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**Tackling Business
and Labour Informality
in Chile**

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ABSTRACT/RESUME

Tackling business and labour informality in Chile

Informality often arises from disincentives associated with high taxes and a restrictive regulatory framework in both labour and product markets. About 20% of the Chilean population aged 15 years and above and working at least 20 hours per week did not have a formal labour contract in 2006. At the same time, nearly 11% of the potential value added tax base is estimated to have been undeclared in 2005. While Chile's tax system is not particularly burdensome to business formality, there is scope for making product-market regulations less onerous to firms and the labour code more flexible, especially with regards to indefinite contracts and the allocation of working time. Low human capital remains an important obstacle to reducing labour informality. To the extent that informal businesses also hire informally, there is some room for designing policies to tackle business informality in conjunction with those aimed at boosting formal labour contracting. Chile is strengthening its social safety net through the introduction of unemployment insurance and by reforming existing health insurance and pension systems. An important policy question is whether the incentives for formality arising from more comprehensive social protection will be strong enough to compensate for the additional costs these contributory programmes entail. This paper relates to the *2007 Economic Survey of Chile* (www.oecd.org/eco/surveys/chile).

JEL codes: J21, J42, O17

Keywords: informality, social protection, human capital, product market regulations

S'attaquer à l'activité informelle au Chili

L'activité informelle résulte souvent de contre-incitations liées au niveau élevé des taux d'imposition et à un cadre réglementaire restrictif, tant sur le marché du travail que sur les marchés de produits. Environ 20 % des Chiliens âgés de 15 ans et plus et travaillant au moins 20 heures par semaine n'avaient pas de contrat de travail en 2003. En même temps, environ 40-50 % des entreprises auraient des activités informelles et l'on estime que près de 11 % des activités soumises à la taxe sur la valeur ajoutée n'ont pas été déclarées en 2005. Même si le système fiscal du Chili ne pèse pas excessivement sur le secteur formel, il est possible de rendre la réglementation des marchés de produits moins coûteuse pour les entreprises et d'assouplir le code du travail, surtout en ce qui concerne l'affectation du temps de travail. Dans la mesure où les entreprises du secteur informel emploient aussi une main-d'œuvre non déclarée, il est possible d'élaborer des politiques en vue de s'attaquer à l'activité informelle, associées aux mesures visant à stimuler l'offre de contrats de travail officiels. Le Chili renforce actuellement son filet de sécurité sociale en mettant en place une assurance chômage et une réforme des systèmes existants d'assurance maladie et de pensions. Une question importante qui se pose est celle de savoir si une protection sociale plus étendue créera des incitations à l'activité formelle assez puissantes pour compenser les coûts additionnels que ces programmes contributifs entraînent. Ce document se rapporte à l'*Étude économique du Chili 2007* (www.oecd.org/eco/etudes/chili).

Classification JEL : J21, J42, O17

Mots-clés : informalité, protection sociale, capital humain, réglementation des marchés des produits

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Tackling business and labour informality in Chile

By

D. Contreras, L. de Mello and E. Puentes¹

It is not easy to measure accurately the extent of informality in the labour market and in the business sector. On the basis of household survey (CASEN) data, slightly more than 20% of the Chilean population aged 15 years and above engaged in full-time work (at least 20 hours per week) did not have a formal labour contract in 2006, which is a conventional metric for labour informality. The ratio is higher, at about 33% of the working population, if individuals working in enterprises with 1-49 employees are considered informal. With regards to business informality, about 40-50% of enterprises are deemed to operate informally, and nearly 11% of the potential tax base of the value added tax, which accounts for nearly one-half of central government revenue, is estimated to have been undeclared in 2005.

International experience suggests that informality often arises from disincentives associated with high taxes and a restrictive regulatory framework in both labour and product markets, which is burdensome on businesses, especially small and medium-sized enterprises (SMEs). On the basis of the OECD indicators of restrictiveness in product market regulations (PMR) and stringency in employment protection legislation (EPL), informality appears to be more closely associated with cumbersome regulations than with the burden of taxation. At the same time, the level of education of the labour force, which is still low by OECD benchmarks, makes it difficult for employers to hire low-productivity workers formally. The empirical evidence reported in this paper suggests that low human capital is a powerful impediment to reducing labour informality in Chile. There is therefore room for policy action to tackle the remaining obstacles to better labour utilisation and to enhancing the business environment.

The main determinants of business informality

Informality in the business sector is conventionally gauged on the basis of non-compliance with tax obligations and business regulations.² As such, a burdensome tax system – with high statutory rates, complex provisions and an inefficient, unfriendly tax administration – and a regulatory framework in product and labour markets that impedes competition are the main reasons why enterprises choose to operate informally. Informality not only has fiscal repercussions, given the revenue foregone, but it also

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2. See Schneider (2004) and Alm *et al.* (2006) for recent surveys on how to measure business informality.

affects economic efficiency, because firms are denied access to credit, government support for innovation and labour training, as well as legal protection. While Chile's low tax burden does not particularly discourage business formality, there is scope for making product-market regulations less burdensome to firms and the labour code more flexible.

Incentives for informality arising from the tax system

On the basis of estimates currently available, tax evasion appears to be declining over time. It is difficult to estimate its prevalence, because it is not observed directly and therefore needs to be inferred from observable data (Box 1). Estimates for the corporate income tax (*Impuesto de primera categoría*, IPC) suggest that evasion accounted for about 40% of potential collection in 1997, which is considerably less than the 58% rate estimated for 1989 (Jorratt and Serra, 1999). Three-quarters of this estimated evasion is due to non-compliance with the value added tax (VAT) code: businesses that are not VAT-registered taxpayers most probably also evade other taxes. The remainder is due to under-invoicing of taxable income, abuse of presumptive taxation provisions and over-invoicing of expenditure, among other usual practices. In the case of the VAT, the evasion rate was estimated at about 11% in 2005, down from nearly 24% in 1998 (SII, 1996 and 2005). It is also estimated to exhibit considerable disparity across sectors, ranging from 13% in hotels and restaurants to 73% of sales in the case of retailing (Engel *et al.*, 1998). Empirical evidence suggests that compliance tends to rise in tandem with economic growth and trade openness, given that it is more difficult to evade taxes paid on imports than on domestic consumption (Serra, 2003).

Box 1. Estimating tax evasion

Tax evasion is not observed directly and therefore needs to be estimated. Conventional methods consist of comparing effective and potential collection, where potential revenue is computed on the basis of the national accounts and/or audits carried out by the tax authority.

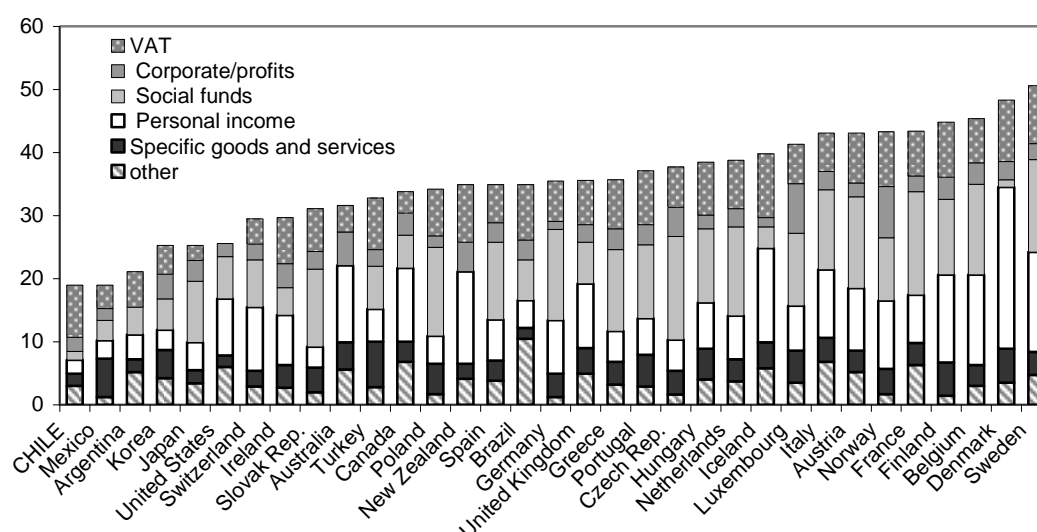
Both methods are fraught with problems; therefore, estimates should be interpreted with caution. Computation of potential revenue depends on the quality of national accounts statistics, which are measured with error and use tax returns to estimate several types of income. Also, assumptions need to be made to exclude from the national accounts aggregates those transactions that are exempt from taxation. Moreover, the methodology does not allow for distinguishing tax avoidance, which is not unlawful, from outright evasion, which is. In turn, estimating evasion on the basis of audit reports depends on the quality of tax administration, which determines the tax authority's ability to correctly identify instances of avoidance and to enforce compliance with the tax code. On a more technical level, this method also suffers from a sample selection bias, because the enterprises that are audited are those that are estimated to have a higher probability of non-compliance, instead of being selected randomly.

In the particular case of sales taxes or VAT, for example, evasion can be estimated by comparing average daily sales over a given period with sales made on a day when the taxpayer was visited by a tax inspector. This is based on the premise that non-compliance is likely to be low, if at all possible, on such a day. The difficulty of this method is that daily sales fluctuate over time and across establishments, and inference depends on the analyst's ability to distinguish fluctuations that are due to the audit effect from those that are associated with the underlying distribution of sales across businesses and over time.

As a result of these methodological difficulties, estimates of VAT evasion vary considerably across countries. In the European Union, for example, evasion rates are estimated to have ranged from about 2.5% of the computed potential tax base in the Netherlands to over 34% in Italy on average during 1994-96 (Nam *et al.*, 2003). Chile is in an intermediate range of estimates on the basis of the 11% evasion rate estimated by SII for 2005 (SII, 1996 and 2005). In the case of Colombia, a regional comparator for which information is readily available, VAT evasion was estimated at about 28% in 1994, with a higher rate for domestically produced goods and services than for imports (Steiner and Soto, 1998).

Figure 1. **Composition of tax revenue: Argentina, Brazil, Chile and OECD countries, 2003**

In % of GDP



Source: OECD (Revenue Statistics), SII for Chile and SRF for Brazil, and OECD calculations.

Chile's revenue-to-GDP ratio is low by OECD standards (Figure 1). This is true even if social security contributions are excluded in the case of the OECD countries to facilitate comparison in light of the privatisation of the social security system in Chile in the early 1980s. International experience suggests that tax evasion tends to rise with the tax rate, because the gains associated with avoidance are potentially large, even when the probability of detection is taken into account. Also, reliance on the VAT – which accounts for nearly 44% of revenue in Chile in 2006 – discourages informality as a result of the invoice-credit mechanism used for collection. This is because a registered taxpayer has a strong incentive to purchase intermediate goods and inputs from another registered taxpayer to obtain a credit for these purchases. When purchases are made from an informal enterprise, they cannot be credited against the registered taxpayer's tax liabilities.

Although there is no comparable estimate for Chile, complexities in tax filing requirements often put a compliance burden on individuals and enterprises, especially SMEs, which encourages informality.³ International evidence suggests that compliance costs are in the neighbourhood of 3-5% of collections for the VAT and retail sales taxes.⁴ Compliance costs are higher for the preparation of tax returns and documentation of tax exemptions. In particular:

- With regards to the VAT, the fact that the tax is uniformly rated at 19% across goods and services in Chile and has relatively few exemptions reduces the cost of compliance with the tax code. But the absence of a threshold for VAT registration probably overburdens small enterprises. Several OECD countries also do not have a registration threshold (Belgium, Italy,

3. The firm-level evidence reported by de Paula and Scheinkman (2006) for Brazil suggests that business formality is correlated with firm size, investment per worker and the capital-labour ratio, controlling for the quality of entrepreneurship.

4. For the United States, for example, compliance with state and local sales tax legislation is estimated to have cost 3% of total sales in 2003 on average, including 13.5% for smaller retailers and 2.2% for the large ones (PricewaterhouseCoopers, 2006). Estimates for the VAT are in the neighbourhood of 3-5% (Slemrod, 1996).

Korea, Mexico, among others), while the level of these thresholds varies considerably in other countries: in the range of less than EUR 10 000 in annual turnover in Finland, Greece and Poland, among others, and between EUR 50 000-80 000 in Ireland and France, for example.⁵ International experience suggests that setting the level of this threshold depends on a trade-off between revenue yield and enforcement/collection costs: a high enough threshold reduces such costs but leaves a large number of businesses out of the tax net.⁶ At the same time, the invoice-credit system imposes financial costs on businesses in Chile, although the time for processing credits is set to come down from 30 days to 8-15 days on average.

- In the case of the income tax, compliance costs are likely to be high due to greater complexity in the tax code than in the case of the VAT. In particular, a discrepancy between the top marginal rate for the personal income tax (currently at 40%) and the uniform corporate tax rate (currently at 17%) creates incentives for individuals to incorporate themselves, although the tax code bans the inclusion of personal expenses in the calculation of tax liabilities other than those related to the enterprise's income-generating activities. In doing so, they can reduce their tax liabilities through a variety of mechanisms, including by claiming personal expenses as business costs. It is important to recognise that this type of tax arbitrage is not cost-free, since it creates a compliance cost for the taxpayer, which may ultimately lead to evasion, in addition to burdening the tax administration. On the other hand, despite the opportunity it creates for tax arbitrage, this gap in rates has allowed firms to finance expansion through retained earnings. It can be argued that the availability of internal sources of finance is important in periods of financial distress and for firms with limited access to external funds.
- Compliance costs also include the time it takes to pay taxes. A new tax system for SMEs introduced in 2007 is aimed at reducing the time and cost of filing taxes, as noted below. But, on the basis of indicators computed by PricewaterhouseCoopers and the World Bank (2006), Chile fares rather poorly in comparison with OECD countries: it takes almost twice as long to comply with the tax code in Chile as in the OECD area on average. Chile fares even worse against the small open economies in the OECD area, such as Ireland and New Zealand, where the time it takes to pay taxes is on average one-third of Chile's. In the case of SMEs, the number of taxes and local charges and fees they have to pay is high in comparison with other Latin American countries, which exacerbates the compliance-cost asymmetry between large and small businesses (Tokman, 2001).

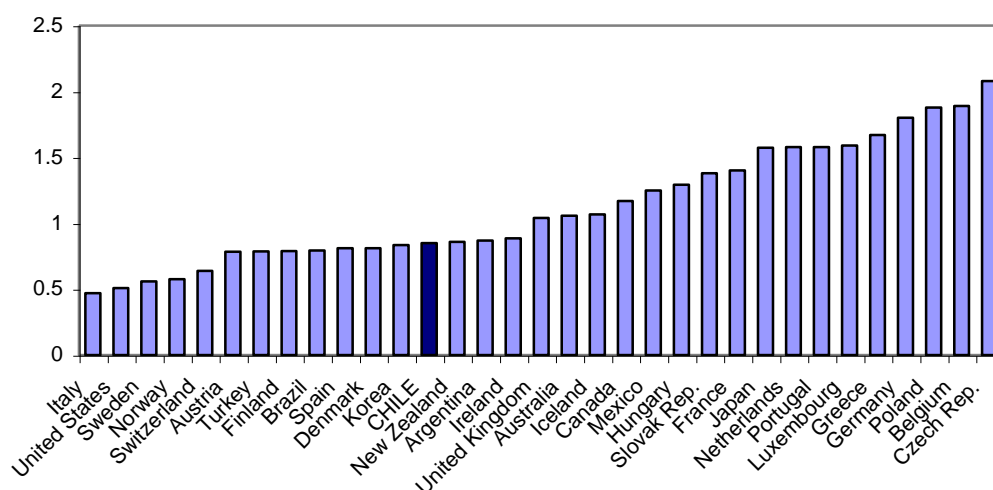
Enforcement also creates costs for tax administration, which tend to rise with the complexity of the tax code. The extent to which an increase in spending on tax enforcement results in a more than commensurate increase in compliance is an empirical question. Evidence for Chile suggests that the payoff of increased emphasis on enforcement can be large. It was estimated in 2001 that a 10% hike in spending on enforcement could reduce VAT evasion from 23% of the computed potential base to 20% (Engel *et al.*, 2001). Much has been done over the last few years to improve Chile's tax administration (see below), and, therefore, it is likely that this payoff is now lower than estimated in 2001. Also, Chile's lean tax administration compares favourably with countries in the OECD area on the basis of the ratio of administrative expenditures on tax administration to net collections (Figure 2). Albeit crude, this ratio is a conventional metric for overall tax administration efficiency.

5. See OECD (2006) for more information.

6. While exemption thresholds vary considerably across countries, exemptions typically affect agricultural goods and selected inputs, fuels, passenger transport, and selected financial transactions and services. See Ebrill *et al.* (2001) for more information.

Figure 2. Tax administration efficiency: OECD and non-OECD countries, 2003

Ratio of administrative costs to net revenue collections (in per cent, 2000-04 average)



Source: OECD (Tax Administration Database).

Efforts to combat business informality have focused on strengthening tax administration and reducing compliance costs. Legislation was approved in 2001 (*Ley Contra la Evasión*) introducing several measures that were implemented during 2001-05, including targets for net increments in revenue collection associated with enforcement of the tax code. Emphasis was placed on boosting coordination between the internal revenue and customs administrations, as well as with the Treasury. A large taxpayers unit was set up, and the VAT and income tax codes have been amended to improve clarity and eliminate legal loopholes. Sanctions for non-compliance have been strengthened.

Successful implementation of the law is associated with a reduction in the estimated VAT evasion rate from about 20% in 2000, the reference year against which the performance targets were set, to about 11% in 2005-06. The improvement in compliance is due to greater emphasis on the part of the tax authority on improving audit standards and capabilities, including through a better screening of taxpayers to be audited. The tax authority has also become more responsive to taxpayers' needs, as evidenced by the taxpayers' satisfaction surveys conducted since 2000. Moreover, conflict resolution is being enhanced through the creation of 16 independent Tax Courts. This measure is expected to speed up legal procedures and strengthen the protection of taxpayers' rights, because first-instance rulings on disputes between taxpayers and the tax authority are currently made by the tax administration, which is believed to create an anti-taxpayer bias in dispute settlements.

Effort has been made to improve taxpayer services to SMEs, especially through e-government. Measures include: greater ease for small enterprises to register electronically as taxpayers; to file and pay taxes; to obtain general information on how to close a business (*Portal PyMEs*); and to liaise with SME associations to raise awareness about taxpayer's rights and obligations, and to facilitate access by these enterprises to the necessary ICT tools and internet access points.⁷ A simplified system was introduced in 2007 for SMEs to reduce the time and cost of filing taxes. In this system, SII uses electronic invoicing to

7. There is no unique definition of SMEs. SII defines micro enterprises as those with annual sales below 2 400 UF, small enterprises as those with annual sales between 2 400-25 000 UF, and medium-sized enterprises as those with annual sales between 25 000-100 000 UF. Based on this definition, SMEs account for about 99% of businesses in Chile.

process the taxpayers' information on purchases and sales and uses it for the purpose of tax pre-filing via the Internet. This strategy aims not only at reducing compliance costs, but also at encouraging the use of ICT tools in commercial operations at large, making enterprises more competitive. Electronic invoicing has also been available since late 2003, including for professional services.⁸ In the case of SMEs, legislation was adopted in late 2005 making the assignment of invoices more flexible, swifter and cheaper, particularly if electronic invoicing is used. The law grants the right of execution to electronic invoices and provides for the assignment of electronic invoices to be notified by electronic registration. Experience to date has been successful. As of October 2007, 5 800 firms had already adopted electronic invoicing, about 67% of which are SMEs.

Incentives for informality arising from product-market regulations

The argument about compliance and enforcement costs applies not only to taxes, but also to regulations in product markets. The empirical evidence reported by de Mello (2008a) for a sample of OECD and non-OECD countries suggests that, in addition to the quality of tax administration, a pro-competition business environment and a flexible labour code are associated with greater compliance with the tax code, at least as gauged by VAT productivity. Of particular relevance in the empirical analysis are regulations on business start-ups, which is an area where Chile still has some way to go to make its regulatory framework in product markets less onerous to business and therefore more conducive to formality.

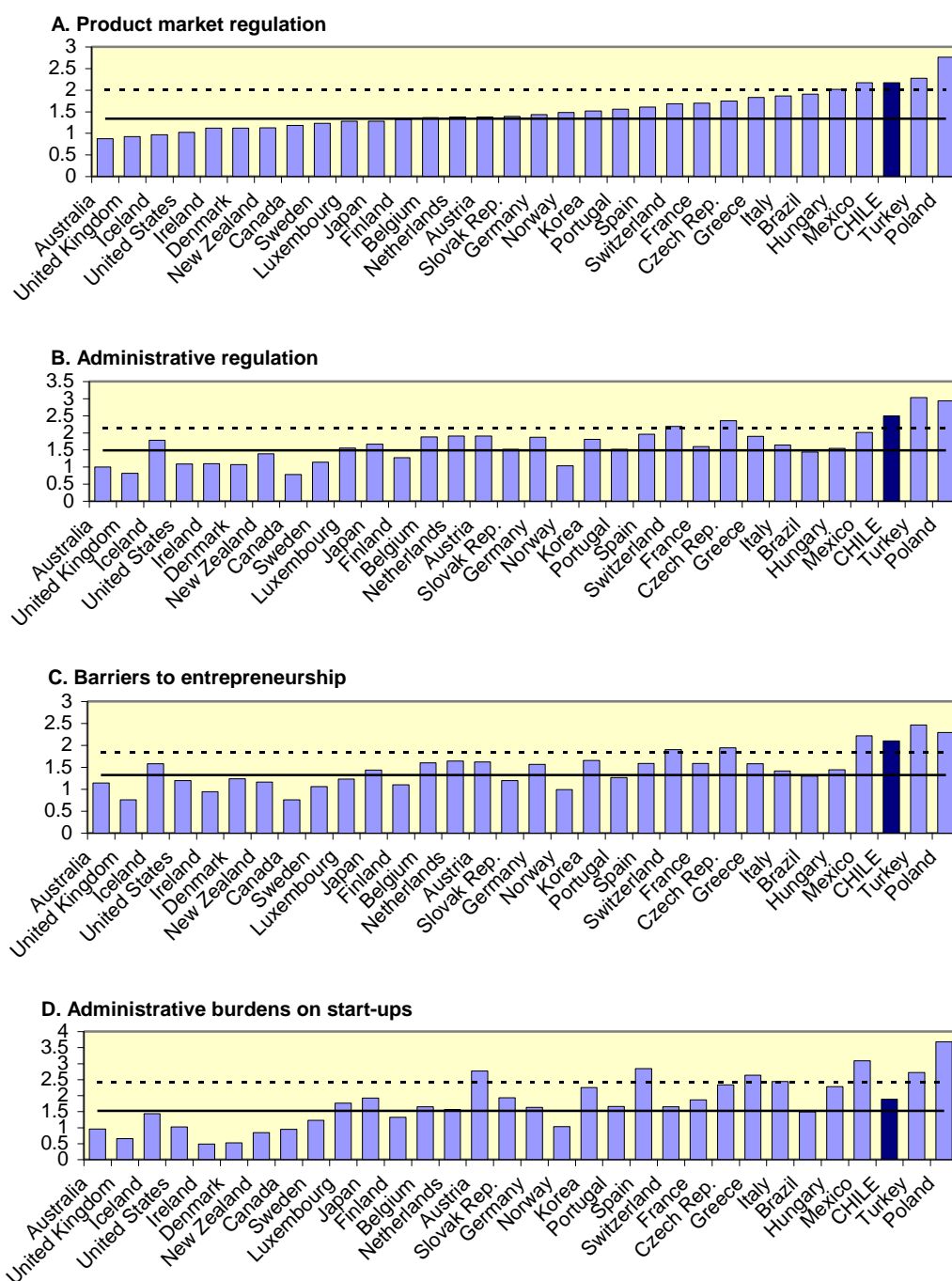
Chile's regulatory framework in product markets is reasonably pro-competition, but there is considerable scope for improvement. On the basis of the OECD indicator of PMR restrictiveness reported in OECD (2003), administrative regulation is more onerous in Chile than in the OECD area, and the country's indicators of barriers to entrepreneurship and regulatory burdens on start-ups is sub-par by OECD standards (Figure 3). This is consistent with the 2005 *Doing Business* indicators calculated by the World Bank, according to which the cost of obtaining licenses as a share of per capita income is high in Chile in relation to OECD comparators. By the same token, opinion surveys conducted with informal enterprises suggest that the number and cost of procedures, as well as a lack of information, are the most important factors discouraging them from applying for municipal licenses (González Garay and Kühn Barrientos, 2004). Regulation on closing a business is burdensome in terms of the time needed for closures (nearly 5.5 years in Chile, as opposed to less than 2.5 on average in the OECD area) and costly (14.5% of the estate in Chile, against 9% on average in the OECD area). Chile also ranks well behind OECD countries (with the exception of Italy, Mexico, Poland and Turkey) in the area of contract enforcement.

Attempts have been made in recent years to address these weaknesses. For example, since early 2006, it has been possible to start and close a business electronically, at least from the point of view of tax administration. New businesses can now register and obtain a taxpayer number (*Rol Unico Tributario, RUT*) on-line. They can also file and pay taxes through the SII website. A lack of internet access and skills in using ICT technologies nevertheless remains an obstacle in the case of SMEs. Effort is therefore being stepped up to set up regional centres providing internet access and disseminating information on taxpayer rights among SMEs. The authorities are also working with the municipalities to simplify procedures for business registration and those regulations that are typically under the purview of local governments. A comprehensive policy strategy (*Chile Emprende Contigo*) was launched in 2007 to address the main difficulties of the SME sector by seeking to simplify the regulatory framework for these enterprises, facilitate their access to credit and foster entrepreneurship and competitiveness.

8. The ensuing reduction in transaction costs is sizeable, especially for SMEs. Other costs, such as those related to the storage of tax documentation, are also reduced. The Santiago Chamber of Commerce estimates that savings may reach up to 0.5% of GDP.

Figure 3. **Product market regulations: Chile, Brazil and OECD countries, 2003**

0-6 increasing scale from least to most restrictive



1. The solid horizontal line refers to the OECD average, excluding the emerging-market economies within the OECD area. The dashed line refers to the average of the emerging-market economies within the OECD area (Czech Republic, Hungary, Korea, Mexico, Poland, Slovak Republic and Turkey) and Brazil.

Source: OECD.

Box 2. Measuring labour informality

It is not easy to define and measure informality in a comparable manner across countries. Conventional metrics focus on enterprise size, individuals' labour-market status and social security coverage of the labour force.¹ There is no universally accepted definition of labour informality, even in the OECD area.

Definitions based on firm size and labour-market status treat as informal those workers employed in low-productivity, precarious jobs. Because labour productivity and job precariousness are not directly observable, conventional proxies are used instead. A worker employed in a small-scale, often family-based enterprise, as well as the self-employed, are therefore typically considered informal. This definition would nevertheless treat own-account white-collar professionals as informal, while these individuals are likely to be well educated and to work in higher-productivity occupations. For example, the International Labour Office (2005) treats as informal the employees of small, private, non-agricultural, unregistered, unincorporated enterprises with less than five paid workers producing at least part of their output for sale or barter. The alternative definition based on social-security coverage also has shortcomings, especially in the light of considerable variation across countries in social-protection entitlements, such as severance payment obligations, unionisation rights, workplace safety regulations, and health and unemployment insurance.

There are important reasons why policy-makers should be concerned about the informal sector. *First*, these activities are often well entrenched and affect both informal- and formal-sector workers. The informal sector therefore often becomes a trap for unskilled workers, perpetuating a vicious circle of limited human capital and low pay in a segmented labour market. *Second*, informality complicates the design of social-protection programmes, because it makes it difficult for the authorities to reach informal-sector workers through social assistance and active labour-market policies (ALMPs). *Third*, informality poses challenges for the design of tax policy, because it narrows tax bases, resulting in the shifting of the tax burden onto formal enterprises and individuals. *Fourth*, labour informality is associated with income inequality, so long as it is related to low educational attainment. *Finally*, a lack of access to the financial sector increases the financing costs facing informal enterprises, which often results in a low level of physical capital used in production and hence low productivity.

1. See OECD (2004 and 2006), Maloney (2004) and Gasparini and Tornarolli (2007) for more information.

The main determinants of labour informality

It is difficult to measure labour informality accurately and to compare these estimates across countries (Box 2). Notwithstanding this caveat, the informal labour market, defined as comprising workers without a formal labour contract, accounted for about 20% of Chile's population aged 15 years or above engaged in full-time jobs (at least 20 hours per week) in 2006 on the basis of household survey (CASEN) data. The ratio is virtually unchanged from 2003. Considering people working in small-scale, low-productivity, often family-based activities as an alternative measure raises the informality rate to 36% of the employed population aged 15 years and above in 2003 (Gasparini and Tornarolli, 2007). Another conventional metric for labour informality is self-employment, which accounted for about 37% of the Chilean labour force in 2003 on the basis of the CASEN Survey. Comparable information for other countries suggests that labour informality is nevertheless lower in Chile than in the rest of Latin America and has decreased over time (Table 1).

International experience suggests that low human capital is a key determinant of labour informality. This is the case in Chile, too. Workers who belong to vulnerable groups, whose attachment to the labour market is weak, such as youths, are most likely to work informally. Restrictions embodied in the labour code do not seem to be the main culprits for informality in Chile, at least as gauged by the OECD methodology for assessing employment protection legislation (EPL) restrictiveness (below), although they tend to be a contributory factor. Unlike other countries in the region, such as Argentina, Brazil and Uruguay, and in the OECD area, the design of social-assistance programmes does not appear, as yet, to

Table 1. Incidence of labour informality in Latin America

	Productive definition ¹		Social protection definition ²	
	Year	Incidence rate (%)	Year	Incidence rate (%)
Argentina	2005	44	2005	43
Bolivia	2002	77	2002	74
Brazil	2003	55	2003	35
Chile	2003	37	2003	22
Colombia	2004	61	1999	59
Costa Rica	2003	41
Dominican Republic	2004	51
Ecuador	2003	66	1998	61
El Salvador	2003	57	2003	48
Guatemala	2002	70	2002	60
Haiti	2001	89	2001	...
Honduras	2003	64	2003	...
Jamaica	2002	58	2002	...
Mexico	2002	54	2002	59
Nicaragua	2001	65	2001	68
Panama	2003	50	2003	...
Paraguay	2003	72	2003	74
Peru	2003	70	2003	70
Uruguay	2004	42	2004	28
Venezuela	2003	54	2003	42

1. An individual is treated as an informal-sector worker if he/she is unskilled self-employed, salaried in a small private firm or has zero declared income.
2. A salaried worker is informal if he/she does not have the right to a retirement pension conditional on employment status.

Source: Gasparini and Tornarolli (2007).

create strong disincentives for formality. To the extent that informal businesses also hire informally, there is some room for designing policies to tackle business informality in conjunction with those aimed at boosting formal labour utilisation.

Incentives for informality arising from low human capital

Information available from the CASEN household survey for 1990-2003 suggests that the incidence of informal labour has been falling gradually since the late-1990s but remains pervasive among youths and the elderly. Informality, defined as the share in employment of full-time workers without a labour contract, rose slightly during 1990-2003, reaching a peak in 1998, when GDP growth decelerated sharply in the midst of the Asian crisis, and decreased gradually thereafter.⁹ Informality is more prevalent among youths, especially those aged 15-19 years, and the elderly (aged 65 years and above) than for prime-age individuals (Table 2). Informality rates are also higher for males than females, for all age groups. Among prime-age individuals, informality is highest among the least educated and falls sharply with years of schooling (Table 3). These trends are similar to those obtained when informality is defined in terms of social-security coverage.

9. See OECD (2005a) for more information.

Table 2. **Labour informality: Incidence rates by age and gender, 1990-2003**

Age	Females				Males			
	1990	1996	1998	2003	1990	1996	1998	2003
15-24	18.2	23.3	23.1	25.3	26.6	29.5	33.4	27.2
15-19	32.4	36.8	41.7	34.4	39.1	51.6	51.4	45.3
25-54	10.3	12.6	14.7	12.0	13.5	16.8	17.6	16.1
55-64	12.0	14.8	14.4	12.1	14.3	21.1	17.6	15.8
65+	34.9	25.2	29.1	29.9	23.9	31.1	37.3	26.3
15+	12.3	14.8	16.3	14.2	16.3	19.6	20.5	17.8

Source: MIDEPLAN (National Household Survey, CASEN).

Table 3. **Labour informality and formal-informal earnings differentials by years of education, 1990-2003**

Years of education	Informality rate (%)					
	Females			Males		
	1990	1996	2003	1990	1996	2003
0 to 7	20.4	24.0	28.0	22.5	30.4	29.2
8 to 11	17.6	16.8	21.1	15.3	19.2	20.5
12	10.4	13.9	11.3	8.0	11.0	13.2
12+	5.0	7.6	7.7	5.8	8.6	8.4
	Formal-informal hourly wage ratio					
0 to 7	1.35	1.53	1.33	1.22	1.37	1.29
8 to 11	1.54	1.40	1.42	1.27	1.43	1.32
12	1.48	1.24	1.49	1.45	1.43	1.42
12+	1.84	1.63	1.77	1.49	1.66	1.50

Source: MIDEPLAN (National Household Survey, CASEN).

The empirical evidence reported in Annex A1, based on household survey data for 2003, confirms the presence of a strong link between labour informality and human capital: an individual's probability of working in the formal sector increases sharply with educational attainment. In addition, labour informality appears essentially to be a self-selection phenomenon in Chile, rather than the outcome of rigidities in the labour market. On the basis of the empirical findings, it seems that low-productivity, less educated individuals self-select into informal-sector jobs. In particular:

- Better educated workers are not only more likely to “queue” for a formal-sector job, but also to obtain one. This suggests that employers use educational attainment as a screening device to assess a job-seeker's productivity level, which is not observable directly. For example, among the least educated individuals (with at most seven years of schooling), it is estimated that for each worker employed in the formal sector, there are about 1.4 workers queuing for a formal-sector job.
- In addition to education, the probability of working in the formal sector increases with job tenure and experience, as well as with the number of elderly people and formal-sector workers in the household. Men are less likely than women to work in the formal sector, and larger firms are more likely to hire formally. Workers living in the metropolitan region of Santiago and in households with children aged less than three years and with informal-sector workers are less likely to work formally.

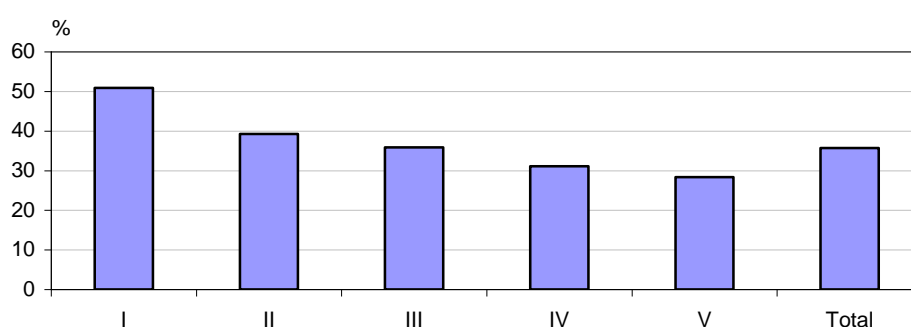
- Informality appears to arise predominantly from self-selection in Chile. This is because workers are estimated to have a high probability of obtaining a formal-sector job if they seek one. Females, better educated individuals and those aged 45-54 years are most likely to queue for and to obtain formal-sector jobs. However, there may be discrimination in the hiring process: males are more likely to obtain a formal-sector job, but are less likely to queue for these jobs, and being married increases a worker's odds of being selected, while decreasing his/her likelihood of queuing for a formal job.

Informal-sector workers are often trapped in low-pay occupations. The empirical evidence reported in Annex A1 suggests that there is an earnings premium in the formal sector. Formal-sector workers earn more than their counterparts in the informal sector for all levels of education, and this earnings premium rises with educational attainment (Table 3). As a result, informal-sector workers are concentrated among low-income groups (Figure 4).

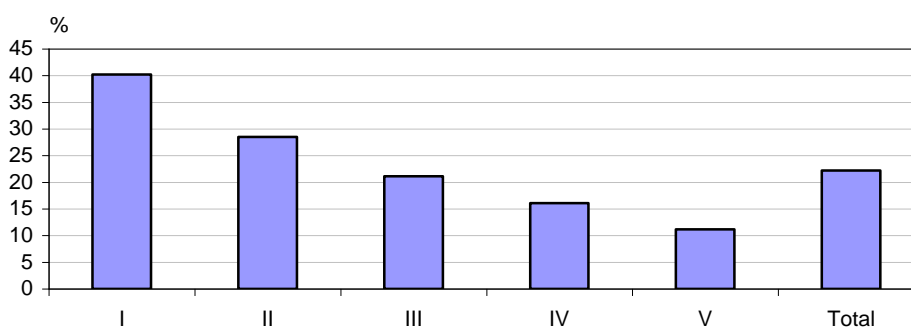
Figure 4. Informality by income level, 2003

Incidence by income quintile, in per cent

A. People not contributing to social security



B. People working without a labour contract



Source: MIDEPLAN (National Household Survey, CASEN).

Incentives for informality arising from employment protection legislation and social protection

The stringency of Chile's labour code is not out of line with OECD comparators, as gauged by the EPL indicator computed by the OECD and reported in OECD (2003) (Figure 5). This is essentially due to a lack of additional restrictions on collective dismissals, which are present in some OECD countries' labour codes. With regard to protection of workers with indefinite and temporary contracts, Chile's EPL is actually somewhat more restrictive than in the OECD area on average. Nevertheless, the absence of additional restrictions on collective dismissals makes the Chilean tax code more flexible than in OECD comparators.

Chile is beginning to strengthen its social-protection programmes. Unemployment insurance was introduced in 2002, the array of publicly funded health care entitlements through AUGE is being broadened, and the solidarity pension system is being strengthened. Formal social safety nets are nevertheless still weak in comparison with OECD countries and regional comparators, such as Argentina, Brazil and Uruguay. Typically, formal-sector jobs become less appealing where access to social-protection programmes is poorly targeted and not conditional on labour-market status. The level of social transfers to the elderly in relation to the minimum wage also affects the incentives facing individuals to work in the formal sector. The attractiveness of enhanced social protection therefore needs to be gauged against the additional costs these contributory programmes entail and that need to be borne entirely (in part in the case of unemployment insurance) by individuals who might otherwise work informally.

Challenges and policy recommendations

Tackling business informality

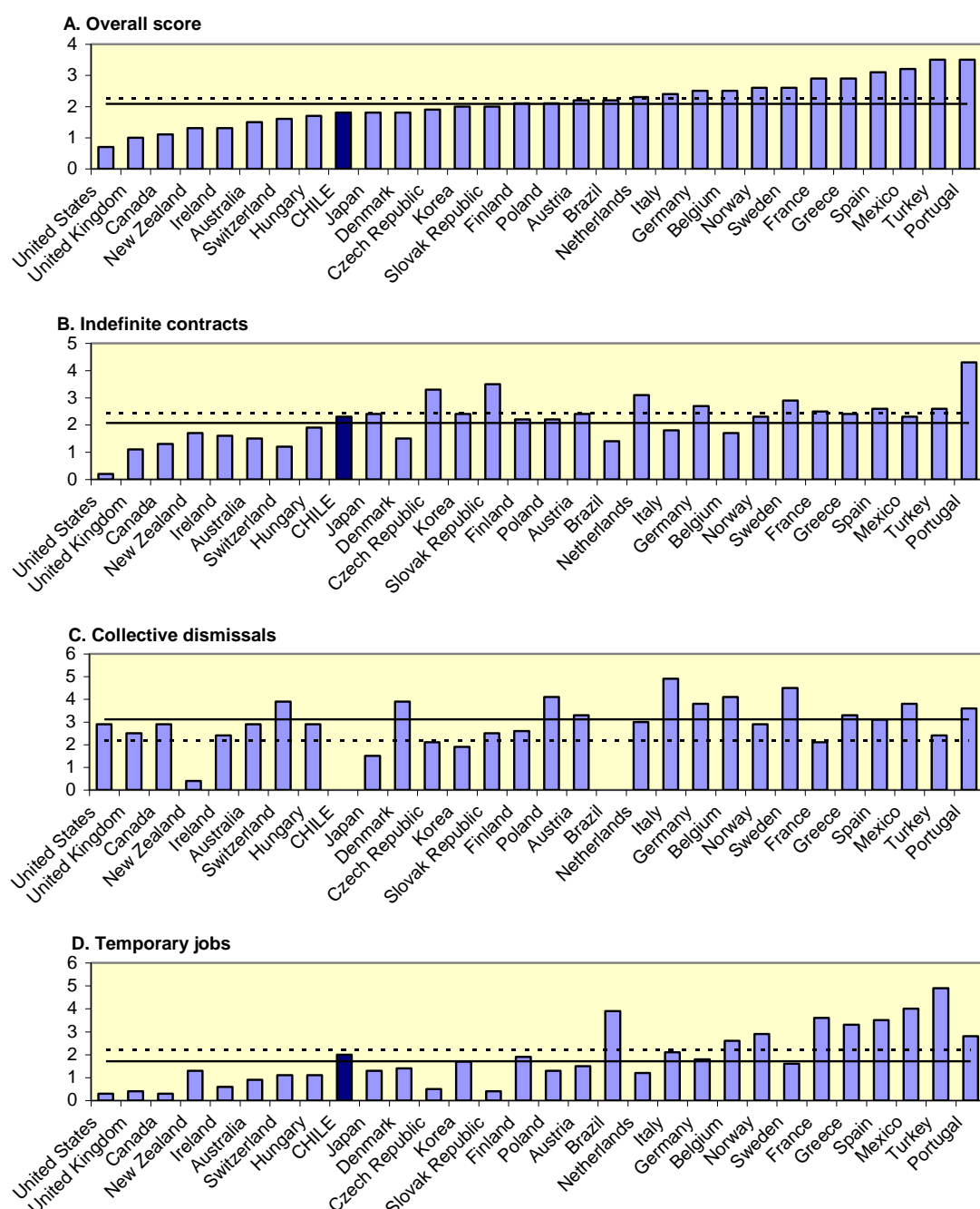
The cross-country evidence reported by de Mello (2008a) shows that the burden of taxes and regulation in product and labour markets are important determinants of business informality, at least as far as measured on the basis of VAT productivity. In the case of Chile, the ratio of tax revenue to GDP is low in relation to OECD comparator countries, making the disincentives for formality arising from the tax code comparatively less potent than in the OECD area. At the same time, the VAT is uniformly rated and has few exemptions, tax administration is efficient and an emphasis on bolstering the tax authority's enforcement capabilities over the last few years has delivered the expected increment in collections and compliance rates. Effort has now been made to bring micro enterprises and SMEs into the tax net, which are most likely to operate informally. But more can be done to make the regulatory framework in product and labour markets less burdensome on businesses.

Making the tax code and tax administration more friendly to formality

Tax compliance should be fostered in a cost-effective manner. An option for lowering compliance and administration costs is to exclude "hard-to-tax" segments of economic activity, including SMEs, from the tax net by introducing registration thresholds for the VAT and the income tax and by concentrating tax administration efforts on large taxpayers. This is especially appealing for countries with weak tax administrations. In other countries, particularly those, such as Chile, where tax administration is comparatively strong, there is no registration threshold for the VAT and the corporate income tax. Among the shortcomings of a registration threshold, which are well documented, is the incentive for enterprises not to expand beyond the level of activity at which they would become liable for paying taxes, or to operate informally when they do cross the threshold. But the existence of a large number of small registered taxpayers makes tax administration onerous to the tax authorities and raises compliance costs to be borne by these taxpayers. Currently, there is no estimate of such costs for Chile, but international experience suggests that they should not be underestimated. Some effort should therefore be expended by the tax

Figure 5. **Employment protection legislation: Chile, Brazil and OECD countries, 2003**

0-6 increasing scale from least to most restrictive



1. The solid horizontal line refers to the OECD average, excluding the emerging-market economies within the OECD area. The dashed line refers to the average of the emerging-market economies within the OECD area (Czech Republic, Hungary, Korea, Mexico, Poland, Slovak Republic and Turkey) and Brazil.

Source: OECD.

authorities to estimate these costs, especially for SMEs, through regular surveys. If costs are deemed high, the option of introducing a registration threshold for VAT could be considered. In any case, the authorities are advised to continue to work towards making the tax system more taxpayer-friendly to small enterprises.

Chile's option for developing the taxpaying capacity of micro businesses and SMEs, which account for the bulk of enterprises in the country, through emphasis on e-government to support tax compliance, is welcome. As noted above, a simplified system was introduced in 2007 for SMEs to reduce their time and cost of filing taxes. In this system, SII uses electronic invoicing to process the taxpayers' information on purchases and sales and uses it for the purpose of tax pre-filing via the Internet. But the introduction of a VAT registration threshold, if deemed appropriate, should not preclude further policy action in this area. An important challenge is therefore to enhance taxpayer services in a manner that is conducive to business development, aiming in particular at reducing the time it takes to pay taxes, which is high in Chile by OECD standards, as noted above. It should be recognised that most micro and small entrepreneurs belong to the poorest segments of society and are therefore likely to lack the skills needed to master ICT tools. In this respect, initiatives such as the MIPYME 10 000-2006 programme – aiming at introducing 10 000 SMEs to the use of ICT and the tools available at the SII website – are welcome. This programme is believed to be working well and should therefore be expanded. In addition, the options of approaching informal businesses – possibly through SME associations – and putting in place campaigns to inform SMEs about registration procedures and the advantages formalisation entails (less costly access to credit and government support, among others) should also be considered. This is important because many informal SMEs consider a lack of information as one of the main obstacles to formalisation.

Making the regulatory framework less burdensome

Procedures for opening and closing businesses should be streamlined and their costs reduced further. Although it is now possible to do so electronically from the point of view of tax administration, there has been much less progress in streamlining other necessary procedures, especially those required by municipal governments. The authorities are well aware of the need for further policy action in this area and are advised to work closely with municipal governments towards this end. In particular, more coordination is needed among the local authorities, health and safety and other agencies to expedite registration.

At the same time, incentives for business formalisation should be strengthened. A survey conducted among small informal enterprises in the metropolitan region of Santiago shows that they are more likely to opt for operating in the formal sector as the costs associated with informality rise. Formality is therefore not perceived as a means to facilitate business operations, but as a stage in the process of business development (Tokman, 2001, Chapter VI). Opinion surveys suggest that it is only after businesses reach a certain level of turnover that informality becomes costly, especially by hindering access to markets and to sources of finance for expansion. Policy action to facilitate access to longer-term credit would also go in the direction of making formalisation more attractive to small enterprises. It would allow firms to expand, benefiting from new business opportunities, and therefore to cross the threshold beyond which informality becomes less attractive. In this respect, the experience of the Social and Solidarity Investment Fund (FOSIS), which provides credit to SMEs and poor own-account workers, could be extended to unregistered businesses, provided that support is conditional on the recipient enterprise taking the necessary steps to move out of informality. These businesses have access only to costlier credit through personal loans granted in the name of the enterprise owner, who typically uses his/her home as collateral. To make formalisation more attractive it is also important that the authorities work closely with business associations, as is the case of SII in its effort to raise awareness about taxpayers' rights and obligations.

Tackling labour informality

Improving human capital accumulation

A powerful instrument for reducing labour informality is to improve the skills of the labour force. This can be done through the education system, given that Chile still lags considerably behind the OECD area in terms of student performance, at least as assessed on the basis of standardised international tests. Secondary-school attainment has risen over the years, and the gap with the OECD area has been narrowed, although attainment remains lower than in the most dynamic economies with which Chile competes in world markets. Higher educational attainment is also low by international comparison, although enrolment is on the rise. As discussed in OECD (2005), the success of policies that have been put in place since 2003 in the area of support for innovation will depend on whether the higher education system will be able to increase the supply of skilled scientists to meet the demand by innovative businesses. Policy action in this area will take time to mature and Chile is taking the necessary steps to improve access by the population to education and to improve the quality of services. The authorities are well aware that policy action in this area is of paramount importance to break the vicious circle of low human capital, informality and low income that perpetuates Chile's extant income disparities, despite years of sustained economic growth.

For those already in the labour force, labour training should be strengthened. Given Chile's heterogeneous labour markets, efforts to promote human capital accumulation should be designed to target a broader cross-section of the labour market, not only formal-sector employees. Labour training is financed through tax rebates, and, more recently, grants have been introduced for small enterprises in lieu of tax relief.¹⁰ The main shortcoming of the current set-up, which is otherwise perceived as successful, is that it fails to reach informal-sector workers. The option of extending the grants available for small enterprises to those that currently operate informally could be considered, provided that support is conditional on the recipient enterprise taking the necessary steps to formalise itself. In addition, the labour training programmes currently financed by FOSIS, the solidarity fund, could target a broader client base, other than youths, including informal-sector workers.¹¹ Moreover, it was argued in OECD (2005a) that further regulation was needed, because the market for training services is largely supply-driven. New legislation is being prepared, but has not yet been approved. SENCE's advisory role should also be enhanced, because studies have suggested that employers are often ill-informed about training possibilities. In this regard, OECD experience suggests that a greater involvement of workers and their associations could be a useful means of increasing awareness of the potential benefits of better training.

The strengthening of labour training should be complemented by an expansion of the skill certification system. Well-functioning, comprehensive certification has the potential of making skills marketable for those workers who lack formal education and therefore cannot compete for a formal-sector job with their better educated counterparts. Certification currently exists for particular skills, such as installation work and tourism, for example, but not as yet for the most common occupations in industry and construction, or in the most dynamic sectors in the economy. Policy action in this area should therefore focus on expanding the current system.

-
10. Labour training provided by enterprises has benefited almost 20% of all dependent employees in recent years (15% of the employed population). The main public institution to support enterprise-level training is SENCE (*Servicio Nacional de Capacitación y Empleo*). Enterprises are typically free to choose training content and to select trainees, notwithstanding the possibility – foreseen in the law, but rarely used – to obtain a somewhat higher tax rebate if the training is agreed upon by a bipartite training committee at the enterprise level.
11. Training programmes such as *Programa de Nivelación de Competencias Laborales* and *Escuela Taller* already target poor unemployed or under-employed individuals who are most likely to work informally.

Making EPL more conducive to labour formalisation

The labour code can become more flexible. To the extent that workers opt for informal self-employment to overcome EPL restrictions, effort to make the labour code more flexible, especially with respect to indefinite contracts and the allocation of working time, would go some way to reducing informality, while at the same time boosting labour supply. OECD (2005a) called for greater flexibility in the allocation of working time as a means of boosting labour supply. It was argued that selective changes in EPL might create room for enterprises and workers to negotiate more flexible arrangements, given that, in practice, there is very little negotiation between employers and employees on matters other than remuneration. To this end, some modification of regulations on full-time work might be useful to clarify that working time can be reduced by any number of hours, and not necessarily by as much as one-third, a limit that currently triggers some special provisions.

Legislation on labour dispatching and subcontracting was amended in early 2007. The new law clarifies the responsibilities of client enterprises and dispatching firms, removing significant legal uncertainties that had discouraged the use of this flexible modality of employment. At the same time, the legal framework for subcontracting was strengthened. While it is too soon to ascertain whether the new legal framework will encourage a more widespread use of flexible labour contracts, preliminary assessments are positive. Policy action in this area is important, because many dispatched and subcontracted workers who used to be hired informally as a means of reducing regulatory uncertainty can now be declared.

The cost of compliance with the labour code and social-security obligations could be reduced further for SMEs, which are most likely to hire informally. For example, SII's efforts to make a host of taxpayer services available on-line could be extended to labour matters. At a minimum, SII could share information of common interest, such as wage bills and individual workers' employment history, with the employment and labour agencies. The option of allowing social-security contributions to be paid on-line, as in the case of taxes, would go in the direction of reducing compliance time and costs, which overburden individual workers and SMEs.

Boosting social protection without making labour formalisation less attractive

Chile needs to find ways of strengthening its social safety net, while not weakening the incentives for labour formality arising from the design of social-protection programmes. Of course, the breadth and depth of social protection depends on societal preferences and ability to pay. But it is important to make sure that these programmes do not encourage informality. In this regard, the authorities' pension-reform proposal currently before Congress, which strengthens the assistance pillar of the social-security system, discussed in de Mello (2008b), should not reduce the opportunity cost of informality. If the level of the solidarity pension is set too high in relation to the minimum wage, it would discourage saving for retirement and formality, which in turn affects the density of contributions and hence the cost of first-pillar pensions borne by the budget. Therefore, a wedge should be kept between the value of the solidarity pension and that of the minimum wage to prevent these perverse incentives from becoming stronger as the relative value of the solidarity pension is raised. Currently, the means-tested social-assistance pension is about one-half of the minimum wage.

Likewise, a broadening of the range of health-care services provided through AUGE would also go in the direction of strengthening social safety nets, but, to the extent possible, should not affect the incentives for workers to obtain health insurance. Health insurance and social-security contributions will become compulsory for own-account workers 10 years after approval of the social-security reform package submitted by the government to Congress in late 2006, although social-security contributions will be voluntary for a three-year period before it becomes compulsory. Because health insurance coverage is now

already high for the population as a whole, including own-account workers, health insurance should be made compulsory at the same time and following the same timeframe for implementation as in the case of pension contributions, rather than delaying it until 10 years after approval of the reform proposal. In any case, this time frame should be flexible enough to allow for a careful assessment of workers' revealed opportunity cost of social protection. This can be achieved by carefully monitoring take-up rates during the period in which social-security contributions will be voluntary and identifying the groups that will be most unlikely to comply, once contributions and health insurance become compulsory. This is an important step towards designing complementary policies that might be put in place during implementation to encourage compliance and step up enforcement mechanisms.

Chile introduced unemployment insurance (*seguro de cesantía*) in 2002. The experience of several OECD countries is that, when appropriately designed, it increases the attractiveness of formal jobs (OECD, 2004). However, in the case of Chile, the cost of unemployment insurance will add to those related to pension contributions and health insurance, which will become compulsory for own-account workers over the next 10 years. An important policy question is therefore whether or not the attractiveness of unemployment insurance – as well as that of health insurance and social-security coverage – will be strong enough to compensate for the additional costs these contributory and other programmes, such as health insurance and social security coverage, entail and that need to be borne by individuals who might otherwise work informally.

Policy action to encourage formal labour-force participation among vulnerable workers, such as females and youths, should be pursued vigorously in support of long-term growth, and further sustained reductions in poverty and income inequality. The authorities are working towards encouraging females and youths to work formally by boosting the supply of day care and pre-school education and proposing mechanisms in the pension-reform package submitted to Congress in December 2006 to reduce gender-related discrepancies in insurance premia and to subsidise pension contributions by youths. These are steps in the right direction, given that the empirical analysis reported in Annex A1 shows that having children aged three years or less is an important obstacle to labour formality.

The fact that the incidence of informal labour rises after prime age suggests that policy action should not neglect older self-employed individuals. There is considerable evidence that older individuals may voluntarily opt for informal self-employment later in their working life, once they have accumulated the skills and capital needed to set up their own businesses. Whether they do so informally or not depends on the attractiveness of formality, which in turn depends on the balance between the perceived benefits of social protection, which may be uncertain and of a long-term nature, against the costs of compliance, which may be high, especially for budget-constrained individuals. Effort to facilitate compliance with taxes and regulations should therefore underpin policy action in this area. Informal self-employment may also be attractive to prime-age females because more flexible working-time arrangements make it easier for them to reconcile work and household responsibilities, especially given the dearth of affordable child care and pre-school education, as noted above. Ongoing efforts to remedy this problem would therefore also encourage self-employed females to work formally.

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Annex A1

The determinants of labour informality in Chile: Evidence from household survey data

This Annex uses data from the CASEN Survey, available from the Ministry of Planning, to empirically assess the main determinants of labour informality. The estimation procedure is comparable to that of Soares (2004) for Brazil and Mengistae (1998) for Ethiopia.

The estimation strategy

The model describes the formal and informal sectors separately. Wages can be written in each sector as:

$$W_f = Z\gamma_f + e_f, \quad (\text{A1.1})$$

$$W_i = Z\gamma_i + e_i, \quad (\text{A1.2})$$

where f and i indicate, respectively, the formal and the informal sectors, Z is a vector of wage determinants, and e_f and e_i are error terms.

Individuals choose the sector in which they wish to work according to the following decision rule:

$$d_1 = 1 \text{ if } I_1 = \alpha_1(W_f - W_i) + X_1\beta_1 + u_1 > 0, \quad (\text{A1.3})$$

$$d_1 = 0 \text{ if } I_1 = \alpha_1(W_f - W_i) + X_1\beta_1 + u_1 \leq 0. \quad (\text{A1.4})$$

Equations (A1.3) and (A1.4) define the so-called “in the queue” conditions. Accordingly, individuals choose the sector in which to work on the basis of inter-sectoral wage differentials and other determinants (X_1) that could include variables not considered in the wage equation, such as the number of children in the household and household income, among others. This set-up assumes that individuals who wish to work in the formal sector will eventually find a job there. However, it is possible that they will need to queue to work in the formal sector and that entrepreneurs select them on the basis of productivity levels and employment costs. Individuals who are not picked from the queue must therefore work in the informal sector. In this case, the selection process carried out by formal-sector entrepreneurs can be defined as:

$$d_2 = 1 \text{ if } I_2 = \alpha_2 E(W_f | I_1 > 0) + X_2\beta_2 + u_2 > 0, \quad (\text{A1.5})$$

$$d_2 = 0 \text{ if } I_2 = \alpha_2 E(W_f | I_1 > 0) + X_2\beta_2 + u_2 \leq 0, \quad (\text{A1.6})$$

where E is the expectations operator.

Equations (A1.5) and (A1.6) define the “chosen from the queue” conditions. The term $E(W_f | I_1 > 0)$ captures the expected cost to be incurred by the employer when hiring a worker, and vector X_2 includes other costs and personal characteristics that proxy for a worker’s productivity.

Two different models will be estimated to take into account the selection mechanisms described above. The first one – the Abowd-Farber model – assumes that the decisions taken by the worker and the entrepreneur are sequential. The second one – the Poirier model – assumes that decisions are simultaneous. In any case, for identification, an exclusion restriction is introduced, so that one or more variables included in X_1 must be excluded from X_2 , and one or more variables included in Z must be excluded from X_1 and X_2 . The variable included in the wage equations and excluded from the “in the queue” and “chosen from the queue” equations is firm size. The variables included in the “in the queue” equation but excluded from the “chosen from the queue” and wage equations are family characteristics. Finally, the variable included in the “chosen from the queue” equation and excluded from the wage equations is a dummy variable that indicates the worker’s marital status.

The wage equations for the formal and informal sectors will be estimated correcting for double selection in the labour market. However, a wage equation for the informal sector cannot be estimated for the Poirier model. The estimation of the wage equations takes into account the presence of heteroscedasticity due to the inclusion of estimates of the inverse Mills ratios and not the actual ratios.¹²

The data

Household survey (CASEN) data are used for 2003. The sample, which includes prime-age individuals (aged 25-64 years) who work in full-time jobs (at least 20 hours per week), contains 25 909 formal-sector workers and 6 957 informal-sector workers. Based on CASEN’s weighting factors, this sample is representative of a population of 1 965 532 formal-sector workers and 384 400 informal-sector workers.

Estimation results

Models without queuing

A simple model without queuing was estimated as a benchmark against which the results of the double-selection models can be compared. A reduce-form probit model was used to estimate a worker’s probability of being employed in the formal sector. The results, reported in Table A1.1 suggest that the probability of working in the formal sector increases with education, at least up to 12 years of schooling, job tenure and experience (in a non-linear manner), and the number of elderly people and formal-sector workers in the household. Men are less likely than women to work in the formal sector, and larger firms are more likely to hire formally. Workers living in the metropolitan region of Santiago and in households with children aged less than three years and with other informal-sector workers are less likely to work formally.

12. The inverse Mills ratio is the ratio of the probability density function over the cumulative density function of a distribution. It is used in regression analysis to take account of a possible selection bias.

Table A1.1. **Formality equation: Reduced-form probit model¹**

	Marginal effect	Coefficient	Standard error
Years of schooling			
8-11	0.000	-0.004	0.005
12	0.005	0.102**	0.006
12+	0.004	0.085**	0.007
Job tenure	0.000	0.003**	0.000
Potential experience	0.001	0.011**	0.001
Potential experience squared	0.000	0.000**	0.000
Gender ("1" = Male)	-0.004	-0.089**	0.004
Firm size			
2-5 workers	-0.145	-1.210**	0.005
6-9 workers	-0.069	-0.734**	0.006
10-49 workers	-0.033	-0.497**	0.005
50-199 workers	-0.012	-0.202**	0.006
Residency			
North	0.003	0.063**	0.006
Central	0.003	0.066**	0.004
South	0.005	0.095**	0.006
Number of children in household			
Less than 3 years of age	-0.001	-0.017**	0.004
3-5 years of age	0.008	0.150**	0.005
6-10 years of age	0.004	0.069**	0.003
11-17 years of age	0.003	0.051**	0.002
Number of elderly individuals in household	0.001	0.028**	0.005
Number of formal-sector workers in household	0.055	1.071**	0.003
Number of self-employed workers in household	0.002	0.030**	0.005
Number of informal-sector workers in household	-0.081	-1.563**	0.003
Number of unemployed workers in household	0.005	0.100**	0.023
Marital status ("1" = Married)	-0.001	-0.027**	0.004
Head of household	0.014	0.256**	0.004
Per capita non-labour income	-0.001	-0.025**	0.001
Constant		0.854**	0.012
Number of observations		2 349 932	
Log L		-331 331.72	

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASEN database) and OECD estimations.

Double-selection models

The results of the double-selection models, reported in Table A1.2, suggest that education is an important determinant of a worker's probability of being "chosen from the queue". Experience has a similar effect on being in the queue and on being selected from the queue. Individuals living in the metropolitan region of Santiago are less likely to be in the queue and to be selected from the queue. The observations that males are more likely to be selected from the queue, but less likely to be in the queue, and that being married increases the odds of being selected, but decreases a worker's likelihood of being in the queue, points to possible discrimination in the hiring process. The results of the Poirier model are similar to those of the Abowd-Farber model. Moreover, the correlation coefficient estimated in the simultaneous model is not statistically significant from zero, which is an indication that the Poirier model is similar to the sequential model.

Table A1.2. Formality equations: Double-selection models¹

	Abowd-Farber model		Poirier model	
	In the queue	Chosen from the queue	In the queue	Chosen from the queue
Years of schooling				
8-11	0.004 (0.007)	-0.034* (0.017)	0.004 (0.007)	-0.034* (0.017)
12	0.082** (0.007)	0.150** (0.018)	0.082** (0.007)	0.151** (0.019)
12+	-0.013 (0.008)	0.660** (0.023)	-0.013 (0.008)	0.660** (0.023)
Tenure	0.004** (0.000)	–	0.004** (0.000)	–
Potential experience	0.013** (0.001)	0.021** (0.002)	0.013** (0.001)	0.021** (0.002)
Potential experience squared	0.000** (0.000)	-0.001** (0.000)	0.000** (0.000)	-0.001** (0.000)
Gender ("1" = Male)	-0.143** (0.005)	0.244** (0.011)	-0.143** (0.005)	0.245** (0.011)
Firm size				
2-5 workers	-1.245** (0.006)	–	-1.245** (0.006)	–
6-9 workers	-0.777** (0.007)	–	-0.777** (0.007)	–
10-49 workers	-0.525** (0.006)	–	-0.525** (0.006)	–
50-199 workers	-0.244** (0.007)	–	-0.244** (0.007)	–
Residency				
North	0.035** (0.007)	0.022 (0.021)	0.035** (0.007)	0.022 (0.021)
Central	0.100** (0.005)	0.023* (0.011)	0.100** (0.005)	0.023* (0.011)
South	0.109** (0.007)	0.256** (0.020)	0.109** (0.007)	0.256** (0.020)
Number of children in household				
Less than 3 years of age	-0.013** (0.005)	–	-0.013** (0.005)	–
3-5 years of age	0.180** (0.005)	–	0.180** (0.005)	–
6-10 years of age	0.042** (0.003)	–	0.042** (0.003)	–
11-17 years of age	0.067** (0.003)	–	0.067** (0.003)	–
Number of elderly individuals in household	0.054** (0.006)	–	0.054** (0.006)	–
Number of formal-sector workers in household	1.576** (0.006)	–	1.576** (0.006)	–
Number of self-employed workers in household	0.036** (0.005)	–	0.036** (0.005)	–
Number of informal-sector workers in household	-1.539** (0.003)	–	-1.539** (0.003)	–
Number of unemployed workers in household	0.158** (0.026)	–	0.158** (0.026)	–
Marital status ("1" = Married)	-0.080** (0.005)	0.278** (0.011)	-0.080** (0.005)	0.278** (0.011)
Head of household	0.368** (0.005)	–	0.368** (0.005)	–
Per capita non-labour income	-0.022** (0.001)	–	-0.022** (0.001)	–
Constant	0.417** (0.014)	1.995** (0.030)	0.418** (0.014)	1.994** (0.030)
ρ	–	–	–	-0.010 (0.014)
Number of observations	2 349 932	–	2 349 932	–
Log L	-321 536.92	–	-321 536.68	–

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASSEN database) and OECD estimations.

Is there queuing in the labour market?

The queuing hypothesis is tested by assuming that all parameters in the “chosen from the queue” equations are zero, except the constant, which must be high enough so that all workers have the same probability of being selected. The hypothesis of no universal queue – implying that all workers want to work in the formal sector and all the selection is carried out by the employer – is tested by assuming that the parameters of the “in the queue” equation are all zero, with the exception of the constant, which must be high enough so that all workers prefer to work formally. The results of a conventional likelihood ratio test (not reported) suggest that both null hypotheses cannot be rejected at the 1% level of significance, thus lending support to the double-selection models as an adequate description of the formal and informal labour markets in Chile.

The parameter estimates reported in Table A1.2 can be used to calculate the probability that individuals will queue for formal jobs, be selected from the queue and work in the formal sector. The results, reported in Table A1.3, show that the probability of being selected from the queue is almost one for most workers, suggesting that, even though a double-selection model is an appropriate description of the allocations of formal- and informal-sector workers in the labour market, there is not much selection in the formal sector. Most of the selection occurs in the “in the queue” equations, where females, more educated workers and individuals aged 45-54 years are most likely to queue for formal jobs. The parameter estimates also allow for estimating the length of the queue, which ranges between about 1.1 and 1.4, depending on model specification. This suggests that, for each formal-sector worker, there are 1.1-1.4 workers in the queue. The most important differences are by educational attainment: the length of the queue for workers with less than eight years of education is 1.4, which implies that for each worker in the formal sector, there are 1.4 informal-sector workers in the queue.

Wage equations

Wage equations can be estimated for formal- and informal-sector workers. The results reported in Table A1.4 suggest that education is a powerful determinant of earnings in both the formal and the informal sectors: uneducated workers earn a higher wage premium in the informal sector, and their more

Table A1.3. **Implied probabilities: Based on double-selection models**

	In the queue		Chosen from the queue		Working in the formal sector		Length of queue	Probit
	Probit	Standard error	Probit	Standard error	Probit	Standard error		
Whole population	0.84	0.31	1.00	0.01	0.84	0.31	1.19	1.19
Males	0.83	0.32	1.00	0.00	0.83	0.32	1.20	1.21
Females	0.87	0.29	0.99	0.01	0.86	0.29	1.15	1.16
Age								
Less than 35 years	0.84	0.31	1.00	0.00	0.84	0.31	1.19	1.19
35-44 years	0.84	0.31	1.00	0.00	0.84	0.31	1.18	1.19
45-54 years	0.85	0.31	0.99	0.01	0.84	0.30	1.18	1.19
55-64 years	0.82	0.33	0.99	0.01	0.81	0.33	1.22	1.23
Years of schooling								
Less than 8	0.72	0.39	0.99	0.01	0.71	0.39	1.39	1.40
8-11	0.80	0.35	0.99	0.00	0.79	0.34	1.26	1.27
12	0.87	0.28	1.00	0.00	0.87	0.28	1.15	1.15
12+	0.92	0.23	1.00	0.00	0.92	0.23	1.09	1.09

Source: MIDEPLAN (CASEN database) and OECD estimations.

Table A1.4. **Wage equations: Reduced-form model¹**

	Formal sector	Informal sector
Years of schooling		
8-11	0.150** (0.000)	0.176** (0.000)
12	0.406** (0.000)	0.340** (0.001)
12+	1.112** (0.000)	0.949** (0.000)
Tenure	0.001** (0.000)	0.000** (0.000)
Potential experience	0.014** (0.000)	0.010** (0.000)
Potential experience squared	0.000** (0.000)	0.000** (0.000)
Gender ("1" = Male)	0.154** (0.000)	0.123** (0.000)
Firm size		
2-5 workers	-0.291** (0.000)	-0.211** (0.001)
6-9 workers	-0.221** (0.001)	-0.020** (0.001)
10-49 workers	-0.125** (0.000)	-0.079** (0.001)
50-199 workers	-0.070** (0.000)	-0.003 (0.002)
Residency		
North	-0.098** (0.000)	-0.179** (0.001)
Central	-0.235** (0.000)	-0.238** (0.000)
South	-0.210** (0.000)	-0.236** (0.001)
Inverse Mills ratio	-0.076** (0.001)	-0.043** (0.000)
Constant	6.259** (0.000)	6.148** (0.001)
Number of observations	25 908	6 946

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASEN database) and OECD estimations.

educated counterparts (with at least 12 years of schooling) earn a higher wage premium in the formal sector. Tenure and experience (in a non-linear manner) also affect wages positively. Males are better paid than females in both sectors, and the wage gap is wider in the formal sector. Wages are higher in larger firms and in the metropolitan region of Santiago. The inverse Mills ratio is negative in both equations, which means that there is a negative correlation between the errors of the decision and the wage equations. This implies that a positive shock to formal-sector wages is associated with a negative shock in the decision equation (making a worker less likely to find a job in the formal sector). The same result is found for the informal sector.

Using the wage equation for the informal sector, the hypotheses of a single queue and the absence a job queue can be tested. The equation for the informal sector can be written as:

$$W_i = Z\gamma_i + \sigma_{1i}\lambda_{3i} + \delta_1\lambda_{1i}^* + \delta_2\lambda_{4i} + e_i, \quad (\text{A1.7})$$

where $\delta_1 = \pi\sigma_{1i}$, $\delta_2 = \pi\sigma_{2i}$, $\lambda_{1i}^* = \lambda_{1i} - \lambda_{3i}$ and σ_{1i} (σ_{2i}) is the covariance between the error term of the “in the queue” (“chosen from the queue”) equation and the error term in the informal sector, (λ_{ji}) are the respective inverse Mills ratios. Finally, π is the proportion of informal-sector workers queuing for a formal-sector job.

A test of the absence of a job queue ($\pi = 0$) is $H_0 : \delta_1 = \delta_2 = 0$, which is rejected at the 1% level (results not reported). The test for the presence of a single queue ($\pi = 1$) is $H_0 : \sigma_{1i} = \delta_1$, which is also rejected at the 1% level. These tests again favour the use of a double-selection model to describe wage setting in the formal and informal sectors in Chile.

Table A1.5. Wage equations: Double-selection models¹

	Abowd-Farber model		Poirier model
	Formal sector	Informal sector	Formal sector
Years of schooling			
8-11	0.154** (0.001)	0.128** (0.005)	0.152** (0.001)
12	0.390** (0.001)	0.344** (0.007)	0.389** (0.001)
12+	1.077** (0.002)	0.986** (0.014)	1.068** (0.001)
Tenure	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Potential experience	0.011** (0.000)	0.014** (0.001)	0.011** (0.000)
Potential experience squared	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Gender ("1" = Male)	0.129** (0.001)	0.161** (0.006)	0.127** (0.001)
Firm size			
2-5 workers	-0.293** (0.001)	-0.271** (0.010)	-0.292** (0.001)
6-9 workers	-0.221** (0.001)	-0.181** (0.011)	-0.220** (0.001)
10-49 workers	-0.125** (0.001)	-0.108** (0.010)	-0.127** (0.000)
50-199 workers	-0.068** (0.001)	-0.050** (0.011)	-0.072** (0.001)
Residency			
North	-0.093** (0.001)	-0.111** (0.008)	-0.099** (0.001)
Central	-0.233** (0.001)	-0.226** (0.004)	-0.237** (0.000)
South	-0.212** (0.001)	-0.208** (0.006)	-0.210** (0.001)
Mills ratio 1	-0.069** (0.001)	—	-0.075** (0.002)
Mills ratio 2	-2.550** (0.061)	—	-2.733** (0.046)
Mills ratio 3	—	-0.078** (0.004)	—
Mills ratio 3*	—	-0.065** (0.002)	—
Mills ratio 4	—	-0.088** (0.017)	—
Constant	6.339** (0.003)	5.993** (0.042)	—
Number of observations	25301	6 069	—

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASEN database) and OECD estimations.

Table A1.6. **Formality equation: Univariate structural probit model¹**

	Marginal effects	Coefficient	Standard error
Wage differential	0.206	3.397**	0.019
Years of schooling			
8-11	0.004	0.077**	0.005
12	-0.007	-0.109**	0.006
12+	-0.028	-0.388**	0.008
Potential experience	0.000	-0.007**	0.001
Potential experience squared	0.000	0.000	0.000
Gender ("1" = Male)	-0.011	-0.187**	0.004
Number of children in household			
Less than 3 years of age	-0.001	-0.011**	0.004
3-5 years of age	0.008	0.129**	0.005
6-10 years of age	0.004	0.072**	0.003
11-17 years of age	0.004	0.058**	0.002
Number of elderly individuals in household	0.002	0.032**	0.005
Number of formal-sector workers in household	0.067	1.096**	0.003
Number of self-employed workers in household	0.001	0.015**	0.005
Number of informal-sector workers in household	-0.095	-1.557**	0.003
Number of unemployed workers in household	0.002	0.037	0.021
Marital status ("1" = Married)	0.000	-0.006	0.004
Head of household	0.018	0.283**	0.004
Per capita non-labour income	-0.001	-0.024**	0.001
Residency			
North	-0.019	-0.256**	0.006
Central	-0.001	-0.008*	0.004
South	-0.007	-0.102**	0.006
Constant		0.158**	0.011
Number of observations		2 349 932	
Log L		-355 680.27	

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASEN database) and OECD estimations.

Structural probits

The informality equations were also estimated using structural probit models, in which the “in the queue” and “chosen from the queue” equations are estimated simultaneously. To benchmark these findings, regression results are reported in Table A1.6 for the univariate model. The coefficient on the wage differential is positive and significant, suggesting that the wage premium is an important element in the decision to work in the formal sector. As for the other regressors, there are a few important differences from the reduced-form probits reported above: education is negatively correlated with formality and potential experience is negatively associated with the probability of working in the formal sector.

As for the bivariate models, the structural probit for the Poirier model could not be estimated, because the informal-sector wage equation cannot be computed. The results of the estimations of the Abowd-Farber model are reported in Table A1.7. As in the univariate case, the wage differential is an important determinant of the queueing decision. Education is also negatively correlated with the decision to join the queue. Unlike the bivariate reduced-form probit, the number of children in the household is positively correlated with the probability of working in the formal sector. In the structural bivariate probit, the number of elderly individuals and formal-sector, self-employed and unemployed workers in the household increases an individual’s probability of working in the formal sector.

Table A1.7. **Formality equation: Bivariate structural probit model¹**

	In the queue	Chosen from the queue
Wage differential	19.484** (0.222)	– –
E(w1/in the queue)	– –	3.594** (0.020)
Years of schooling		
8-11	-0.537** (0.011)	-0.561** (0.009)
12	-0.846** (0.014)	-1.275** (0.012)
12+	-1.716** (0.024)	-3.594** (0.024)
Potential experience	0.062** (0.001)	-0.021** (0.001)
Potential experience squared	-0.002** (0.000)	0.000** (0.000)
Gender ("1" = Male)	0.550** (0.009)	-0.435** (0.006)
Residency		
North	-0.227** (0.011)	0.281** (0.008)
Central	0.121** (0.006)	0.985** (0.008)
South	0.026** (0.008)	1.048** (0.010)
Number of children in household		
Less than 3 years of age	0.058** (0.006)	– –
3-5 years of age	0.100** (0.007)	– –
6-10 years of age	0.073** (0.004)	– –
11-17 years of age	0.041** (0.004)	– –
Number of elderly individuals in household	0.057** (0.007)	– –
Number of formal-sector workers in household	4.378** (0.067)	– –
Number of self-employed workers in household	0.109** (0.008)	– –
Number of informal-sector workers in household	-1.343** (0.004)	– –
Number of unemployed workers in household	0.103** (0.037)	– –
Marital status ("1" = Married)	-0.345** (0.007)	0.332** (0.005)
Head of household	0.514** (0.007)	– –
Per capita non-labour income	-0.013** (0.001)	– –
Constant	-8.939** (0.098)	-20.970** (0.124)
Number of observations	2 349 932	–
Log L	-333 105.36	–

1. Standard errors are reported in parentheses. (**) and (*) denote statistical significance at the 1% and 5% levels, respectively.

Source: MIDEPLAN (CASEN database) and OECD estimations.

In the “chosen from the queue” equation, the wage rate is positively correlated with being selected from the queue, suggesting that it might be measuring productivity. Also, rather surprisingly, education is negatively associated with the probability of being chosen from the queue. A similar result was found by Soares (2004) using Brazilian data. A negative coefficient on years of schooling implies that, for a given wage level, education has a negative correlation with formality, even though it is positively correlated with wages. The overall effect of educational attainment on informality is therefore unknown and could be better approximated by the reduced-form probit. Another interpretation is that more educated individuals would select themselves into the informal sector.¹³

13. As a sensitivity test (not reported), the “chosen from the queue” equations were re-estimated by excluding the expected wage in the formal sector for workers who join the queue. The results suggest that workers with 12 years of schooling are less likely to join the queue, although they are more likely to be selected from the queue. The converse holds for workers with more than 12 years of schooling, and males are more likely to be selected from the queue.

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