sup>I aggregate some of the sectors of industry in the EPH data following the official classification used by the Ministry of Economics based on ISIC to match the levels of aggregation of exports variable which takes into account the particular characteristics of the industries for the Argentinean economy. Appendix B.1 displays the list of the sectors of industry with a brief characterization.

between the export intensity of manufacturing industries and the share of formal workers employed in high complexity tasks occupations, but this is not the case within the informally employed.

### 3 Estimates of the Impact of Export Intensity on Labor Informality

In this section I explore empirically how the export intensity of the industries affects the informal employment in the manufacturing sector. This allows to infer the degree of substitutability between formal and informal workers in production and how the probability of working informally is affected by the share of exports on total production of the industry.

#### 3.1 Empirical Model

I begin by studying the relationship between exports and labor informality, considering the following regression model for informality:

$$inf_{ijt} = \alpha EXP_{jt} + x'_{it}\beta_1 + \phi_a + \phi_j + \phi_t + \epsilon_{ijt} \quad (1)$$

where  $inf_{ijt}$  is a dummy variable that measures the informality status of individual  $i$  employed in the industry  $j$  at year  $t$ . On the right-hand side, the variable  $EXP_{jt}$  denotes the export intensity of industry  $j$ , measured as the share of exports over its gross value of production (i.e.  $EXP_{jt} = (exports/GVP)_{jt}$ ). Its coefficient captures the effect of interest. I use this variable instead of simply the exports value,  $exports_{jt}$ , since  $EXP_{jt}$  reflects the relevance of the industry's exports on the total production value, capturing a higher variability across industries and years. The vector  $x'_{it}$  is a set of conditioning variables of individual characteristics such as gender, age, educational level, indicator variables for marital status, head of household, as well as household's characteristics such as household income (in equivalent-adult units), and number of children younger than 14 years. Industry level variables are measured at the 3-digits SIC level. Thus, the sample includes employees working in a total of 47 manufacturing industries and spans a period of 5 years (1997-2001).

The regression model also includes agglomerate, 2-digits SIC industry level and year fixed effects ( $\phi_a$ ,  $\phi_j$  and  $\phi_t$ , respectively). I include industry fixed effects to control for the unobserved industry characteristics that are time-invariant that could be correlated with exports and may have an independent effect on the informal employment of the individuals. Year

fixed effects allow me to account for aggregate shocks related to the business cycle or political economy changes linked to the labor market that are common to all the industries and individuals. The random component  $\epsilon_{ijt}$  (the error term) captures the residual determinants of the informality status.<sup>15</sup>

Table 2 reports the Pooled OLS estimates from equation (1) of the effect of the export share on the labor informality status as a benchmark, considering a Linear Probability Model. Standard errors are clustered at the 3-digits industry-year level. These estimates are consistent if the export intensity is independent of the share of informal workers in the industry or depends on time-invariant characteristics of the industry that affect independently the informal share of labor force. The estimates show a negative and strongly significant effect of exports on labor informality. An increase in the export intensity of the manufacturing industry of 10 percentage points reduces the probability of working informally by approximately 3 percentage points. This result is robust to including a set of covariates to control for worker's observable characteristics. Moreover, the conditional effects of the covariates have the expected signs, consistently with the descriptive statistics in Section 2.

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<sup>15</sup>Estimating equation (1) with aggregate data at the industry level would only be appropriate if the individual characteristics were constrained to be equal across industries. This restriction is not plausible since, in particular, informal and formal workers' characteristics are different within and across industries.

Table 2: POOLED OLS ESTIMATES OF THE EFFECTS OF EXPORTS INTENSITY ON LABOR INFORMALITY

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |
|----------------------|--|-----------------------|-----------------------|
|                      | (1)  | (2)                   | (3)                   |
| Exports/GVP          | -0.2889***<br>(0.061)                        | -0.1932***<br>(0.058) | -0.1790***<br>(0.056) |
| Male                 |  | -0.1305***<br>(0.021) | -0.1127***<br>(0.021) |
| Age                  |  | -0.0485***<br>(0.003) | -0.0411***<br>(0.003) |
| Age Sq.              |  | 0.0006***<br>(0.000)  | 0.0005***<br>(0.000)  |
| Married              |  |                       | -0.0540***<br>(0.014) |
| Primary Incomplete   |  |                       | 0.1353***<br>(0.030)  |
| Primary Complete     |  |                       | 0.0884***<br>(0.023)  |
| Secondary Incomplete |  |                       | 0.0717***<br>(0.022)  |
| Secondary Complete   |  |                       | 0.0049<br>(0.020)     |
| Higher Incomplete    |  |                       | 0.0138<br>(0.020)     |
| Head of Household    |  |                       | -0.0693***<br>(0.013) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0261***<br>(0.004)  |
| Observations         | 25,793                                       | 25,793                | 25,793                |
| R-squared            | 0.0897                                       | 0.1574                | 0.1850                |
| Covariates:          |  | ✓                     | ✓                     |
| All covariates:      |  |                       | ✓                     |
| Industry FE          | ✓  | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     |

*Note: The table reports pooled OLS estimates from equation (1), calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared. All covariates includes, in addition, married and head of household indicator variables, educational level dummies, household income per adult-equivalent, and the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*



## 3.2 Identification Strategy

There are many reasons why exports might be endogenous in regression model (1). On the one hand, industries may choose the level of exports and the composition of the labor force simultaneously. For instance, industries with a higher share of informal workers may be less efficient and, consequently, decide to export less. At the same time, increasing the export intensity of the industries may imply a reduction in the informal share of employment to raise the average labor productivity, since formal workers are more skilled. On the other hand, workers sort across industries. Unobservable characteristics of the workers that may make them have higher probability of working formally and, simultaneously, choose to work in ‘more export intensive’ industries, lead to biased estimations. In order to address this endogeneity issue, I use an instrumental variable strategy.

As a source of identification of the effects of exports, I would like to capture global demand shocks to Argentinean industries’ exports. In order to construct a valid instrument, I exploit the exogenous variation of the Argentinean industries’ exports arising from changes in the GDP of the importer countries. Then, I construct an instrumental variable for exports as a country-weighted average of the real income of the import countries that is orthogonal to Argentinean real income, by industry-year. To construct this variable I use two sources of data. Annual real GDP data of the countries of destination of manufacturing industries’ exports is obtained from the *World Development Indicators* (WDI) database. This variable is weighted at industry level by the share of exports to each destination in the bundle of exports of each manufacturing industry in 1997, using data from *UN Comtrade*.

From gravity models we know that the GDP of the trading partner is a relevant variable to determine the trade flows between two countries (see, for instance, [Head and Mayer \(2014\)](#) for a summary of this literature). Moreover, this variable is expected to satisfy the exclusion restriction, a condition necessary for its validity as an instrument. It is difficult to think that the GDP of the countries that import Argentinean manufacturing products affects directly the labor force composition of the exporter industries. Nevertheless, it is possible that some exogenous shocks to the GDP of the importer country affect simultaneously Argentina’s GDP, or that both economies share a common trend. If this is the case, the exclusion restriction may fail to be valid. To account for this potential concern on the validity of the instrument, I consider only the variation on the trend and cyclical components of the GDP of the importer countries of Argentinean manufactures in 1997 (baseline period) that

is orthogonal to Argentina’s GDP.<sup>16</sup> In order to construct this orthogonalised measure of the GDP of the trading partners, I implement a simple econometric procedure to isolate the shocks that consists of two steps:

Comparison between the orthogonalized instrumental variable used in the paper versus the direct instrumental variable that uses the GDP of each importer country without any orthogonalization.

*Step 1:* estimate by OLS the following log-linear trend model for each country of destination of the Argentinean exports,  $c$ , separately,<sup>17</sup>

$$\ln GDP_t^c = \gamma_0^c + \gamma_1^c t + \gamma_2^c \ln GDP_t^{Arg} + \nu_t^c \quad (2)$$

where  $\ln GDP_t^c$  is the natural logarithm of the real GDP of the country  $c$  at year  $t$ ,  $t$  is a linear trend, and  $\ln GDP_t^{Arg}$  is the natural logarithm of Argentina’s real GDP.  $\nu$  is the error term component. From this regression, calculate the predicted trend of each country  $c$  as the sum of the estimated intercept,  $\hat{\gamma}_0^c$ , and  $\hat{\gamma}_1^c t$ . The predicted residual,  $\hat{\nu}_t^c$ , gives us the GDP cyclical component orthogonal to Argentina’s GDP.

*Step 2:* compute the natural logarithm of the GDP of each country  $c$  orthogonal to Argentina’s GDP for the period 1997-2001 as the sum of the predicted trend and cyclical components obtained in Step 1:

$$\ln \hat{GDP}_t^{c,*} = \hat{\gamma}_0^c + \hat{\gamma}_1^c t + \hat{\nu}_t^c \quad (3)$$

Considering this orthogonalized measure of the GDP of the import countries of Argentinean manufactures to Argentina’s GDP, I construct the Exports Destinations’ Real Income by industry-year ( $y_{jt}^*$ ) instrumental variable for the exports intensity,  $EXP_{jt}$ , as:

$$y_{jt}^* \equiv \sum_c \ln \hat{GDP}_t^{c,*} \times \psi_{j,97}^c \quad (4)$$

This instrument is computed as a weighted sum, where the weight is given by  $\psi_{j,97}^c \equiv \frac{expo_{j,97}^c}{expo_{j,97}}$ , which is the share of exports of industry  $j$  to each country over its total exports in 1997 (baseline period). Thus, it takes into account each industry’s exposure to a given economy, determined by the initial share on Argentinean exports of industry  $j$ , providing the source of variability across industries. By fixing the shares at the 1997 year level, this value

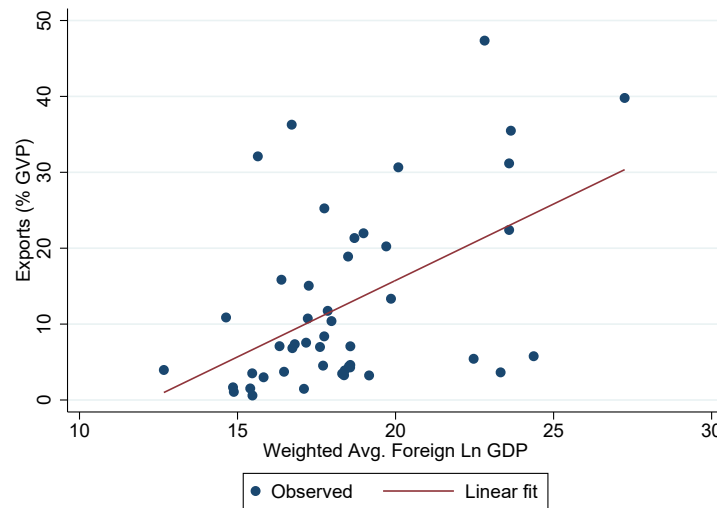
<sup>16</sup> Appendix C.1 provides a sensitivity check by comparing the estimation results that are shown later in Section 3.3 with the estimates using the instrument without any orthogonalization of the GDP.

<sup>17</sup> I only consider the countries that were importing the Argentinean manufacturing products in 1997.

is predetermined. Note that the variation of the instrumental variable is given exclusively by the changes across industries on the GDP of the countries of destination of their exports.

The relevance of this instrument to explain variations in the export intensity can be tested empirically. Figure 3 displays the relationship between the weighted sum of exports destination's GDP and the exports intensity for the manufacturing industries, on average over the period 1997-2001. We observe a strong positive relationship between these two variables. The correlation is 0.43 and statistically significant. However, this evidence is not sufficient to assess the relevance of the instrument.

Figure 3: EXPORTS SHARE OF GVP AND WEIGHTED AVERAGE OF FOREIGN GDP BY MANUFACTURING SECTOR: 1997-2001



Notes: Manufacturing industries are at 3-digits SIC level. Each observation represents the average value of the variables over the period 1997-2001. The weighted average foreign GDP variable is defined by equation (4). Source: Own calculations based on Ministry of Industry of Argentina and WDI data.

Table 3 displays the results of the first stage estimation. The impact of the demand shock (i.e. the changes in destinations' real income) on export intensity is highly significant and has the expected sign. An increase in 1 percent of the weighted foreign GDP increases the export intensity by approximately 3.7 percentage points on average for the manufacturing industries, being statistically significant. Moreover, the F-statistic is larger than the minimum criteria for validity and is well above the critical value for the Stock and Yogo test (10 percent maximal IV size) of 16.38, reflecting that the measure of destinations' real income is a strong instrument. Results are robust to including different sets of control variables, considering an alternative year for the weight to construct the instrumental variable (Appendix C.1), and

alternative measure of informality (Appendix C.2 and C.3).

Table 3: FIRST STAGE: ESTIMATES OF THE EFFECT OF EXPORTS' DESTINATION COUNTRIES GDP ON EXPORTS

| Specifications     | Dependent variable: Export Intensity |                      |                      |
|--------------------|--------------------------------------|----------------------|----------------------|
|                    | (1)                                  | (2)                  | (3)                  |
| Weighted Avg. GDP* | 0.0387***<br>(0.005)                 | 0.0386***<br>(0.005) | 0.0386***<br>(0.005) |
| Observations       | 25,793                               | 25,793               | 25,793               |
| F-statistic        | 63.91                                | 63.48                | 63.76                |
| R-squared          | 0.67                                 | 0.67                 | 0.67                 |
| Covariates:        |                                      | ✓                    | ✓                    |
| All covariates:    |                                      |                      | ✓                    |
| Industry FE        | ✓                                    | ✓                    | ✓                    |
| Year FE            | ✓                                    | ✓                    | ✓                    |
| Agglomerate FE     | ✓                                    | ✓                    | ✓                    |

*Note: The table reports Pooled OLS estimates from equation (1), calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared. All covariates includes, in addition, married and head of household indicator variables, educational level dummies, household income per adult-equivalent, and the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

Using a Linear Probability Model and implementing an instrumental variable strategy, in the next subsection I estimate the effect of exports on the probability of working informally in a manufacturing industry.

### 3.3 IV Estimates

Estimates of the effects of the exports share on labor informality using IV are reported in Table 4. An increase in the export intensity of 10 percentage points reduces the probability of an individual working informally by approximately 2.2 percentage points. This result is highly significant and remains robust across different specifications. Also, the estimated coefficients of control variables have the expected sign, with informality decreasing with age, educational level, among others, and increasing with the number of children younger than 14 years.<sup>18</sup>

<sup>18</sup>Estimation results displaying all the estimates are in Appendix C.1.

Table 4: IV ESTIMATES OF THE EFFECTS OF EXPORTS ON LABOR INFORMALITY

| Specifications  | Dependent variable: Informal Labor Indicator |                       |                       |
|-----------------|--|-----------------------|-----------------------|
|                 | (1)  | (2)                   | (3)                   |
| Exports/GVP     | -0.3691***<br>(0.080)                        | -0.2165***<br>(0.073) | -0.2224***<br>(0.069) |
| Observations    | 25,793                                       | 25,793                | 25,793                |
| R-squared       | 0.090  | 0.157                 | 0.184                 |
| DWH Chi-sq test | 2.309  | 0.218                 | 0.839                 |
| Covariates:     |  | ✓                     | ✓                     |
| All covariates: |  |                       | ✓                     |
| Industry FE     | ✓  | ✓                     | ✓                     |
| Year FE         | ✓  | ✓                     | ✓                     |
| Agglomerate FE  | ✓  | ✓                     | ✓                     |

*Note: The table reports IV estimates from equation (1), calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared. All covariates includes, in addition, married and head of household indicator variables, educational level dummies (measured as the maximum level of education achieved), household income per adult-equivalent, and children under 14 (number of children younger than 14 years in the household). Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

If we compare the estimation results in Table 4 with the Pooled OLS estimates, the estimated coefficients for the effect of exports intensity are not significantly different as indicated by the Durbin-Wu-Hausman test. This evidence provides the intuition that, in fact, the potential endogeneity issues highlighted in Section 3.2 seem not to be a problem here. These results are robust to considering the alternative ‘Productive’ definition of informality (see Appendix C.2). Furthermore, considering all remunerated jobs (i.e. both salaried and self-employed workers) under the productive definition, estimated effects of exports on informality are preserved, even though the magnitudes are significantly larger, as shown in Appendix C.3. This may be related to the fact that self-employed workers have different motivations and skills relative to salaried workers (see, among others, Perry et al., 2007; Blanchflower and Oswald, 1998). Moreover, self-employment may serve as an alternative margin of adjustment of the labor market to adverse shocks for both workers and firms.

The findings in this section show the relevance of the exports intensity to determine the probability of a salaried worker of being informality employed in manufacturing industries. Formalization of informal workers explains the reduction of the informality rate as notice from transition dynamics for the labor force (see Appendix B.3). This is consistent with the findings reported by Paz (2014) and Goldberg and Pavcnik (2003) according to which most

of the informal share variation occurs within manufacturing industries. To provide a deeper understanding of the mechanisms of this effect, in the next section, I explore the channel through which exports affect the informality.

## 4 Exploring the Mechanisms

Empirical evidence in Section 3 gives support to the relevance of exports to determine the share of informal workers in the labor force. In this section, I proceed to analyze the potential mechanisms behind this effect. To this end, I look at two aspects of the phenomenon.

First, I study the impact of the exports on the informality rate by differentiating the effect depending on the income level of the country of destination of the exports. There is evidence that exporting to high-income countries increases firm productivity and requires higher skills compared to exporting to other destinations. If the productivity channel partially explains the effect on the informality rate, exporting to high- or low-income countries should have a similar differential effect on the share of informal workers in an industry. Second, a rise in an industry's productivity may also be associated with increases in the complexity of the task performed in the jobs. Thus, I explore how much of the effect of exports on the informality rate is explained by changes in the average complexity of the tasks.

### 4.1 Distinguishing between Income Groups of Destination Countries

Exports growth may require an increase in productivity that may lead to a drop in the informal composition of the labor force in an industry. [Marin \(1992\)](#), [De Loecker \(2007\)](#), [Park et al. \(2010\)](#), and [Brambilla, Lederman and Porto \(2012\)](#), among others, show that exports to high-income countries increase firm productivity and the average skills requirements. Moreover, a quality-driven demand effect on bilateral trade operates through the relationship between income and the aggregate demand for quality ([Hallak, 2006](#)). Considering these effects, if increasing productivity drives the reduction of the informal composition of the labor force, I should find evidence on two facts. First, increasing exports to high-income destinations should reduce informality. Second, for low-income countries this effect should be significantly smaller.

Distinguishing between exports to high- and low-income destination countries, I explore the effects of exports intensity on the probability of working informally in manufacturing

industries. Thus, I estimate the following regression model for informality:

$$inf_{ijt} = \alpha_1 EXP_{jt}^{LI} + \alpha_2 EXP_{jt}^{HI} + x'_{it}\beta_1 + \phi_a + \phi_j + \phi_t + \epsilon_{ijt} \quad (5)$$

where,  $EXP_{jt}^{LI}$  denotes the export intensity of the industry  $j$  measured as the share of exports to low-income countries (LI) over its gross value of production (i.e.  $EXP_{jt}^{LI} = (expLI/GVP)_{jt}$ ) and, analogously, for high-income (HI) export intensity,  $EXP_{jt}^{HI}$ . Income Groups are classified according to World Bank Analytical classification: High Income Group (High and Upper Middle Income countries) and Low Income Group (Low and Lower Middle Income countries), that is calculated based on the GNI per capita in US\$ (Atlas Methodology). This is an adaptation of regression model (1), in which  $x'_{it}$  is the same vector of individual characteristics, and  $\epsilon_{ijt}$  is the disturbance term.

Given the potential endogeneity concerns in the estimation of equation (5), I follow an instrumental variable strategy to estimate the effect of the export variables on the informality rate in manufacturing industries. An advantage of the Destination countries' GDP instrument of Section 3.2 is that I can simply split it as a weighted average of the natural logarithm of high- and low-income destinations' GDP. Hence, I obtain an instrument for each export variable, such that  $y_{jt}^{IG,*} \equiv \sum_{c \in IG} \ln \hat{GDP}_t^{c,*} \times \psi_{j,97}^c$ , with  $IG = \{HI, LI\}$ . Estimation results on the coefficient of the informal labor indicator are in Table 5. First stage estimates are in Appendix C.1. The impact of the demand shocks (destinations' real incomes) on export intensity is highly significant and has the expected sign for high- and low-income instruments. The F-statistics are larger than the minimum criteria for validity and are well above the critical value for the Stock and Yogo test (10% maximal IV size), reflecting that the two measures of destinations' real income are strong instruments. Moreover, these results are robust to including different sets of control variables.

When exports are to high-income countries, their negative effect on labor informality is much higher than without differentiating by the income-group. An increase in export intensity to high-income destinations by 10 percentage points, decreases the probability of working informally in the manufacturing industries by around 5 percentage points. In the case of exports to low-income countries, the effect has the opposite sign, but it is not significant.<sup>19</sup> A possible explanation for this may be that the lower quality requirements in the manufacturing products imported by these countries may generate more competition in terms of prices. Therefore, in order to reduce costs, industries may increase the informal

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<sup>19</sup>Note that I obtain consistent estimation results of changes in labor productivity using the same identification strategy for estimating the effect of exports to high-/low-income destinations on the natural logarithm of the hourly wage. The complete second stage estimation results can be found in the Appendix C.1.

composition of the labor force. To sum up, only increasing exports to high-income countries reduces the share of informal workers in the manufacturing industries. This evidence is consistent with the idea that the reduction in informality rates comes through an increase in the productivity of the industry driven by an increase in exports.

Table 5: IV ESTIMATES OF THE EFFECTS OF EXPORTS INTENSITY BY INCOME GROUP ON LABOR INFORMALITY

| Specifications       | Dependent variable: Informal Labor Indicator |                      |                      |
|----------------------|--|----------------------|----------------------|
|                      | (1)  | (2)                  | (3)                  |
| ExpoLI/GVP           | 1.1588*<br>(0.698)                           | 0.7343<br>(0.560)    | 0.4614<br>(0.522)    |
| ExpoHI/GVP           | -0.9207***<br>(0.291)                        | -0.5444**<br>(0.243) | -0.4485**<br>(0.226) |
| <i>First Stages:</i> |  |                      |                      |
| F-Statistic HI       | 23.93  | 23.62                | 23.75                |
| F-Statistic LI       | 22.95  | 23.02                | 23.04                |
| Observations         | 25,793                                       | 25,793               | 25,793               |
| R-squared            | 0.086  | 0.156                | 0.184                |
| DWH Chi-sq test      | 4.997  | 2.025                | 1.918                |
| Covariates:          |  | ✓                    | ✓                    |
| All covariates:      |  |                      | ✓                    |
| Industry FE          | ✓  | ✓                    | ✓                    |
| Year FE              | ✓  | ✓                    | ✓                    |
| Agglom. FE           | ✓  | ✓                    | ✓                    |

*Note: The table reports IV estimates from equation (5) of export intensity to high(HI)- and low(LI)-income destinations, considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared. All covariates includes, in addition, married and head of household indicator variables, educational level dummies, household income per adult-equivalent, and the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

## 4.2 Task Complexity

In previous sections I have shown that export intensity has a negative effect on labor informality. This is partially explained by the variations on industries' productivity generated by the changes in their export intensity. A possible way of increasing labor productivity is via a rise in the complexity of the tasks performed in the jobs. Exposure to advanced technologies from importing countries may increase task complexity and, thus, the demand for skilled labor. In this section, I show how changes in the task complexity of the jobs explain the effect of the export intensity on the informality rate.

To estimate the effect of exports on the manufacturing industry's share of informal work-



ers that is due to changes in the task complexity of the jobs, I consider the following regression model:

$$EXP_{jt} = \beta_1^1 y_{jt}^* + \beta_2^1 x'_{ijt} + \phi_a + \phi_j + \phi_t + \eta_{jt}^1 \quad (6)$$

$$HCT_{ijt} = \beta_1^2 \hat{X}P_{jt} + \beta_2^2 x'_{ijt} + \phi_a + \phi_j + \phi_t + \eta_{ijt}^2 \quad (7)$$

$$Inf_{ijt} = \beta_1^3 \hat{H}CT_{ijt} + \beta_2^3 x'_{ijt} + \phi_a + \phi_j + \phi_t + \eta_{ijt}^3 \quad (8)$$

where  $y_{jt}^*$  is the Destination countries' real GDP instrumental variable,  $HCT_{ijt}$  is a dummy variable that indicates whether the task performed in the job by worker  $i$  employed in industry  $j$  at year  $t$  is of high-complexity. A task is of high(low)-complexity if it is technical or professional (operative or low-skilled) (see Section 2). The model also includes agglomerate, 2-digits SIC industry level and year fixed effects,  $\phi_a$ ,  $\phi_j$  and  $\phi_t$ , respectively.  $\eta_{ijt}$  are the random error components. Alternatively, I can add  $EXP_{jt}$  variable and its interaction with  $HCT_{ijt}$  to equation (8) to estimate the direct and indirect effect effect of exports on labor informality. However, this is not feasible without using additional instruments.

I estimate the regression model in three stages. First, equation (7) is estimated by 2SLS, where equation (6) is the first stage. The third stage is given by the estimation of equation (8) with standard errors calculated by bootstrap method. Results of second and third stages are in Table 6.

The negative effect that the export intensity of the industries has on the informality rate is partially explained by an increase in the complexity of the tasks performed in the jobs. An increase in the export intensity of the manufacturing industries of 10 percentage points reduces the share of informal workers by 1.7 percentage points, on average.<sup>20</sup> Hence, the effect of exports on the informality rate is largely explained by an increase in the task complexity of the jobs performed by the workers, which represents 79 percent of the total effect.

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<sup>20</sup>The estimated coefficients of equation (8) are significantly different than Pooled OLS estimates as indicated by the Durbin-Wu-Hausman test.

Table 6: ESTIMATES OF THE EFFECTS OF EXPORTS INTENSITY ON LABOR INFORMALITY

| Specifications         | High-Task's Complexity<br>( <i>Second Stage</i> ) |                      |                      | Informal Labor Indicator<br>( <i>Third Stage</i> ) |                      |                      |
|------------------------|---|----------------------|----------------------|--|----------------------|----------------------|
|                        | (1)   | (2)                  | (3)                  | (4)  | (5)                  | (6)                  |
| Exports/GVP            | 0.1747***<br>(0.053)                              | 0.1380***<br>(0.053) | 0.1431***<br>(0.039) |  |                      |                      |
| High-Task's Complexity |   |                      |                      | -1.648***<br>(0.376)                               | -1.393***<br>(0.456) | -1.244***<br>(0.417) |
| Observations           | 25,758  | 25,758               | 25,758               | 25,758   | 25,758               | 25,758               |
| F-statistic            | 27.50   | 30.05                | 74.14                |  |                      |                      |
| R-squared              |   |                      |                      | 0.09   | 0.16                 | 0.18                 |
| DWH Chi-sq test        | 0.56  | 1.09                 | 0.35                 | 10.27  | 5.94                 | 6.23                 |
| Covariates             |   | ✓                    | ✓                    |  | ✓                    | ✓                    |
| All covariates         |   |                      | ✓                    |  |                      | ✓                    |
| Industry FE            | ✓   | ✓                    | ✓                    | ✓  | ✓                    | ✓                    |
| Year FE                | ✓   | ✓                    | ✓                    | ✓  | ✓                    | ✓                    |
| Agglomerate FE         | ✓   | ✓                    | ✓                    | ✓  | ✓                    | ✓                    |

*Note: The table reports 3SLS estimates from equations (6)-(8), calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared. All covariates includes, in addition, married and head of household indicator variables, educational level dummies, household income per adult-equivalent, and the number of children younger than 14 years in the household. Robust Standard Errors of second stage and Bootstrap Standard Errors of third stage in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

## 5 Conclusions

Exports may have significant effects in local labor markets and, in particular, in the share of informal workers in an industry. Using data from Argentinean workers in the manufacturing industries from 1997 to 2001, I have analysed the reaction of the labor market in terms of informality as a response to demand shocks on exports.

I have found empirical evidence that exports intensity negatively affects the probability of working informally in the manufacturing industries. The observed effect on informality is mostly explained by the transition of informal workers to formal employment within the manufacturing sector. While price competition may induce to hire informal workers to reduce costs, higher quality requirements in exports may require to hire more formal workers, that are more skilled, and to induce an increase in the productivity of the industries. I have shown that export intensity reduces labor informality and that the net effect is explained by exporting to high-income countries. Exporting to high-income destinations increases firm productivity and average skill requirements in production, which may explain the increase

in the formal share of the labor force. I have also provided evidence that this effect is largely explained by an increase in task complexity of the jobs, which might indicate changes in the productivity of the industries.

To conclude, the empirical evidence suggests that export intensity is an important determinant on informality. Changes in labor productivity largely explain the role of exports to affect informal employment in manufacturing sector. Nevertheless, not all kind of exports are equally relevant to reduce informal employment. This is an important factor that should be considered when designing policies in order to increase exports and/or to contribute to the reduction of informality.

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## Appendix

### A *Encuesta Permanente de Hogares* (EPH)

The *Encuesta Permanente de Hogares* (EPH - Permanent Household Survey) is the main household and labor force micro-level survey in Argentina, carried on by the *Instituto Nacional de Estadística y Censos* (INDEC) (see <https://www.indec.gob.ar/>). The EPH includes an specific survey on labor market variables according to international standards. It covers great urban agglomerates (more than 100,000 inhabitants) and has an approximate coverage of more than 70 percent of urban population. Since the share of urban areas in Argentina is around 87 percent, the sample of the EPH represents approximately 62 percent of total population of the country. Note that since the survey considers only urban areas, it has a low coverage of employment in agricultural sector. The survey is conducted twice a year (May and October) with a 25 percent rotation of the panel. During 2003 a major methodological change was implemented, including changes in the questionnaires and the frequency of the survey visits.

The EPH gathers information on individual socio-demographic characteristics, employment status, hours of work, wages, income, type of job, education, and migration status. It includes the following main labour related characteristics: employment, unemployment, underemployment, hours of work, wages, employment related benefits, informal employment, social security coverage, absence from work, as well as other labour related characteristics such as industry, occupation, status in employment, institutional sector (public/private), size of establishment, full time/part time status, permanency of the job, type of workplace, duration of employment, existence of more than one job, duration of unemployment, previous working experience, characteristics of the last job, search for another job, receipt of unemployment benefits, reasons for not being in the labour force. In particular, salaried workers are asked to self-declare if they count with different social security benefits (such as retirement pension, health insurance, paid vacations, indemnification, among others). The specific question used to identify the informality status is: ‘In your main occupation, do you have the right to receive a pension when retired?’. If she does, we classify the individual as working formally; otherwise, informally. Nevertheless, this survey does not provide information on the compliance of tributary and social security norms of self-employees.

The labor force survey is considered official for employment and unemployment. Thus, this survey is particularly useful for the analysis given that not only includes individual and firm level variables that allows to classify the individuals as working in a formal/informal job, but also provides information on the sector of employment of the individuals. Worker activity’s sector is registered following the *International Standard Industrial Classification*(ISIC), Revision 3, at the level of aggregation of 3 digits. We focus on the manufacturing sector that accounts for more than 70 percent (on average) of total exports for the period 1997-2001.

### ***Task Complexity Classification***

The EPH includes the question ‘what is the name of your occupation and which task is performed in this occupation?’ (variable P20). A new variable is constructed, based on this question, that classifies the task of the worker according to the *Clasificador Nacional de Ocupaciones INDEC* (National Classification of Occupations, CNO’91). Thus, we are not able to reconstruct any other measure of task complexity based on this classification since it does not provide the information regarding the occupation and task of the individual. This variable is conformed by three digits, considering the following dimensions of the occupational structure: general character, complexity, technology and hierarchy within the labor process.

I only consider the complexity of the task, that consists on an objective characteristic

of the work process that measures the complexity of the action delegated by it. This task complexity measure is disaggregated in four categories:

- *Low-skilled Tasks*: includes those occupations in which the task performed are of low diversity, using simple objects and instruments or, in many cases, the own body of the worker. These occupations do not require previous abilities or knowledge for their execution, except for some brief instructions at the beginning.
- *Operative Tasks*: are those in which the tasks involves certain frequency and variety that require attention, speed and manipulative skills as well as some specific knowledge of the properties of the objects and instruments used. These occupations require specific knowledge and abilities acquired by previous training and/or work experience.
- *Technical Tasks*: comprises those occupation in which, in general, the worker performs multiple and diverse tasks with a changing sequence, that require at the same time manipulative skills and theoretical specific knowledge on the properties and characteristics of the objects and instruments used at work and the specific rules of the involved processes. These occupations require specific knowledge and abilities acquired by previous formal training and/or equivalent work experience.
- *Professional Tasks*: are those in which the worker performs multiple and diverse tasks with a changing sequence, that require general and specific theoretical knowledge on the properties and characteristics of the objects and instruments used at work, and of the rules and laws that regulate the processes. These occupations require knowledge acquired by specific formal training and equivalent work experience.

## B Supplementary Analysis

### B.1 Manufacturing Industries in Argentina

Table 7: DESCRIPTION OF MANUFACTURING INDUSTRIES

| Industry | Description   | % of Man-<br>ufacturing<br>GDP | % of Man-<br>ufacturing<br>Exports | Informality<br>Rate |
|----------|---|--------------------------------|------------------------------------|---------------------|
| 151      | <i>Food (including meat, fish, fruits, pulses, vegetables, oils and fats)</i> | 12.61                          | 29.21                              | 30.88               |

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Table 7 – Continued from previous page

| Industry | Description  | % of Manufacturing GDP | % of Manufacturing Exports | Informality Rate |
|----------|--|------------------------|----------------------------|------------------|
| 152      | <i>Manufacture of Dairy Products</i>   | 3.35                   | 1.96                       | 23.62            |
| 153      | <i>Milling of wheat, pulses and cereals. Preparation of rice, animal food and starch</i>     | 1.75                   | 2.35                       | 21.21            |
| 154      | <i>Bakery products, sugar, chocolate, fresh and dried pasta, coffee, tea, mat and spices</i> | 5.73                   | 2.27                       | 35.73            |
| 155      | <i>Manufacture of soft drinks, wine, beer, mineral water, fruit juices and spirits</i>       | 4.32                   | 1.78                       | 24.69            |
| 160      | <i>Preparation of tobacco sheets, cigarettes and loose tobacco for pipes</i>                 | 2.13                   | 0.16                       | 2.89             |
| 171      | <i>Manufacture of yarn and fabrics, finishing of textiles</i>                                | 2.03                   | 1.06                       | 20.48            |
| 172      | <i>Manufacture of bedding, towels, linens and carpets, ropes and nets</i>                    | 0.95                   | 0.47                       | 51.50            |
| 173      | <i>Manufacture of knitted and crocheted items</i>  | 0.69                   | 0.12                       | 46.51            |
| 18A      | <i>Manufacture of garments and leather goods</i>   | 2.54                   | 0.73                       | 59.32            |
| 191      | <i>Tanning and leather finishing and manufacture of saddlery and leather goods</i>           | 1.45                   | 5.72                       | 37.17            |
| 192      | <i>Manufacture of footwear and parts</i>   | 1.10                   | 0.39                       | 51.76            |
| 20A      | <i>Manufacture of wood and its products (except for furniture), cork and straw goods</i>     | 1.98                   | 0.46                       | 55.31            |
| 210      | <i>Manufacture of paper and paper products</i>   | 2.80                   | 1.63                       | 12.97            |
| 221      | <i>Edition of booklets, books, newspapers and production of records, CDs, etc.</i>           | 2.01                   | 0.64                       | 33.19            |
| 222      | <i>Printing and related services</i>   | 2.11                   | 0.08                       | 40.37            |
| 23A      | <i>Manufacture of coke (fuel) ovens</i>  | 0.04                   | 0.03                       | 0.00             |
| 232      | <i>Production of liquid and gaseous fuels, and lubricant greases</i>                         | 8.71                   | 5.02                       | 3.49             |
| 241      | <i>Manufacture of basic chemicals, except fertilizers</i>                                    | 2.73                   | 6.27                       | 5.72             |
| 242      | <i>Manufacture of chemicals</i>  | 7.70                   | 4.12                       | 33.96            |

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Table 7 – Continued from previous page

| Industry | Description  | % of Manufacturing GDP | % of Manufacturing Exports | Informality Rate |
|----------|--|------------------------|----------------------------|------------------|
| 243      | <i>Manufacture of man-made fibers (artificial and synthetic)</i>   | 0.30                   | 0.59                       | 0.00             |
| 251      | <i>Rubber products</i>   | 0.79                   | 0.71                       | 34.61            |
| 252      | <i>Manufacture of plastic products</i>   | 3.94                   | 0.96                       | 31.43            |
| 261      | <i>Manufacture of glass and glass products</i>   | 0.38                   | 0.28                       | 6.83             |
| 269      | <i>Manufacture of non-metallic mineral products</i>  | 2.01                   | 0.51                       | 32.82            |
| 271      | <i>Iron and steel products</i>   | 3.10                   | 5.94                       | 21.99            |
| 272      | <i>Products of nonferrous metals</i>   | 0.79                   | 1.72                       | 0.00             |
| 281      | <i>Manufacture of metal products for structural uses, tanks, reservoirs and steam generators</i>                       | 0.86                   | 0.24                       | 37.88            |
| 289      | <i>Process of finishing metal surfaces</i>   | 2.46                   | 0.82                       | 31.30            |
| 291      | <i>Manufacture of general purpose machinery</i>  | 1.68                   | 2.28                       | 22.35            |
| 292      | <i>Manufacture of special purpose machinery</i>  | 1.41                   | 0.86                       | 6.11             |
| 293      | <i>Manufacture of stoves, water heaters, electrical appliances and other household goods</i>                           | 0.95                   | 0.10                       | 12.21            |
| 300      | <i>Manufacture of office, accounting and computing machinery</i>   | 0.10                   | 0.19                       | 10.78            |
| 31A      | <i>Manufacture of motors; electrical generators and transformers; and electricity control and distribution devices</i> | 0.52                   | 0.48                       | 13.35            |
| 31B      | <i>Manufacture of accumulators, batteries, electric lamps and lighting equipment</i>                                   | 0.52                   | 0.52                       | 27.88            |
| 313      | <i>Manufacture of insulated wire and cables</i>  | 0.32                   | 0.16                       | 1.33             |
| 32A      | <i>Manufacture of tubes, valves and other electronic components; radio and TV transmitters and telephone apparatus</i> | 0.31                   | 0.17                       | 75.09            |
| 323      | <i>Manufacture of TV and radio receivers, video &amp; sound players and recorders</i>                                  | 0.64                   | 0.17                       | 32.85            |
| 33A      | <i>Medical, optical and precision instruments, watches</i>   | 0.32                   | 0.45                       | 36.10            |

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Table 7 – Continued from previous page

| Industry     | Description  | % of Manufacturing GDP | % of Manufacturing Exports | Informality Rate |
|--------------|--|------------------------|----------------------------|------------------|
| 341          | <i>Manufacture of motor vehicles</i>   | 4.44                   | 13.51                      | 6.33             |
| 342          | <i>Manufacture of bodies-work for motor vehicles, trailers and semitrailers</i>                          | 0.63                   | 0.05                       | 18.07            |
| 343          | <i>Manufacture of parts and accessories for motor vehicles and their engines</i>                         | 2.13                   | 2.87                       | 16.67            |
| 35A          | <i>Manufacture of locomotives and rolling stock for railways and trams, and aircraft manufacturing</i>   | 0.26                   | 0.21                       | 1.59             |
| 351          | <i>Building and repairing of ships and boats</i>   | 0.15                   | 0.40                       | 6.91             |
| 359          | <i>Manufacture of motorcycles, bicycles, wheelchairs and braces</i>                                      | 0.16                   | 0.03                       | 65.36            |
| 361          | <i>Manufacture of furniture, beds and mattresses</i>   | 2.16                   | 0.62                       | 61.24            |
| 369          | <i>Jewelery, musical instruments, sporting goods, toys and games, and other manufacturing industries</i> | 0.62                   | 0.20                       | 59.97            |
| <b>Total</b> |  | <b>100.00</b>          | <b>100.00</b>              | <b>33.14</b>     |

Note: Shares computed using data corresponding to year 1998. Informality is defined using the legalistic definition. Source: Ministry of Industry and own calculations based on EPH data.

## B.2 Labor Force Characteristics by Informality Status in Argentina

Table 8: DESCRIPTIVE STATISTICS

|                               | Mean   | S.D.   | Min | Max    |
|-------------------------------|--------|--------|-----|--------|
| <i>Formal</i> (Obs.: 17,756)  |        |        |     |        |
| Male                          | 0.81   | 0.39   | 0   | 1      |
| Age                           | 36.98  | 11.50  | 16  | 65     |
| Married                       | 0.69   | 0.46   | 0   | 1      |
| Primary Incomplete            | 0.07   | 0.25   | 0   | 1      |
| Primary Complete              | 0.29   | 0.46   | 0   | 1      |
| Secondary Incomplete          | 0.22   | 0.42   | 0   | 1      |
| Secondary Complete            | 0.22   | 0.42   | 0   | 1      |
| Higher Incomplete             | 0.12   | 0.32   | 0   | 1      |
| Higher Complete               | 0.08   | 0.27   | 0   | 1      |
| Head of Household             | 0.63   | 0.48   | 0   | 1      |
| Adult-Eq. Income              | 445.08 | 479.34 | 3   | 11,000 |
| Children Under 14             | 1.05   | 1.25   | 0   | 13     |
| <i>Informal</i> (Obs.: 8,037) |        |        |     |        |
| Male                          | 0.65   | 0.48   | 0   | 1      |
| Age                           | 32.23  | 12.36  | 15  | 65     |
| Married                       | 0.49   | 0.50   | 0   | 1      |
| Primary Incomplete            | 0.09   | 0.28   | 0   | 1      |
| Primary Complete              | 0.34   | 0.47   | 0   | 1      |
| Secondary Incomplete          | 0.28   | 0.45   | 0   | 1      |
| Secondary Complete            | 0.17   | 0.37   | 0   | 1      |
| Higher Incomplete             | 0.10   | 0.30   | 0   | 1      |
| Higher Complete               | 0.03   | 0.18   | 0   | 1      |
| Head of Household             | 0.38   | 0.49   | 0   | 1      |
| Adult-Eq. Income              | 318.24 | 327.77 | 3   | 6,981  |
| Children Under 14             | 1.24   | 1.49   | 0   | 13     |
| <i>Total</i> (Obs.: 25,793)   |        |        |     |        |
| Male                          | 0.76   | 0.43   | 0   | 1      |
| Age                           | 35.40  | 12.01  | 15  | 65     |
| Married                       | 0.62   | 0.49   | 0   | 1      |
| Primary Incomplete            | 0.07   | 0.26   | 0   | 1      |
| Primary Complete              | 0.31   | 0.46   | 0   | 1      |
| Secondary Incomplete          | 0.24   | 0.43   | 0   | 1      |
| Secondary Complete            | 0.20   | 0.40   | 0   | 1      |
| Higher Incomplete             | 0.11   | 0.31   | 0   | 1      |
| Higher Complete               | 0.06   | 0.24   | 0   | 1      |
| Head of Household             | 0.55   | 0.50   | 0   | 1      |
| Adult-Eq. Income              | 402.88 | 438.90 | 3   | 11,000 |
| Children Under 14             | 1.11   | 1.34   | 0   | 13     |

*Note: Averages are calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. Male, married and head of household are indicator variables. Educational level measures the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Source: Own calculations based on EPH data.*

### B.3 Employment Dynamics in Manufacturing Sector

The analysis in Section 3 allows to understand and quantify the relevance of exports to determine the formal/informal composition of the labor force in the manufacturing sector. However, it does not show if the shrink in informality when increasing exports is associated to a transition of informal workers towards formality within the manufacturing sector or due to a change in the extensive margin.

To investigate these dynamics, I exploit the rotative panel structure of the EPH dataset, one of the few surveys in Latin America that enables to follow an individual across four consecutive waves (May and October, for two years). Given that I want to evaluate one-year change in employment status to address potential concerns in terms of seasonal effects, I focus on the changes across May waves. For simplicity, I only keep individuals active in both years. Table 9 displays the transition outflows from formal/informal salaried employment in manufacturing and non-manufacturing sectors, self-employment and unemployment for Argentina during the period 1997-2001.

Table 9: SECTOR TRANSITION DYNAMICS

| From\To       |                   | Unemployed      | Salaried Manuf. |                 | Salaried Non-Manuf. |                 | Self-employed   | Total |
|---------------|-------------------|-----------------|-----------------|-----------------|---------------------|-----------------|-----------------|-------|
|               |                   |                 | Informal        | Formal          | Informal            | Formal          |                 |       |
| Unemployed    |                   | 42.72<br>(0.97) | 4.33<br>(0.41)  | 2.12<br>(0.30)  | 23.89<br>(0.82)     | 10.92<br>(0.61) | 16.02<br>(0.69) | 100   |
| Salaried      | Informal          | 14.97<br>(1.41) | 40.76<br>(1.96) | 13.11<br>(1.29) | 13.88<br>(1.35)     | 5.70<br>(0.91)  | 11.58<br>(1.24) | 100   |
|               | Manuf. Formal     | 6.76<br>(0.64)  | 3.36<br>(0.45)  | 73.18<br>(1.11) | 2.81<br>(0.40)      | 11.09<br>(0.78) | 2.79<br>(0.39)  | 100   |
| Salaried      | Informal          | 13.41<br>(0.54) | 3.21<br>(0.30)  | 1.49<br>(0.20)  | 50.86<br>(0.79)     | 15.54<br>(0.56) | 15.50<br>(0.57) | 100   |
|               | Non-Manuf. Formal | 4.32<br>(0.24)  | 0.41<br>(0.07)  | 2.46<br>(0.19)  | 6.56<br>(0.28)      | 83.21<br>(0.43) | 3.05<br>(0.19)  | 100   |
| Self-employed |                   | 10.40<br>(0.48) | 2.17<br>(0.25)  | 0.95<br>(0.16)  | 14.97<br>(0.56)     | 5.33<br>(0.34)  | 66.18<br>(0.74) | 100   |
| Total         |                   | 12.88<br>(0.24) | 3.44<br>(0.14)  | 8.29<br>(0.20)  | 18.81<br>(0.27)     | 37.43<br>(0.33) | 19.15<br>(0.27) | 100   |

*Note: The table reports the transition probabilities for the different employment sectors in Argentinean labor market. Panel sample is constructed based on EPH data (1997-2001) for waves of May, calculated considering the individual sampling weights. Labor informality is based on Legalistic definition considering only salaried workers. Standard Errors in parentheses.*

Around 28 percent of unemployed are absorbed by the salaried informal sector (in manufacturing and non-manufacturing sectors). One possible interpretation is that the informal sector serves, in most of the cases, as a stepping-stone into employment. However, the informally employed workers are also the main group moving to unemployment, specially within the non-manufacturing sector, which reflects the instability of these job positions. Similar dynamics are observed for the self-employed workers, that absorb 16 percent of the unemployed and represent 15 percent of the transitions to unemployment sector.

While salaried workers in the manufacturing sector (both formal and informal) mostly stay in the same sector, there is a high probability of moving to the non-manufacturing sector (around

15 percent), usually preserving their formal or informal status. Nevertheless, the transitions from non-manufacturing industries to manufacturing ones is less frequent within the salaried employees (lower than 4 percent). Overall, these findings suggest that an increase in the share of formal workers in the manufacturing sector does not reflect a reshuffle of the formal salaried workers from other sectors but is associated with a reallocation of workers within the manufacturing industries. Moreover, there is a significant probability of transition towards formality within both sectors of industry (i.e. manufacturing and non-manufacturing sectors). This formalization probability within the manufacturing sector is consistent with the findings reported by Paz (2014) and Goldberg and Pavcnik, 2003 according to which most of the informal share variation occurs within manufacturing industries. This could be associated to sector-specific skill requirements or work experience that would prevent mobility across sectors as shown by Dix-Carneiro (2014) and Neal (1995). Thus, the dynamics of salaried workers is consistent with a stepping-stone to formal jobs from working informally in manufacturing industries as reported previously by Cunningham and Bustos Salvagno (2011), and Bosch and Maloney (2010), for instance, for a set of countries in Latin America, including Argentina).



## C Estimation Results Considering the Legalistic and Productive Definitions of Informal Labor.

### C.1 Estimation Results Considering the Legalistic Definition of Informality for Salaried Workers.

Table 10: FIRST STAGE: ESTIMATES OF THE EFFECT OF EXPORTS' DESTINATION COUNTRIES GDP ON EXPORTS

| Specifications       | Dependent variable: Export Intensity |                       |                       |
|----------------------|--------------------------------------|-----------------------|-----------------------|
|                      | (1)                                  | (2)                   | (3)                   |
| Weighted Avg. GDP*   | 0.0387***<br>(0.005)                 | 0.0386***<br>(0.005)  | 0.0386***<br>(0.005)  |
| Male                 |                                      | 0.0006<br>(0.002)     | 0.0005<br>(0.002)     |
| Age                  |                                      | 0.0007**<br>(0.000)   | 0.0007*<br>(0.000)    |
| Age Sq.              |                                      | -0.0007*<br>(0.000)   | -0.0007<br>(0.000)    |
| Married              |                                      |                       | -0.0030*<br>(0.002)   |
| Primary Incomplete   |                                      |                       | -0.0036<br>(0.004)    |
| Primary Complete     |                                      |                       | -0.0104***<br>(0.004) |
| Secondary Incomplete |                                      |                       | -0.0081**<br>(0.004)  |
| Secondary Complete   |                                      |                       | -0.0055<br>(0.004)    |
| Higher Incomplete    |                                      |                       | 0.0001<br>(0.004)     |
| Head of Household    |                                      |                       | 0.0033*<br>(0.002)    |
| Adult-Eq. Income     |                                      |                       | 0.0000<br>(0.000)     |
| Children Under 14    |                                      |                       | 0.0002<br>(0.000)     |
| Constant             | -0.8104***<br>(0.120)                | -0.8229***<br>(0.119) | -0.8154***<br>(0.119) |
| Observations         | 25,793                               | 25,793                | 25,793                |
| F-statistic          | 63.91                                | 63.48                 | 63.76                 |
| R-squared            | 0.67                                 | 0.67                  | 0.67                  |
| Industry FE          | ✓                                    | ✓                     | ✓                     |
| Year FE              | ✓                                    | ✓                     | ✓                     |
| Agglomerate FE       | ✓                                    | ✓                     | ✓                     |

*Note: The table reports the Pooled OLS estimates, considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicators, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*



Table 11: POOLED OLS AND IV ESTIMATES OF THE EFFECTS OF EXPORTS ON LABOR INFORMALITY

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |                       |                       |                       |
|----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | Pooled OLS                                   |                       |                       | IV                    |                       |                       |
|                      | (1)  | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
| Exports/GVP          | -0.2889***<br>(0.061)                        | -0.1932***<br>(0.058) | -0.1790***<br>(0.056) | -0.3691***<br>(0.080) | -0.2165***<br>(0.073) | -0.2224***<br>(0.069) |
| Male                 |  | -0.1305***<br>(0.021) | -0.1127***<br>(0.021) |                       | -0.1303***<br>(0.021) | -0.1124***<br>(0.021) |
| Age                  |  | -0.0485***<br>(0.003) | -0.0411***<br>(0.003) |                       | -0.0485***<br>(0.003) | -0.0410***<br>(0.003) |
| Age Sq.              |  | 0.0006***<br>(0.000)  | 0.0005***<br>(0.000)  |                       | 0.0006***<br>(0.000)  | 0.0005***<br>(0.000)  |
| Married              |  |                       | -0.0540***<br>(0.014) |                       |                       | -0.0540***<br>(0.014) |
| Primary Incomplete   |  |                       | 0.1353***<br>(0.030)  |                       |                       | 0.1357***<br>(0.030)  |
| Primary Complete     |  |                       | 0.0884***<br>(0.023)  |                       |                       | 0.0880***<br>(0.023)  |
| Secondary Incomplete |  |                       | 0.0717***<br>(0.022)  |                       |                       | 0.0713***<br>(0.022)  |
| Secondary Complete   |  |                       | 0.0049<br>(0.020)     |                       |                       | 0.0046<br>(0.020)     |
| Higher Incomplete    |  |                       | 0.0138<br>(0.020)     |                       |                       | 0.0136<br>(0.020)     |
| Head of Household    |  |                       | -0.0693***<br>(0.013) |                       |                       | -0.0691***<br>(0.013) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |                       |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0261***<br>(0.004)  |                       |                       | 0.0261***<br>(0.004)  |
| Constant             | 0.4951***<br>(0.046)                         | 1.5588***<br>(0.079)  | 1.3753***<br>(0.085)  | 0.5683***<br>(0.046)  | 1.5851***<br>(0.080)  | 1.3860***<br>(0.085)  |
| Observations         | 25,793                                       | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                |
| R-squared            | 0.0897                                       | 0.1574                | 0.1850                | 0.0895                | 0.1573                | 0.1849                |
| Industry FE          | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |

Note: The table reports Pooled OLS and IV estimates from equation 1, calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 12: FIRST STAGE: ESTIMATES OF THE EFFECT OF EXPORTS' DESTINATION COUNTRIES GDP ON EXPORTS BY INCOME GROUP

| Specifications        | Dependent variables:  |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                       | Export Intensity LI   |                       |                       | Export Intensity HI   |                       |                       |
|                       | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
| Weighted Avg. GDP* LI | 0.0043***<br>(0.001)  | 0.0043***<br>(0.001)  | 0.0043***<br>(0.001)  | 0.0048**<br>(0.002)   | 0.0048**<br>(0.002)   | 0.0048**<br>(0.002)   |
| Weighted Avg. GDP* HI | 0.0052***<br>(0.001)  | 0.0052***<br>(0.001)  | 0.0052***<br>(0.001)  | 0.0236***<br>(0.004)  | 0.0235***<br>(0.004)  | 0.0235***<br>(0.004)  |
| Male                  |                       | -0.0008<br>(0.001)    | -0.0009<br>(0.001)    |                       | 0.0025*<br>(0.001)    | 0.0026*<br>(0.001)    |
| Age                   |                       | 0.0002**<br>(0.000)   | 0.0002*<br>(0.000)    |                       | 0.0007**<br>(0.000)   | 0.0007**<br>(0.000)   |
| Age Sq.               |                       | -0.0000*<br>(0.000)   | -0.0000<br>(0.000)    |                       | -0.0000**<br>(0.000)  | -0.0000*<br>(0.000)   |
| Married               |                       |                       | -0.0007*<br>(0.000)   |                       |                       | -0.0019<br>(0.001)    |
| Primary Incomplete    |                       |                       | 0.0005<br>(0.001)     |                       |                       | -0.0039<br>(0.004)    |
| Primary Complete      |                       |                       | -0.0007<br>(0.001)    |                       |                       | -0.0097***<br>(0.003) |
| Secondary Incomplete  |                       |                       | -0.0006<br>(0.001)    |                       |                       | -0.0081**<br>(0.003)  |
| Secondary Complete    |                       |                       | -0.0001<br>(0.001)    |                       |                       | -0.0060*<br>(0.004)   |
| Higher Incomplete     |                       |                       | 0.0001<br>(0.001)     |                       |                       | 0.0000<br>(0.003)     |
| Head of Household     |                       |                       | 0.0006*<br>(0.000)    |                       |                       | 0.0026*<br>(0.001)    |
| Adult-Eq. Income      |                       |                       | -0.0000<br>(0.000)    |                       |                       | 0.0000<br>(0.000)     |
| Children Under 14     |                       |                       | 0.0002<br>(0.000)     |                       |                       | -0.0000<br>(0.000)    |
| Constant              | -0.1798***<br>(0.031) | -0.1830***<br>(0.031) | -0.1826***<br>(0.031) | -0.5526***<br>(0.094) | -0.5660***<br>(0.093) | -0.5577***<br>(0.092) |
| Observations          | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                |
| F-Statistic           | 22.95                 | 23.02                 | 23.04                 | 23.93                 | 23.62                 | 23.75                 |
| R-Squared             | 0.6732                | 0.6737                | 0.6741                | 0.6362                | 0.6366                | 0.6380                |
| Industry FE           | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Year FE               | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Agglomerate FE        | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |

Note: The table reports the Pooled OLS estimates on Export Intensity to high(HI)- and low(LI)-income destinations, calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 13: IV ESTIMATES OF THE EFFECT OF EXPORTS ON LABOR INFORMALITY BY INCOME GROUP

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |
|----------------------|--|-----------------------|-----------------------|
|                      | (1)  | (2)                   | (3)                   |
| ExpoLI/GVP           | 1.1588*<br>(0.698)                           | 0.7343<br>(0.560)     | 0.4614<br>(0.522)     |
| ExpoHI/GVP           | -0.9207***<br>(0.291)                        | -0.5444**<br>(0.243)  | -0.4485**<br>(0.226)  |
| Male                 |  | -0.1284***<br>(0.021) | -0.1108***<br>(0.021) |
| Age                  |  | -0.0483***<br>(0.003) | -0.0409***<br>(0.003) |
| Age Sq.              |  | 0.0006***<br>(0.000)  | 0.0005***<br>(0.000)  |
| Married              |  |                       | -0.0540***<br>(0.014) |
| Primary Incomplete   |  |                       | 0.1331***<br>(0.030)  |
| Primary Complete     |  |                       | 0.0859***<br>(0.023)  |
| Secondary Incomplete |  |                       | 0.0693***<br>(0.022)  |
| Secondary Complete   |  |                       | 0.0029<br>(0.020)     |
| Higher Incomplete    |  |                       | 0.0137<br>(0.020)     |
| Head of Household    |  |                       | -0.0692***<br>(0.013) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0259***<br>(0.004)  |
| Constant             | 0.593***<br>(0.045)                          | 1.596***<br>(0.080)   | 1.3954***<br>(0.084)  |
| Observations         | 25,793                                       | 25,793                | 25,793                |
| R-squared            | 0.086  | 0.156                 | 0.184                 |
| Industry FE          | ✓  | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     |

*Note: The table reports the IV estimates on Export Intensity to high(HI)- and low(LI)-income destinations, calculated considering the individual sampling weights. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year, and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

Table 14: ESTIMATES OF THE EFFECTS OF EXPORTS INTENSITY ON LABOR INFORMALITY USING TWO ALTERNATIVE INSTRUMENTS

| Specifications   | (1)<br>Pooled<br>OLS  | (2)<br>IV 1           | (3)<br>IV 2           | (4)<br>IV 1 & 2       | (5)<br>Pooled<br>OLS  | (6)<br>IV 1           | (7)<br>IV 2           | (8)<br>IV 1 & 2       | (9)<br>Pooled<br>OLS  | (10)<br>IV 1          | (11)<br>IV 2          | (12)<br>IV 1 & 2      |
|------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Exports/GPV      | -0.2889***<br>(0.061) | -0.3691***<br>(0.080) | -0.6857***<br>(0.161) | -0.3429***<br>(0.079) | -0.1932***<br>(0.058) | -0.2165***<br>(0.073) | -0.4041***<br>(0.140) | -0.2010***<br>(0.072) | -0.1790***<br>(0.056) | -0.2224***<br>(0.069) | -0.3774***<br>(0.133) | -0.2095***<br>(0.068) |
| Observations     | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                | 25,793                |
| R-squared        | 0.0897                | 0.0895                | 0.0842                | 0.0896                | 0.1574                | 0.1573                | 0.1558                | 0.1574                | 0.1850                | 0.1849                | 0.1836                | 0.1849                |
| F-stat. F.Stage  |                       | 31.59***              | 21.07***              | 33.03***              |                       | 29.81***              | 19.97***              | 31.01***              |                       | 28.66***              | 18.11***              | 30.49***              |
| K-P Wald F-stat. |                       | 1504.88               | 380.68                | 1400.00               |                       | 1488.98               | 371.13                | 1388.97               |                       | 1490.43               | 374.19                | 1382.29               |
| D-W-H Test       |                       | 2.31                  | 9.59***               | 1.31                  |                       | 0.22                  | 3.29*                 | 0.08                  |                       | 0.84                  | 3.29*                 | 0.46                  |
| Covariates       |                       |                       |                       |                       | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| All covariates   |                       |                       |                       |                       |                       |                       |                       |                       | ✓                     | ✓                     | ✓                     | ✓                     |
| Industry FE      | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Year FE          | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Agglomerate FE   | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |

Note: The table reports Pooled OLS and IV estimates calculated considering the individual sampling weights. IV 1 corresponds to the estimation using instrument  $y_{it}^*$  of Section 3.2, IV 2 using  $y_{it} \equiv \sum_c \ln GDP_c^c \times \psi_{j,97}^c$ , where  $\ln GDP_c^c$  is the natural logarithm of the real GDP of the country  $c$  at year  $t$ , and IV 1 & 2 using both instruments simultaneously. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Covariates includes: male indicator, age and age squared variables. All covariates includes, in addition, married and head of household indicator variables, educational level dummies (measured as the maximum level of education achieved), household income per adult-equivalent, and children under 14 (number of children younger than 14 years in the household). Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 15: IV ESTIMATES OF THE EFFECTS OF EXPORTS ON LABOR INFORMALITY USING YEAR 1996 ALTERNATIVE WEIGHT IN IV

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |
|----------------------|--|-----------------------|-----------------------|
|                      | (1)  | (2)                   | (3)                   |
| Exports/GVP          | -0.3635***<br>(0.089)                        | -0.2097***<br>(0.080) | -0.1985***<br>(0.076) |
| Male                 |  | -0.1304***<br>(0.021) | -0.1126***<br>(0.021) |
| Age                  |  | -0.0485***<br>(0.003) | -0.0410***<br>(0.003) |
| Age Sq.              |  | 0.0006***<br>(0.000)  | 0.0005***<br>(0.000)  |
| Married              |  |                       | -0.0540***<br>(0.014) |
| Primary Incomplete   |  |                       | 0.1355***<br>(0.030)  |
| Primary Complete     |  |                       | 0.0882***<br>(0.023)  |
| Secondary Incomplete |  |                       | 0.0715***<br>(0.022)  |
| Secondary Complete   |  |                       | 0.0047<br>(0.020)     |
| Higher Incomplete    |  |                       | 0.0137<br>(0.020)     |
| Head of Household    |  |                       | -0.0692***<br>(0.013) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0261***<br>(0.004)  |
| Constant             | 0.5679***<br>(0.046)                         | 1.5849***<br>(0.080)  | 1.3852***<br>(0.085)  |
| <i>First Stage:</i>  |  |                       |                       |
| Weighted GDP*        | 0.0298***<br>(0.004)                         | 0.0297***<br>(0.004)  | 0.0296***<br>(0.004)  |
| F-statistic          | 45.44  | 45.21                 | 45.11                 |
| Observations         | 25,793                                       | 25,793                | 25,793                |
| R-squared            | 0.0895                                       | 0.1573                | 0.1849                |
| Industry FE          | ✓  | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     |

Note: The table reports IV estimates from equation 1, calculated considering the individual sampling weights. The IV is constructed considering a weight for year 1996. Labor informality is based on the Legalistic definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 16: IV ESTIMATES OF THE EFFECT OF EXPORTS ON HOURLY WAGE BY INCOME GROUP

| Specifications       | Dependent variable: Ln Hourly Wage |                      |                      |
|----------------------|------------------------------------|----------------------|----------------------|
|                      | (1)                                | (2)                  | (3)                  |
| ExpoLI/GVP           | -3.797***<br>(1.114)               | -3.256***<br>(0.913) | -1.704**<br>(0.696)  |
| ExpoHI/GVP           | 2.194***<br>(0.423)                | 1.644***<br>(0.356)  | 1.048***<br>(0.274)  |
| Male                 |                                    | 0.155***<br>(0.028)  | 0.175***<br>(0.019)  |
| Age                  |                                    | 0.070***<br>(0.004)  | 0.048***<br>(0.003)  |
| Age Sq.              |                                    | -0.001***<br>(0.000) | -0.001***<br>(0.000) |
| Married              |                                    |                      | 0.088***<br>(0.015)  |
| Primary Incomplete   |                                    |                      | -0.591***<br>(0.040) |
| Primary Complete     |                                    |                      | -0.496***<br>(0.038) |
| Secondary Incomplete |                                    |                      | -0.424***<br>(0.033) |
| Secondary Complete   |                                    |                      | -0.268***<br>(0.028) |
| Higher Incomplete    |                                    |                      | -0.165***<br>(0.027) |
| Head of Household    |                                    |                      | 0.102***<br>(0.014)  |
| Adult-Eq. Income     |                                    |                      | 0.001***<br>(0.000)  |
| Children Under 14    |                                    |                      | 0.013***<br>(0.005)  |
| Constant             | 0.430***<br>(0.048)                | -1.051***<br>(0.088) | -0.424***<br>(0.068) |
| Observations         | 24,081                             | 24,081               | 24,081               |
| R-squared            | 0.167                              | 0.256                | 0.518                |
| Industry FE          | ✓                                  | ✓                    | ✓                    |
| Year FE              | ✓                                  | ✓                    | ✓                    |
| Agglomerate FE       | ✓                                  | ✓                    | ✓                    |

*Note: The table reports the IV estimates on Export Intensity to high(HI)- and low(LI)-income destinations, calculated considering the individual sampling weights. All regressions include industry (2-digits SIC), year, and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

## C.2 Robustness Analysis Considering the Productive Definition of Informality for Salaried Workers.

Table 17: FIRST STAGE: ESTIMATES OF THE EFFECT OF EXPORTS' DESTINATION COUNTRIES GDP ON EXPORTS

| Specifications       | Dependent variable: Export Intensity |                       |                       |
|----------------------|--------------------------------------|-----------------------|-----------------------|
|                      | (1)                                  | (2)                   | (3)                   |
| Weighted Avg. GDP*   | 0.0384***<br>(0.005)                 | 0.0383***<br>(0.005)  | 0.0383***<br>(0.005)  |
| Male                 |                                      | 0.0008<br>(0.002)     | 0.0007<br>(0.002)     |
| Age                  |                                      | 0.0006*<br>(0.000)    | 0.0006<br>(0.000)     |
| Age Sq.              |                                      | -0.0000<br>(0.000)    | -0.0000<br>(0.000)    |
| Married              |                                      |                       | -0.0032**<br>(0.002)  |
| Primary Incomplete   |                                      |                       | -0.0033<br>(0.004)    |
| Primary Complete     |                                      |                       | -0.0105***<br>(0.004) |
| Secondary Incomplete |                                      |                       | -0.0083**<br>(0.004)  |
| Secondary Complete   |                                      |                       | -0.0062<br>(0.004)    |
| Higher Incomplete    |                                      |                       | 0.0002<br>(0.004)     |
| Head of Household    |                                      |                       | 0.0034*<br>(0.002)    |
| Adult-Eq. Income     |                                      |                       | 0.0000<br>(0.000)     |
| Children Under 14    |                                      |                       | 0.0002<br>(0.000)     |
| Constant             | -0.8048***<br>(0.121)                | -0.8166***<br>(0.120) | -0.8089***<br>(0.120) |
| Observations         | 24,030                               | 24,030                | 24,030                |
| F-statistic          | 61.25                                | 60.85                 | 61.01                 |
| R-squared            | 0.66                                 | 0.66                  | 0.66                  |
| Industry FE          | ✓                                    | ✓                     | ✓                     |
| Year FE              | ✓                                    | ✓                     | ✓                     |
| Agglomerate FE       | ✓                                    | ✓                     | ✓                     |

*Note: The table reports the Pooled OLS estimates, calculated considering the individual sampling weights. Labor informality is based on the Productive definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

Table 18: POOLED OLS AND IV ESTIMATES OF THE EFFECTS OF EXPORTS ON LABOR INFORMALITY

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |                       |                       |                       |
|----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | Pooled OLS                                   |                       |                       | IV                    |                       |                       |
|                      | (1)  | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
| Exports/GVP          | -0.3212***<br>(0.074)                        | -0.2917***<br>(0.072) | -0.2772***<br>(0.074) | -0.4690***<br>(0.095) | -0.4245***<br>(0.093) | -0.4189***<br>(0.094) |
| Male                 |  | -0.0186<br>(0.014)    | -0.0043<br>(0.014)    |                       | -0.0175<br>(0.014)    | -0.0033<br>(0.014)    |
| Age                  |  | -0.0210***<br>(0.003) | -0.0144***<br>(0.003) |                       | -0.0208***<br>(0.003) | -0.0142***<br>(0.003) |
| Age Sq.              |  | 0.0002***<br>(0.000)  | 0.0002***<br>(0.000)  |                       | 0.0002***<br>(0.000)  | 0.0002***<br>(0.000)  |
| Married              |  |                       | -0.0498***<br>(0.011) |                       |                       | -0.0497***<br>(0.011) |
| Primary Incomplete   |  |                       | 0.0463*<br>(0.026)    |                       |                       | 0.0477*<br>(0.026)    |
| Primary Complete     |  |                       | 0.0336<br>(0.020)     |                       |                       | 0.0322<br>(0.020)     |
| Secondary Incomplete |  |                       | 0.0266<br>(0.019)     |                       |                       | 0.0253<br>(0.019)     |
| Secondary Complete   |  |                       | -0.0064<br>(0.018)    |                       |                       | -0.0073<br>(0.018)    |
| Higher Incomplete    |  |                       | -0.0365**<br>(0.018)  |                       |                       | -0.0369**<br>(0.018)  |
| Head of Household    |  |                       | -0.0419***<br>(0.011) |                       |                       | -0.0412***<br>(0.011) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |                       |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0080**<br>(0.004)   |                       |                       | 0.0081**<br>(0.004)   |
| Constant             | 0.6361***<br>(0.041)                         | 1.0512***<br>(0.072)  | 0.9468***<br>(0.077)  | 0.5800***<br>(0.040)  | 0.9741***<br>(0.066)  | 0.8598***<br>(0.071)  |
| Observations         | 24,030                                       | 24,030                | 24,030                | 24,030                | 24,030                | 24,030                |
| R-squared            | 0.0739                                       | 0.0849                | 0.1015                | 0.0729                | 0.0841                | 0.1006                |
| Industry FE          | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |

Note: The table reports Pooled OLS and IV estimates from equation 1, calculated considering the individual sampling weights. Labor informality is based on the Productive definition (only salaried workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



### C.3 Robustness Analysis Considering the Productive Definition of Informality for Salaried and Self-employed Workers.

Table 19: FIRST STAGE: ESTIMATES OF THE EFFECT OF EXPORTS' DESTINATION COUNTRIES GDP ON EXPORTS

| Specifications       | Dependent variable: Export Intensity |                       |                       |
|----------------------|--------------------------------------|-----------------------|-----------------------|
|                      | (1)                                  | (2)                   | (3)                   |
| Weighted Avg. GDP*   | 0.0342***<br>(0.005)                 | 0.0342***<br>(0.005)  | 0.0342***<br>(0.005)  |
| Male                 |                                      | -0.0023<br>(0.002)    | -0.0031<br>(0.003)    |
| Age                  |                                      | -0.0000***<br>(0.000) | -0.0000**<br>(0.000)  |
| Age Sq.              |                                      | -0.0012***<br>(0.000) | -0.0011**<br>(0.000)  |
| Married              |                                      |                       | -0.0013<br>(0.001)    |
| Primary Incomplete   |                                      |                       | -0.0010<br>(0.004)    |
| Primary Complete     |                                      |                       | -0.0084**<br>(0.003)  |
| Secondary Incomplete |                                      |                       | -0.0050<br>(0.003)    |
| Secondary Complete   |                                      |                       | -0.0036<br>(0.003)    |
| Higher Incomplete    |                                      |                       | 0.0033<br>(0.003)     |
| Head of Household    |                                      |                       | 0.0041**<br>(0.002)   |
| Adult-Eq. Income     |                                      |                       | 0.0000<br>(0.000)     |
| Children Under 14    |                                      |                       | -0.0003<br>(0.000)    |
| Constant             | -0.6842***<br>(0.120)                | -0.7022***<br>(0.119) | -0.6955***<br>(0.119) |
| Observations         | 29,958                               | 29,958                | 29,958                |
| F-statistic          | 45.36                                | 45.39                 | 45.65                 |
| R-squared            | 0.64                                 | 0.64                  | 0.64                  |
| Industry FE          | ✓                                    | ✓                     | ✓                     |
| Year FE              | ✓                                    | ✓                     | ✓                     |
| Agglomerate FE       | ✓                                    | ✓                     | ✓                     |

Note: The table reports the Pooled OLS estimates, calculated considering the individual sampling weights. Labor informality is based on the Productive definition for salaried and self-employed workers for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 20: POOLED OLS AND IV ESTIMATES OF THE EFFECTS OF EXPORTS ON LABOR INFORMALITY

| Specifications       | Dependent variable: Informal Labor Indicator |                       |                       |                       |                       |                       |
|----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | Pooled OLS                                   |                       |                       | IV                    |                       |                       |
|                      | (1)  | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
| Exports/GVP          | -0.4002***<br>(0.110)                        | -0.3844***<br>(0.108) | -0.3551***<br>(0.109) | -0.7864***<br>(0.147) | -0.7479***<br>(0.139) | -0.7204***<br>(0.138) |
| Male                 |  | -0.0734***<br>(0.015) | -0.0610***<br>(0.015) |                       | -0.0693***<br>(0.015) | -0.0577***<br>(0.015) |
| Age                  |  | -0.0129***<br>(0.003) | -0.0067**<br>(0.003)  |                       | -0.0123***<br>(0.003) | -0.0063**<br>(0.003)  |
| Age Sq.              |  | 0.0002***<br>(0.000)  | 0.0001***<br>(0.000)  |                       | 0.0002***<br>(0.000)  | 0.0001***<br>(0.000)  |
| Married              |  |                       | -0.0313***<br>(0.012) |                       |                       | -0.0305***<br>(0.012) |
| Primary Incomplete   |  |                       | 0.1380***<br>(0.028)  |                       |                       | 0.1408***<br>(0.028)  |
| Primary Complete     |  |                       | 0.1383***<br>(0.021)  |                       |                       | 0.1355***<br>(0.021)  |
| Secondary Incomplete |  |                       | 0.1580***<br>(0.020)  |                       |                       | 0.1555***<br>(0.020)  |
| Secondary Complete   |  |                       | 0.1333***<br>(0.021)  |                       |                       | 0.1311***<br>(0.020)  |
| Higher Incomplete    |  |                       | 0.1094***<br>(0.022)  |                       |                       | 0.1088***<br>(0.022)  |
| Head of Household    |  |                       | -0.0478***<br>(0.011) |                       |                       | -0.0456***<br>(0.011) |
| Adult-Eq. Income     |  |                       | -0.0001***<br>(0.000) |                       |                       | -0.0001***<br>(0.000) |
| Children Under 14    |  |                       | 0.0112***<br>(0.003)  |                       |                       | 0.0110***<br>(0.003)  |
| Constant             | 0.9846***<br>(0.063)                         | 1.2145***<br>(0.073)  | 0.9769***<br>(0.075)  | 0.8436***<br>(0.044)  | 1.0507***<br>(0.064)  | 0.8203***<br>(0.068)  |
| Observations         | 29,958                                       | 29,958                | 29,958                | 29,958                | 29,958                | 29,958                |
| R-squared            | 0.1272                                       | 0.1396                | 0.1601                | 0.1223                | 0.1353                | 0.1557                |
| Industry FE          | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Year FE              | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |
| Agglomerate FE       | ✓  | ✓                     | ✓                     | ✓                     | ✓                     | ✓                     |

Note: The table reports Pooled OLS and IV estimates from equation 1, calculated considering the individual sampling weights. Labor informality is based on the Productive definition (salaried and self-employed workers) for the period 1997-2001. All regressions include industry (2-digits SIC), year and agglomerate fixed effects. Male, married and head of household are indicator variables, educational level dummies are measured as the maximum level of education achieved. Children under 14 measures the number of children younger than 14 years in the household. Robust Standard Errors in parentheses, clustered at the 3-digits industry-year level. Significance level: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .