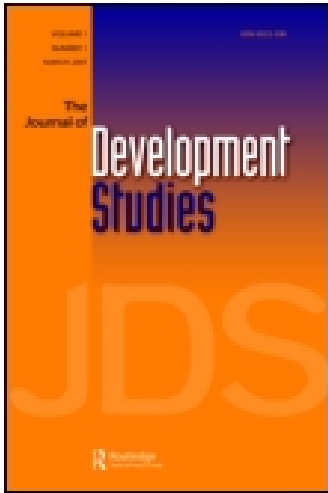


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Informal Jobs and Trade Liberalisation in Argentina

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ABSTRACT *Rapid trade liberalisation can exert profound effects on labour markets. Domestic firms, to sustain competitiveness for survival, could react by cutting labour benefits to achieve cost reductions. Alternatively, trade liberalisation may alter the industry composition of firms, changing the aggregate formality rates. This paper studies the relationship between trade liberalisation and informality in Argentina. Using manufacturing industry-level data for 1992–2003, the results confirm the hypothesis that trade increases informality in industries that experience sudden foreign competition. This explains about a third of the increase in informality. Sectors with higher investment ratios are able to neutralise and reverse this effect.*

I. Introduction

Informal activity is a common feature in developing countries. Informality refers to the lack of compliance with taxation and regulation by employers, and the lack of protection and services that the government can provide to workers. Informality is a complex phenomenon: in Harris and Todaro's (1970) view, the informal self-employment sector is a 'parking lot' in which aspirants to formal salaried employment bide time; however, recent evidence challenges this view and instead suggests that workers and firms may voluntarily choose to have 'informal' contracts to avoid unwanted or undervalued benefits (Maloney, 1999, 2004).

Recent works studied the main determinants of labour informality, highlighting government interventions as playing a major role, through taxation and labour market regulations (Friedman, Johnson, Kaufmann, & Zoido-Lobaton, 2000; Fugazza & Jacques, 2004; Johnson, Kaufmann, & Zoido-Lobaton, 1998) or bureaucracy and corruption (Busato & Chiarini, 2004; Choi & Thum, 2005; Dabla-Norris, Gradstein, & Inchauste, 2008), among other institutional and enforcement conditions. Income inequality has also been signalled as an important driver of informality (Chong & Gradstein, 2007). Other studies have argued that firms' heterogeneity and limited access to credit and capital markets are more relevant in explaining the emergence of informal activities (Amaral & Quintin, 2006; Antunes & Cavalcanti, 2007; Dessy & Pallage, 2003; Gordon & Li, 2005).

Rapid trade liberalisation can exert profound effects on labour markets aside from the abundantly documented effects on employment levels and compensations. This paper looks at the potential effect of trade liberalisation on labour informality in economies that are relatively closed to foreign competition in goods and services. Evidence for developing countries on the potential effect of trade exposure on the size of the informal sector is scant, and, therefore, empirical results on this

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issue are important. At a cross-country level and using alternative definitions and data sources for informal labour, Fliess and Fugazza (2008) do not find any conclusive association with trade liberalisation. Currie and Harrison (1997) find a positive relationship between trade liberalisation and informal jobs in Morocco. In Latin America, Goldberg and Pavcnik (2003) show results from Brazil and Colombia, finding no effect in Brazil but a positive relationship in Colombia during the period preceding a major labour market reform. Bosch, Goñi-Pacchioni, and Maloney (2012) do not find a significant effect of trade reforms in the rise in informality for Brazil in the 1980s and 1990s, with rise in firing costs and union power being more important drivers. Finally, Aleman-Castilla (2006) finds that Mexican import tariffs are significantly related to reductions in the likelihood of informality in the tradable industries, but informality decreases less in industries with higher levels of import penetration, and more in industries that are relatively more export-oriented.

This paper presents additional evidence on the relationship between trade liberalisation and informality in developing countries, using industry-level data for Argentina. Argentina is the Latin American country for which the speed and depth of economic reforms were among the largest in the region (Behrman, Birsdall, & Szekely, 2007). Its government started a programme in the early 1990s that included massive privatisation and deregulation, as well as trade and financial liberalisation. However, the intensity of this process was not uniform across economic sectors, which allows an identification strategy by taking advantage of the variability in time and extent of trade exposure and tariff regimes across industries in Argentina's manufacturing sector.

The results in this paper suggest that informality has significantly increased in Argentinean manufacturing sectors in which trade liberalisation has been more intense, explaining around a third of the increase in informality between 1993 and 2003. Given that trade liberalisation had a significant effect on reducing the cost of acquiring new technology, we also find that sectors with higher investment ratios were able to neutralise and reverse this effect. These results hold after controlling for other sector characteristics, such as the export/import orientation of the sector, size, and industry- and time-specific fixed effects, as well as general macroeconomic shocks.

The paper is organised as follows. [Section II](#) discusses the effect of trade on formality. [Section III](#) presents recent trade exposure and informality trends in Argentina. [Section IV](#) shows results at the industry level of the link between trade liberalisation and industry informality differential. The paper concludes with some brief comments and interpretation of the results in [Section V](#).

II. Informality and Trade

The effect of trade on formality can be decomposed into a within-industry effect, which corresponds to the response of the firms in a given industry with respect to their workers' formality, and a between-industry effect, in which workers move to other industries with more or less formality.

Regarding the between-industry effect, formal firms may respond to the intensified competition from abroad by laying off workers who subsequently seek employment in the informal sector. Depending on their qualifications, workers have different degrees of between-industry mobility.

Regarding the within-industry effect, in developing countries, low enforcement of labour market regulations determines that firms have greater flexibility to adjust to trade exposure by self-selecting into different degrees of formality. Goldberg and Pavcnik (2003, p. 464) argue that trade exposure increases pressure on firms 'to try to reduce labour costs by cutting worker benefits, replacing permanent workers with part-time labour, or subcontracting with establishments in the informal sector, including home-based and self-employed microentrepreneurs'. In a similar vein, Revenga (1997) and Galiani and Porto (2010) argue that trade protection produces rents that are partially absorbed by workers in the form of wage premiums, namely unskilled unionised workers, and that the removal of those rents can affect their wages negatively and presumably reduce their job benefits.

There is also theoretical ground for the opposite effect; that is, trade liberalisation may increase formality by way of a composition effect. Trade models predict that trade exposure has a significant effect in the industry composition. Melitz (2003) argues that trade exposure induces more productive firms to enter, less

productive firms to reallocate towards the domestic market, and, simultaneously, forces the least productive firms to exit. Thus, Aleman-Castilla (2006) suggests that import tariff elimination could increase job quality by making it more profitable to some firms to enter the formal sector, forcing the less productive firms to exit the industry, and inducing the most productive ones to engage in foreign trade.

Acosta and Gasparini (2007) argue that trade liberalisation reduces the cost of acquiring new technology through the reduction in the cost of imported capital goods. Using an efficiency wage argument, if firms can upgrade to better technology, they may be able to offer better job conditions to its labour force in order to maintain the best workers, thus increasing formality.

Between-industry analysis requires a longitudinal labour database that follows individuals for subsequent waves. Unfortunately, Argentina's household survey is a pooled cross-section and not a panel. Thus, this paper only studies the within-industry effects by analysing the industry trends and by establishing potential causality with trade. We focus on the manufacturing sector, in which we can focus on the direct within-industry effect of trade in order to test for direction of the within-industry effect. We evaluate the effect of trade using the empirical model of Goldberg and Pavcnik (2003), described in detail in Section IV.a. This model is extended to evaluate the potential effect of reducing the cost of acquiring capital goods developed in Acosta and Gasparini (2007).

III. Trade Liberalisation and Informality Trends in Argentina

Argentina was a country relatively closed to international trade from the end of the Second World War to the 1990s. This period was characterised by an import substitution process, conceived for promoting industrialisation based in national production. But the country witnessed an important trade liberalisation process during the 1990s, mainly through customs tariff reduction. Reforms included the end of sector-specific subsidies with protectionist goals and a commercial agreement with neighbour countries (Brazil, Paraguay, and Uruguay, called MERCOSUR). The largest import tariff reductions agreed at the MERCOSUR level were implemented in wood, paper, printing, chemical and petrochemical, machinery, and electrical/electronic equipment. Average *ad valorem* manufacturing import tariffs declined from an average of 21 per cent in 1992 to 17 per cent in 1995, and to 14 per cent in 2003 (Figure 1). As a result, trade openness (as measured by imports plus exports as a share of GDP) increased from 14 per cent in 1992 to 24 per cent in 1997, and 39 per cent in 2003.

Contemporaneously with trade liberalisation, the 1990s was a period of economic growth, deindustrialisation, and labour market deregulation in Argentina. Macroeconomic stability, an ambitious

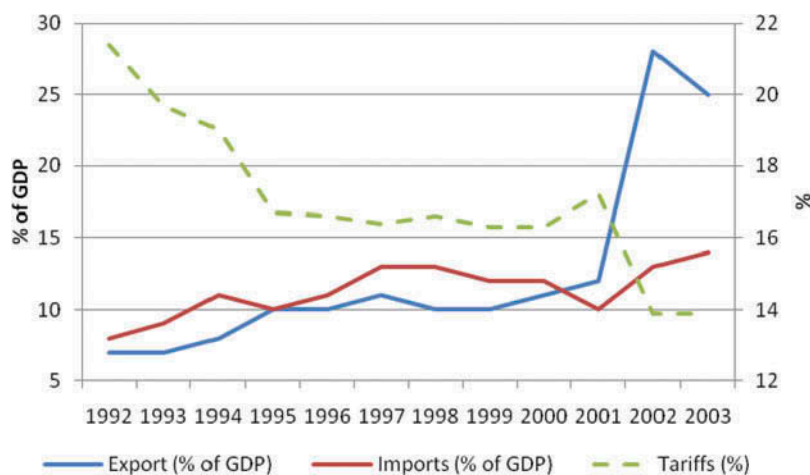


Figure 1. Trade openness (exports and imports, as a share of GDP) and average *ad valorem* tariff evolution. *Source:* Galiani and Porto (2010); World Development Indicators (2009).

privatisation programme, and reduction of state intervention resulted in a GDP growth of around 50 per cent during the decade until 2002, when Argentina suffered a severe economic collapse.¹ Economic growth was not even across sectors: the manufacturing industry, as a share of value added, declined from 22 per cent in 1980 to 18 per cent in 1990, and 15 per cent in 2002.

Although labour costs only decreased slightly in Argentina in the 1990s (Galiani, 2002), there is evidence that government enforcement of labour regulations relaxed during this period (Ronconi, 2010). Informality rates, defined in this paper as the ‘absence of social security and other labour benefits’, increased considerably in the 1990s.² While labour informality in the manufacturing sector was in the order of 17 per cent in 1992, by 2003 this figure was around 30 per cent. Sectors in which informality increased the most in this period include food and beverages (34% of workers in the informal sector in 2003), textiles (30%), clothing (52%), and leather and footwear (60%) (Table 1). These are typical ‘unskilled’ sectors in Argentina, with two-thirds of the workers being without a secondary school degree when, on average, half of the workers in the manufacturing sector have completed secondary education. Between 1992 and 2003, these sectors experienced a tariff protection rate reduction of 2 to 7 percentage points (Figure 2).

Other sectors experienced more drastic reductions in tariff protection: electrical and electronic equipment, machinery and equipment, paper, wood and cork, and publishing and printing. In these sectors, tariffs declined between 9 and 13 percentage points over the period 1992–2003. But informality rates did not increase as much in comparison with other sectors, and as of 2003 less than one-third of the workers in the sector were informal. With the exception of wood and cork, these sectors are relatively ‘high-skilled’, with more than half of the workers having completed secondary education. Wood and cork and paper are also among the sectors that have been exposed to important technological change, through the acquisition of foreign machinery and equipment (Acosta & Gasparini, 2007).

While previous evidence for Argentina has suggested that this trade liberalisation episode had an effect in the labour market through an increase in the relative wages of high-skilled workers with respect to less-skilled counterparts (Galiani & Porto, 2010; Galiani & Sanguinetti, 2003), this paper explores instead a causal link between trade liberalisation and informality by exploiting variability in tariff reductions across sectors. A priori, simple correlations of tariff reductions and informality surge seem to suggest a link among both episodes (Figure 3). But since manufacturing sectors differ in terms of typical workers’ skills

Table 1. Informality rates (‘absence of social security benefits’) by manufacturing sector, Argentina, 1992–2003

Sector	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Food, beverages, and tobacco	12.5	16.0	14.7	18.2	19.7	23.1	23.3	22.1	26.5	22.0	27.1	33.5
Textiles	5.7	13.1	17.5	14.0	15.2	8.2	20.7	21.3	19.2	16.6	25.2	30.3
Clothing	21.5	37.3	29.4	32.1	42.6	48.8	41.3	39.0	39.1	28.8	51.1	51.5
Leather and footwear	41.1	38.3	38.7	31.5	30.9	43.5	38.7	32.7	29.7	52.3	47.9	60.3
Wood and cork	31.7	24.9	29.6	19.4	34.1	31.6	33.8	36.5	26.8	35.1	49.1	38.2
Paper	15.3	6.8	15.6	20.2	15.3	6.8	12.7	48.1	16.0	26.6	7.8	6.1
Publishing and printing	12.9	11.8	13.8	13.4	23.4	31.2	25.8	31.4	23.2	25.3	8.1	22.7
Chemicals and petrochemicals	10.0	10.2	14.7	11.7	11.2	18.8	14.8	16.2	10.0	15.0	19.9	17.6
Plastics and rubber products	18.2	12.4	16.3	16.4	12.4	13.1	19.4	11.5	5.5	12.1	22.4	5.1
Non-metallic mineral products	21.0	19.6	11.4	13.8	17.0	20.9	24.1	27.3	17.0	17.6	40.6	27.5
Basic metallic products	7.6	9.4	2.2	6.1	3.8	9.1	6.0	4.9	9.3	7.1	9.1	4.0
Fabricated metallic products	15.8	11.6	14.3	16.4	15.8	14.9	25.8	18.7	17.9	18.7	24.7	26.5
Machinery and equipment	14.9	13.6	10.5	8.6	11.6	16.2	8.9	13.9	18.7	17.2	10.9	20.1
Electrical and electronic equipment	17.0	6.2	3.6	17.3	12.5	20.8	17.3	18.2	22.1	28.3	21.3	15.4
Transportation vehicles	11.0	13.2	4.1	9.3	19.2	8.3	6.5	10.5	15.2	6.3	6.0	23.5
Furniture and other	26.7	25.6	23.5	17.4	35.6	29.7	33.9	30.5	34.5	19.1	31.4	29.8
Manufacturing sector	17.3	17.2	16.2	17.1	20.7	22.8	23.2	22.8	22.6	21.6	26.8	30.3
All sectors	17.0	16.6	16.0	18.0	20.6	22.6	23.0	23.9	23.7	23.1	29.5	29.7

Notes: Authors’ calculations based on EPH, October issues. Sample considers full-time (more than 20 hours worked) paid workers, between 18 and 65 years old.

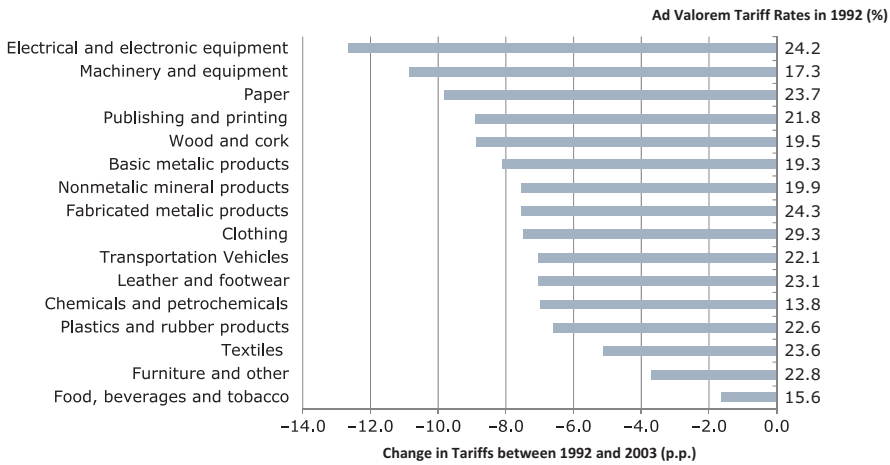


Figure 2. Average *ad valorem* import tariffs by manufacturing sector.

Source: Authors' calculations based on Galiani and Porto (2010).

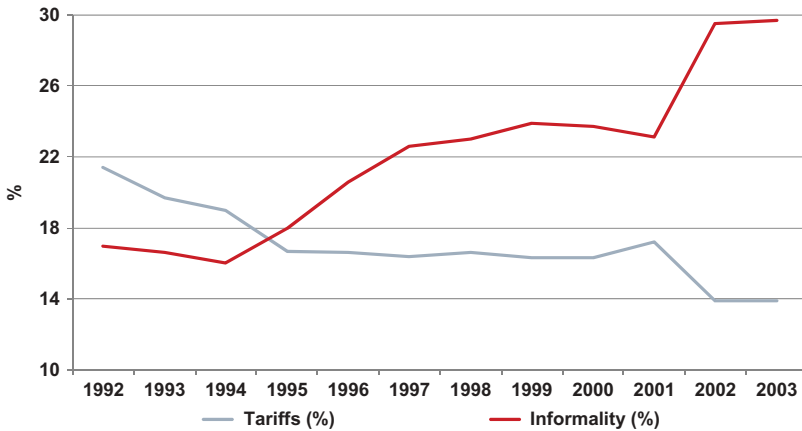


Figure 3. Informality rates and *ad valorem* tariffs in the manufacturing sector.

Source: Authors' calculations based on EPH, October issues; Galiani and Porto (2010).

and size, as well as the exposure to technological change, among other dimensions, it is important to control for observed and unobserved characteristics of sectors to avoid imputing spurious causality effects. The next section presents a two-step methodology to isolate the effect of trade protection from other confounding effects that operate simultaneously with trade liberalisation.

IV. Industry Informality Differentials and Trade Liberalisation

IV.a. Empirical Methodology

This paper follows a two-step methodology originally proposed in Goldberg and Pavcnik (2003), which is the standard methodology in empirical trade labour market studies.³ In the first stage, industry-level informality propensity indicators are estimated, using labour and household survey data.

Let Inf_{ijt} be an indicator variable for whether the worker, i , is informal (see Section III for a definition of informality) in industry $j = 1, \dots, J$, and time $t = 1, \dots, T$. Arguably, Inf_{ijt} is the result of a bargaining process between the hiring firm, the worker, and (potentially) the government. The

multidimensional nature of informality determines that several factors may affect the probability of being a formal worker. Eventually, this outcome would depend on the observable attributes of the individual, H_{it} , concerning age, age squared, education, gender, and geographic location, unobservable attributes ε_{ijt} , and the industry F_{jt} . A reduced-form relationship will imply:

$$Inf_{ijt} = \sum_{t=1}^T H_{it}\alpha_t + \sum_{j=1}^J F_{jt}\beta_{jt} + \varepsilon_{ijt}. \tag{1}$$

The set of coefficients $\{\beta_{jt}\}$ captures the variation in the informal employment that cannot be explained by worker characteristics, but rather is attached to industry affiliation. These coefficients represent the industry-specific propensity to informality, which by construction are orthogonal to individual characteristics.

To evaluate the effect of trade on the industry-specific propensities towards creating informal jobs, a reduced-form specification at the industry level is proposed. Let $Tariff_{jt}$, M_{jt} , and X_{jt} be the average tariff level, imports and exports by industry, respectively, where the latter two are normalised by the gross value of production (GVP) in each industry and year. Each variable has a different interpretation and captures different potential effects of trade. $Tariff$ is a proxy for the actual level of protection; M measures the foreign penetration in a particular industry, that is it shows the actual effect of competition from abroad in a particular industry; and X measures the industry competitiveness abroad. Note that $Tariff$ and M capture different effects. For instance, there could be an industry with low tariffs but low import penetration if the country has a clear comparative advantage in this industry vis-à-vis the rest of the world; eventually this may or may not be reflected in X_{jt} . Note that given that we use a fixed-effects specification, we are already controlling for industry-specific comparative advantages.

Moreover, let Y_t be year dummies and F_j industry dummies. The effect of trade on informality can be measured by a regression of the industry-specific informality indicators on tariffs levels, exports, imports, and other controls:

$$\beta_{jt} = Tariff_{jt}\theta + X_{jt-1}\phi + M_{jt-1}\gamma + \sum_{j=1}^J F_j\eta_j + \sum_{t=1}^T Y_t\mu_t + \xi_{jt}. \tag{2}$$

Following this methodology, the coefficients of $Tariff$, X and M would not be capturing industry differences in worker composition correlated with trade indicators, because in order to obtain the industry-specific informality indicators, Equation (1) already controlled for workers' characteristics. Similarly, as suggested in Pavcnik, Blom, Goldberg, and Schady (2004), because worker characteristics are allowed to differ year by year in the computation of the informality industry indicators, all of the economy-wide changes in the propensity to become informal associated with changes in labour supply over time are already taken into account. Moreover, the time dummies also capture other important effects, such as changes in the real exchange rate and changes in GDP. Note that the joint inclusion of time and industry dummies made the latter redundant. Equation (2) is estimated by fixed-effects least-squares accounting for general forms of heteroscedasticity in the error term using Huber–White standard errors clustered by industry and year.

As argued in Section II, if trade liberalisation also has the effect of reducing the cost of acquiring capital goods, sectors that update their technologies should be able to face foreign competition in better shape. In this case, we expect that sectors that invest the most may have smaller effects in terms of formality. Thus we also consider in some specifications the addition of the ratio of imports of capital goods by sector, standardised by GVP.

The exports variable intends to capture how foreign competition affects firms' behaviour, since it may lead them to reduce the burden of non-wage benefits to remain competitive. However, this should not be associated with firms' productivity, which may also be related to informality (less productive firms could only remain in the market by becoming informal). To explore this productivity channel,

the GVP of the industry of reference divided by the number of workers employed (a proxy for labour productivity) is also included.

IV.b. Data

Labour market data to calculate informality rates by sector come from Encuesta Permanente de Hogares (EPH), the only nationally-representative household survey of Argentina. For the period 1992-2003, repeated cross-sectional data are available, covering 28 urban areas that account for nearly two-thirds of the total country's population.⁴ We employed the October round of each household survey. The analysis is restricted to 16 manufacturing sectors, grouped according to survey statistical representation with the International Standard Industrial Classification (ISIC) Rev. 3 classification (Table 1 shows the sector classification employed). Workers considered are males and females between 18 and 65 years of age with positive earnings. Education is measured as completed years of schooling: workers are classified into those with no high school degree, at most a high school degree, and a university degree.⁵

Workers are classified as 'informal' if they lack social security (pension and health insurance) and other labour benefits (paid holidays and yearly bonuses). In the case of the worker receiving any of these benefits, he/she is classified as 'formal'. Unfortunately, we are not able to identify individuals who become voluntary to avoid changes in the burden of formality, those who negotiate with their employers to avoid losing their jobs, and those who lose a formal job and find a new informal one. The interpretation of the results below should then take into account that we are estimating the effect of trade on both voluntary and involuntary informal workers without making this distinction.

Trade data is from the Institute for the Integration of Latin America and the Caribbean's database of the Inter-American Development Bank. Sectors originally classified according to the two-digit ISIC classification were matched to correspond to the 16 sectors considered. Data on machinery and equipment gross investment by manufacturing sector (at current prices) come from Centro de Estudios de la Producción, Ministry of Economy. Gross value added (at current prices) by manufacturing sector is available at the National Institute for Statistics and Census.

Finally, the average *ad valorem* import tariffs by manufacturing sector come from Galiani and Porto (2010). These originally come from official tariff schedules, which specify the tariff rate levied on each item of the Harmonised System (HS). Each heading in the HS is matched with its closest equivalent in the ISIC. Galiani and Porto (2010) explain with additional details this matching process. To aggregate at each industry-sector level, the median is taken from the item belonging to each sector.

IV.c. Results

Table 2 shows, for a subsample of the years considered (1994, 1997, and 2001), the main results from Equation (1) that correlate informality status with individual characteristics, including sector of employment.^{6,7} As expected, male, older, and more educated workers are less likely to be informally employed. Married individuals also have a lower propensity to work in the informal sector, while being the household head increases it. In terms of sector of employment, the degree of significance varies from year to year, though not the sign of the relationship with informality. Sectors such as metallic products, machinery and equipment, and transportation vehicles are consistently employing less informal workers compared to food and beverages (the base category in the regression), presumably due to higher unionisation rates.

Table 3, in turn, shows the set of industry-specific informality indicators (β_{ji}) for the period 1992-2003, as calculated following the regression specification in Equation (1) and normalised as deviations of coefficients on industry indicators with respect to the employment-weighted average informality rate (Krueger & Summers, 1988). As in Table 2, it confirms the existence of substantial differences in informality levels and evolution across manufacturing sectors in Argentina, even after accounting for differences in the composition of the workforce (age, gender, and education).

Table 2. Determinants of informality status ('absence of social security benefits'), Argentina, 1994, 1997, and 2001

	1994	1997	2001
Age	-0.025*** (0.001)	-0.028*** (0.001)	-0.029*** (0.002)
Age squared*100	0.026*** (0.002)	0.029*** (0.002)	0.029*** (0.002)
Male	0.002 (0.005)	-0.016*** (0.005)	-0.050*** (0.006)
Household head	0.005*** (0.001)	0.013*** (0.002)	0.009*** (0.002)
Married	-0.043*** (0.005)	-0.070*** (0.005)	-0.075*** (0.006)
Primary complete	-0.030*** (0.006)	-0.034*** (0.007)	-0.047*** (0.008)
Secondary incomplete	-0.128*** (0.006)	-0.117*** (0.007)	-0.151*** (0.008)
Secondary complete	-0.133*** (0.008)	-0.165*** (0.008)	-0.174*** (0.009)
Tertiary education	-0.145*** (0.007)	-0.189*** (0.008)	-0.218*** (0.009)
Textiles	-0.026 (0.022)	-0.173*** (0.025)	-0.100*** (0.041)
Clothing	0.097*** (0.019)	0.200*** (0.019)	0.021 (0.025)
Leather and footwear	0.154*** (0.021)	0.156*** (0.025)	0.180*** (0.034)
Wood and cork	0.115*** (0.036)	0.034 (0.040)	0.093* (0.051)
Paper	-0.042 (0.038)	-0.222*** (0.039)	0.022 (0.044)
Publishing and printing	-0.011 (0.019)	0.070*** (0.024)	0.011 (0.027)
Chemicals and petrochemicals	0.007 (0.020)	-0.014 (0.021)	-0.048*** (0.024)
Plastics and rubber products	-0.032 (0.022)	-0.087*** (0.026)	-0.124*** (0.033)
Non-metallic mineral products	-0.068*** (0.027)	-0.059* (0.032)	-0.066 (0.044)
Basic metallic products	-0.126*** (0.037)	-0.092*** (0.045)	-0.174*** (0.052)
Fabricated metallic products	-0.041*** (0.014)	-0.092*** (0.019)	-0.049*** (0.023)
Machinery and equipment	-0.046*** (0.020)	-0.044*** (0.023)	-0.069*** (0.030)
Electrical and electronic equipment	-0.101*** (0.026)	-0.015 (0.022)	0.112*** (0.041)
Transportation vehicles	-0.136*** (0.017)	-0.138*** (0.020)	-0.158*** (0.033)
Furniture and other	0.030* (0.018)	0.041* (0.023)	-0.058*** (0.030)
Regional indicators	Yes	Yes	Yes
Observations (unweighted)	26,627	29,686	20,581
Adjusted R2	0.094	0.110	0.118

Notes: Authors' calculations based on EPH, October issues. Sample considers full time (more than 20 hours worked) paid workers, between 18 and 65 years old. Survey's population weights considered. ***significant at 1 per cent level. **significant at 5 per cent level. *significant at 10 per cent level.

Table 3. Normalised industry informality differentials, Argentina, 1992–2003

Sector	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Food, beverages, and tobacco	-0.057	-0.023	-0.028	-0.007	-0.020	-0.013	-0.011	-0.034	0.010	-0.024	-0.024	-0.003
Textiles	-0.132	-0.056	-0.001	-0.035	-0.054	-0.137	-0.024	-0.045	-0.055	-0.053	-0.011	0.013
Clothing	0.021	0.179	0.103	0.108	0.195	0.233	0.124	0.112	0.137	0.062	0.217	0.124
Leather and footwear	0.208	0.188	0.180	0.137	0.049	0.194	0.135	0.088	0.041	0.237	0.159	0.246
Wood and cork	0.154	0.058	0.145	0.044	0.139	0.071	0.117	0.138	0.071	0.137	0.128	0.067
Paper	-0.023	-0.093	-0.028	-0.023	-0.045	-0.184	-0.103	0.235	-0.085	0.066	-0.248	-0.334
Publishing and printing	-0.036	-0.060	0.003	-0.067	0.037	0.074	0.012	0.094	0.024	0.031	-0.136	-0.020
Chemicals and petrochemicals	-0.071	-0.035	0.028	-0.026	-0.071	-0.019	-0.050	-0.048	-0.077	-0.033	-0.016	-0.107
Plastics and rubber products	0.038	-0.035	-0.010	0.000	-0.106	-0.065	-0.029	-0.107	-0.163	-0.078	-0.024	-0.198
Non-metallic mineral products	0.045	0.016	-0.046	-0.014	-0.030	-0.024	0.026	0.060	-0.026	-0.034	0.108	-0.048
Basic metallic products	-0.046	-0.075	-0.104	-0.071	-0.162	-0.106	-0.136	-0.111	-0.125	-0.158	-0.093	-0.211
Fabricated metallic products	0.012	-0.044	-0.018	0.024	-0.045	-0.061	0.038	-0.028	-0.035	-0.010	-0.034	0.031
Machinery and equipment	-0.019	-0.019	-0.019	-0.050	-0.059	-0.038	-0.143	-0.036	0.023	-0.031	-0.083	0.015
Electrical and electronic equipment	0.029	-0.093	-0.080	0.007	-0.040	-0.010	-0.010	0.000	0.039	0.146	0.013	-0.081
Transportation vehicles	-0.056	-0.026	-0.112	-0.039	0.011	-0.142	-0.131	-0.101	-0.036	-0.126	-0.170	-0.058
Furniture and other	0.085	0.063	0.052	-0.023	0.135	0.061	0.102	0.061	0.074	-0.017	0.026	-0.016

Notes: Authors' calculations based on EPH (October issues). Survey's population weights considered. Informality differentials by industry are calculated by regressing an informality indicator on age, age squared, gender, household head indicator, education indicators, marital status, geographic location, and a set of industry indicators. Reported industry informality differentials are calculated as deviations of coefficients on industry indicators with respect to the employment-weighted average industry differential.

The main econometric results appear in [Table 4](#). For comparison purposes, when using dynamic panel estimation (we lose one year of lag), the analysis is concentrated on 1993–2003 (1992 is the first period lag). We first consider a regression of the estimated normalised industry-specific informality coefficients (β_{jt}) on tariff rates by industry, controlling for industry and year fixed-effects (column 1). Tariffs induce a statistically significant negative effect on informality, implying that a reduction of average tariffs by 1 per cent produces an increment in informality rates by 0.55 per cent. Column 2 excludes 2002 and 2003 from the analysis for robustness, given the inclusion of two severe crisis years in which informality grew substantially. The effect of tariffs increases in magnitude and statistical significance. The rest of the analysis continues with those years included.

In columns 3 and 4 we add exports and imports (standardised by the value of production) as additional covariates. While imports and exports per se are not statistically significant, the effect of tariffs on informality is robust to the inclusion of these variables, implying that a similar reduction in tariffs would produce an increment in informality of 0.6 per cent. Exports and imports show opposite signs, implying that the manufacturing sectors with high export ratios have less informality, while high import ratios increase informality. This implies that the sector performance on international markets affects the formality rates of its labour force. These results are consistent with the hypothesis that trade openness makes firms reduce job formality in order to cope with international competition. However, this can be seen as a partial equilibrium effect, which does not account for the full (general or global) effect of trade openness, and there might be potential endogeneity bias in our estimates.

First, governments might reduce tariffs in those industries in which organised labour was weaker (and hence informality larger). This does not generate bias as long as the fixed-effects by industry capture the nature of labour organisation, which is the case in Argentina, where historical labour unions are attached to different industries. Moreover, these political economy considerations for tariff settings are less of a concern since tariff levels in Argentina are actually not determined at the sole discretion of the country but at the MERCOSUR level (in agreement with governments from neighbouring countries participant in the trade block). Thus, we are confident that tariffs can be used to identify exogenous changes to trade policy that are not affected by informality

Second, tariff reductions (and presumably other measures that affected labour informality) might have been compensated by the government by increasing industry-specific subsidies or non-tariff trade barriers. This would determine that the estimated effect of tariffs on informality would be biased upwards, and, therefore, tariffs might have induced a larger (negative) effect. We were not able to construct a panel of government subsidies and non-tariff barriers by industry, and, therefore, our estimates should be considered as a lower bound (in absolute value) with potentially larger effects. Nevertheless, it should be emphasised that much of the trade liberalisation policy in the 1990s was accompanied with other policies of general liberalisation in the economy, with overall reduction in state subsidies across all sectors.

Third, tariff elimination could make it more profitable for firms to enter and less profitable to exit the industry, and could promote export-oriented firms (Acosta & Montes-Rojas, 2008). Our own estimates on the effect of exports on informality (column 3) suggest this hypothesis. Thus, the change in the industry composition after trade opening can exert an effect on the sector's informality levels. We test this hypothesis by including the ratio of GVP to employment in each industry, a proxy for labour productivity, but we do not find evidence that less productive firms are associated with higher informality levels (column 5).

Fourth, trade liberalisation also reduces the cost of acquiring new technology through the reduction in the cost of imported capital goods, as argued for Argentina in Acosta and Gasparini (2007). Using an efficiency wage argument, if firms can upgrade to a better technology, they may be able to offer better job conditions to its labour force in order to maintain the best workers. We test for this hypothesis by including the ratio of investment to gross value of production in the regression, as well as its interaction with the tariffs variable. This last variable is thus intended to identify simultaneous effects of trade liberalisation on the industry and, in particular, changes in the technology. The results in column 6 show that, as expected, sectors that invest more have a lower incidence of informality and that they also have a lower impact of tariff reduction on informality. For instance, a

sector with no investment would have an increment of 0.85 per cent in informality after a 1 per cent reduction in tariffs. However, a sector with an average investment rate of 10 per cent would have an impact of only 0.28 per cent ($= 0.85 - 5.72 \times 0.1$). Furthermore, a sector with an investment ratio above 15 per cent would have a positive effect of tariff reduction on informality.

As a robustness check of the previous results, we also introduce the lags of the considered covariates, together with the lag of the dependent variable. The results in column 7 confirm that there is a negative relation between trade liberalisation and informality, again with an average elasticity close to 0.6 in absolute terms. In fact, the results show that only the contemporaneous effect is significant. This determines that the sectors adjust relatively fast to trade openness. The lagged dependent variable appears as non-statistically significant in both specifications and, therefore, the fixed-effects model does not require a dynamic specification (with the consequent use of instruments for eliminating potential dynamic panel bias). Further analysis reveals that the inclusion of the year dummies produces this lack of significance, which means that many sectors behave similarly across periods and that they are affected by common shocks. The interaction of investment and tariffs produces similar effects.

As mentioned before, the dependent variable in Table 4 corresponds to the set of industry-specific informality indicators (β_{jt}) that net out individual characteristics. But, as an additional robustness check, Table 5 reports estimates using as the dependent variable the raw (unadjusted) informality ratios by industry, already presented in Table 1. As seen, the main conclusions with respect to the role of tariffs, exports, and imports in explaining informality are unaffected when we use informality rates (though statistically significant levels vary). But, given that this alternative variable omits individual

Table 4. Determinants of labour informality: industry-level fixed effects

Dependent variable: industry informality differentials (β_{jt})	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tariffs	-.554* (.319)	-.698** (.313)		-.596* (.349)	-.592* (.334)	-.851** (.342)	-1.030** (.401)
Exports (% of GVP)			-.067 (.028)	-.052* (.028)	-.091* (.049)	-.079*** (.026)	-.036 (.082)
Imports (% of GVP)			.083 (.053)	.083 (.053)	.079 (.062)	.081 (.066)	.045 (.086)
Labour productivity (GVP/L)					-.024 (.062)		
Investment (% of GVP)						-.761** (.333)	-1.300* (.670)
Investment (% of GVP) * Tariffs						5.720** (2.390)	8.980** (4.310)
Lagged one period							
Tariffs							-.016 (.090)
Exports (% of GVP)							.362 (.405)
Imports (% of GVP)							-.068 (.083)
Investment (% of GVP) * Tariffs							.075 (.078)
Investment (% of GVP)							-6.930 (4.270)
Observations	176	144	176	176	171	171	169

Notes: All specifications include industry and year fixed effects. Column (2) excludes 2002 and 2003. Robust standard errors adjusted for industrial clusters. Tariffs: average tariffs by industry. ***significant at 1 per cent level. **significant at 5 per cent level. *significant at 10 per cent level.

Table 5. Determinants of labour informality: industry-level fixed effects

Dependent variable:	Industry informality differentials (β_{it})	Non-adjusted industry informality rates	Industry informality differentials (β_{it})	Non-adjusted industry informality rates
Tariffs	-.554* (.319)	-.550* (.315)	-.596* (.349)	-.534 (.356)
Exports (% of GDP)			-.052* (.028)	-.048** (.022)
Imports (% of GDP)			.083 (.053)	.038 (.058)
Observations	176	176	176	176

Notes: All specifications include industry and year fixed effects. Robust standard errors adjusted for industrial clusters. Tariffs: average tariffs by industry. ***significant at 1 per cent level. **significant at 5 per cent level. *significant at 10 per cent level.

factors not related to industry effects, we prefer to use the corrected measure proposed by Goldberg and Pavcnik (2003) for the rest of the analysis.

Finally, following Bosch et al. (2012), to overcome remaining concerns that tariffs could be an endogenous variable for the impact of trade liberalisation on informality, we also consider the dynamic panel GMM estimator model of Arellano and Bond (1991). We use first differences and lags of the dependent variable, together with X and M , as instruments for solving the potential dynamic panel data bias and endogeneity. All the variables are treated as potentially endogenous, including *Tariff*, to which the same set of instruments is applied. Results for this specification are presented in Table 6. Note that the results are very close to those in Table 4, which we keep as the preferred specification.

Figure 4 shows the actual evolution of informality rates and its predicted evolution using our preferred elasticity of 0.6 per cent, starting with the 1992 average tariff level. Our results suggest that trade liberalisation in the form of tariff reduction can explain around a third (32%) of the observed increase in informality in Argentina between 1992 and 2003. This impact is large compared with those for Colombia, reported in Goldberg and Pavcnik (2003), in the order of 10–15 per cent. Moreover,

Table 6. Determinants of labour informality: Arellano-Bond GMM estimator

Dependent variable: informality	(1)	(2)
Tariffs	-.657** (.331)	-.902** (.306)
Exports (% of GDP)	-.058* (.030)	-.082*** (.024)
Imports (% of GDP)	.082 (.051)	.088 (.069)
Investment (% of GDP) * Tariffs		5.740** (2.320)
Investment (% of GDP)		-.757** (.324)
Lagged one period Informality	-.035 (.049)	-.045 (.046)
AR(2) test, p-value	.575	.453
Hansen test, p-value	1.000	1.000
Observations	160	153

Notes: All specifications include industry and year fixed effects. Robust standard errors adjusted for industrial clusters. Tariffs: average tariffs by industry. ***significant at 1 per cent level. **significant at 5 per cent level. *significant at 10 per cent level.

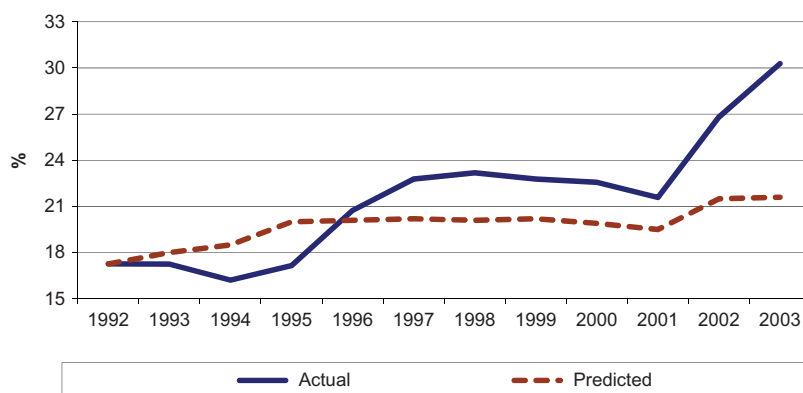


Figure 4. Actual and predicted informality rates in the manufacturing sector.

Source: Authors' calculations based on the estimated 0.6 elasticity starting at the 1992 average tariff level.

they contrast to those for Brazil in Goldberg and Pavcnik (2003) and Bosch et al. (2012), both of which find no relationship between informality and trade, as well as Aleman-Castilla (2006), which shows a negative relationship for Mexico.

V. Conclusion

This paper tests for the effect of trade liberalisation on informality using industry-level data for Argentina. The results suggest that informality has significantly increased in those manufacturing sectors in which trade liberalisation has been more intense. The econometric results show that a reduction of average tariffs by 1 per cent produces an increment in informality rates by 0.6 per cent. However, sectors with higher investment ratios were able to neutralise and reverse this effect. These results are robust to trade variables capturing the export/import orientation of the sector.

These estimated impacts could actually be a lower bound of the full effect of trade liberalisation on informality. This is because workers who lost their formal manufacturing jobs due to trade liberalisation might end working in an informal job in the non-manufacturing sector. During the 1990s in Argentina there was an increment in the number of informal jobs in the service sector and a reduction in the number of formal jobs in the manufacturing sector, suggesting that this could have been an important channel of adjustment of the labour market to trade liberalisation. Further research is needed to understand the trade effects on overall labour markets that include the service sector. Finally, because workers can move across sectors, a tariff reduction in manufacturing sector j may not only affect the informality rate in j but can also affect the informality rate in other manufacturing sectors. This problem is also likely to bias the estimates downwards.

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Notes

1. A thorough description of the 2002 Argentinean crisis and its effects on labour markets can be found in McKenzie (2004).
2. We use this strict definition of labour informality because pension contributions, basic health insurance, paid vacations, and yearly bonuses are all legally-mandated social security benefits in Argentina, so non-compliance with any of them would

result in a violation of the labour laws. As the literature has suggested, alternative definitions of labour informality may include the self-employed and workers in micro-firms.

3. To mention a few studies applying this procedure: Acosta and Gasparini (2007); Attanasio, Goldberg, and Pavcnik (2004); Pavcnik et al. (2004).
4. Urban areas considered are: Buenos Aires City, Gran Buenos Aires, Bahía Blanca, Catamarca, Comodoro Rivadavia, Córdoba, Corrientes, Formosa, Jujuy, La Plata, La Rioja, Mar del Plata, Mendoza, Neuquén, Paraná, Posadas, Resistencia, Río Cuarto, Río Gallegos, Rosario, Salta, San Juan, San Luis, Santa Fe, Santa Rosa, Santiago del Estero, Tierra del Fuego, and Tucumán. These areas account for nearly two-thirds of the country's population.
5. Primary education in Argentina consists of seven years of schooling, while secondary education comprises five years of schooling.
6. Results for other years do not differ much from those reported, and are available upon request.
7. Following the standard methodology in the literature, we use a linear probability model. The range of predicted values shows that the linear model performs well for this sample. Results using logit or probit model are similar to those of the linear probability model.

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