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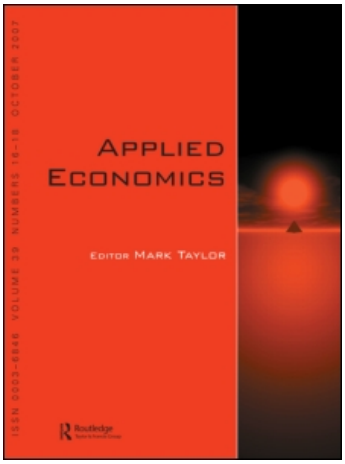

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The determinants of labour force participation and employment in Chile

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The determinants of labour force participation and employment in Chile

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Chile's labour force participation is low in comparison with Organization for Economic Co-operation and Development (OECD) and Latin American countries on average, especially among females and youths. This article estimates the main determinants of labour supply and employment for prime-age individuals and youths using data from the National Household Survey (CASEN) for 1990, 1996 and 2003. Educational attainment is found to be a powerful predictor of labour supply and employability for both males and females. The number of young children in the household is a strong deterrent to female participation, both for prime-age and young women. Changes in labour supply and employment during 1990 and 2003 are decomposed using the probit estimations. The results suggest that structural changes in the economy were the main determinants of changes in participation among prime-age individuals, but the converse is true for changes in employment, which depended predominantly on shifts in individual characteristics.

I. Introduction

Chile's labour force participation is low in comparison with most countries in the Organization for Economic Co-operation and Development (OECD) area, especially among women and youth. In the case of women, labour supply has risen steadily since 1990 for prime-age and older individuals, against a background of relative stability for men. With regard to youth, participation rates are trending down, predominantly as a result of rising school enrolment, especially for males, while remaining fairly low and stable over the years among young females. The share of youth who are neither studying nor working is also coming down, although it remains comparatively high among females. This group is not accumulating any kind of human capital and is facing a labour market that is putting an increasingly high premium on human capital.

In this article, we estimate the main determinants of labour force participation and employability in Chile using data from the National Household Survey (CASEN) for 1990, 1996 and 2003. The CASEN survey is conducted every 3 years and covers the entire country. Instead, previous empirical work used a household survey conducted annually in the

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metropolitan region of Santiago. Broader regional coverage is therefore an important contribution of this article. We also report the results of a decomposition exercise for changes in participation and employment to shed further light on the main determinants of trends in both variables.

The empirical evidence shows that educational attainment is one of the most powerful determinants of participation and employability for both men and women. The number of young children in the household is a strong deterrent to female participation, both for prime-age and young women. The decomposition exercise suggests that, in the case of labour supply, structural changes in the economy (captured in the estimated coefficients of the participation equations for 1990 and 2003) were the main determinants of participation among prime-age individuals. But the converse is true for employment: long-term trends in the underlying determinants of employability, rather than structural changes in the economy, tend to explain most of the changes in employment rates for both prime-age individuals and youth.

This article is organized as follows. Section II describes the main trends in labour supply and employment. It highlights important age and gender-related gaps in labour supply and demand. Section III reports the results of probit models for labour force participation and employment for prime-age individuals and youth for 1990, 1996 and 2003. In Section IV, the results of the probit models are used to decompose changes in labour force participation and employment during 1990–2003 between changes in estimated coefficients and in the variables included in the regressions. Section V concludes and presents some policy recommendations for raising labour supply among women.

II. Trends in Labour Force Participation and Employment

Chile's labour supply has exhibited distinctly different trends along gender and age lines over the years. On the one hand, female participation has been on the rise, increasing by almost 10 percentage points during 1990–2003 to about 42%, especially among individuals aged between 55 and 64 years (Table 1). Notwithstanding this increase, female participation remains low, even by Latin American standards. This is in contrast to a relative stability in male participation since 1990 at about 73% in 2003, which is close to the average of OECD countries. On the other hand, in the case of youth, participation has been low and stable over the years for females, but relatively high, although falling, for males. The gender gap in participation rates remains sizeable but is falling, over time, as a result of the relative stability of labour supply among males and an increase among females.

Participation is also rising among older workers. Recent empirical evidence based on household survey data (the University of Chile's *Encuesta de Ocupación*, which focuses on the metropolitan region of Santiago) suggests that the pension reform of the early 1980s, which replaced a pay-as-you-go system by a privately run, fully funded, defined-contribution scheme, encouraged labour force participation among the elderly (James and Edwards, 2005). This is because of a combination of restricted access to savings in the event of early retirement, on the one hand, and a strengthening of the actuarial linkage between contributions and retirement income, on the other. The reform also exempted pensioners who continue to work after retirement from social security contributions. This reduction in the tax burden on post-retirement income also encouraged labour force participation among the elderly.

As in the case of trends in participation, there are important age- and gender-related differences in employment rates. Employment increased steadily during 1990–2003 among females but began to fall after 1996 for males, having risen gradually during 1990–1996. These trends, nevertheless, mask important discrepancies among different age groups. In the case of youth, employment remained stable for females during 1990–2003, whereas there was a pronounced decline among males, especially in the 15–19 age group, a pattern that tracks closely the trends in participation described above. The increase in employment among older workers (55 years and above) is also noticeable among both men and women.

Participation rates are strongly correlated with educational attainment.[1] Labour supply rises monotonically with years of schooling among females, but only for individuals with up to 12 years of education in the case of males. Participation is lower among the best educated men than for those with 12 years of education. The sharpest increase in participation during 1990–2003 was for individuals – both males and females – with 12 years of education, for whom the increase in unemployment was most severe.

[1] For a more detailed discussion on the main characteristics of Chilean labour market, see OECD (2005a, 2007), de Mello (2008) and Contreras *et al*. (2005).

Table 1. Labour force participation and employment by age and gender, 1990, 1996 and 2003

	Participation (%)			Employment (%)		
Age group	1990	1996	2003	1990	1996	2003
Females						
15–24	27.3	27.9	30.1	22.1	23.2	22.3
15–19	12.9	12.6	13.4	9.7	9.3	8.9
25–54	41.7	47.6	55.8	38.7	45.0	50.3
55–64	20.7	26.2	34.3	19.9	25.5	31.7
65+	6.1	7.3	7.7	5.9	7.0	7.4
15+	32.4	36.3	42.2	29.3	33.6	37.1
Males						
15–24	51.4	46.8	41.7	43.8	42.2	34.2
15–19	26.7	21.9	17.1	21.5	18.5	13.1
25–54	93.7	94.5	93.9	88.2	90.9	87.7
55–64	69.6	75.6	78.0	66.0	72.5	72.3
65+	25.2	30.9	29.2	23.1	29.4	27.8
15+	73.6	74.7	73.1	68.0	71.0	67.1

Source: MIDEPLAN (CASEN database).

These trends also suggest that demand for better educated individuals – those who have completed at least upper-secondary education – has not kept pace with supply.

The effective gender gap in labour force participation is higher still when part-time work is taken into account; it tends to be more prevalent among women. Part-time work is strongly affected by educational attainment: the percentage of working-age women with at least 12 years of schooling who work less than 20 h per week is less than one-half of that of their counterparts with less than 12 years of schooling. These trends underscore the fact that part-time work is an option for women to reconcile household and professional activities. But the strong correlation between the incidence of part-time work and educational attainment also suggests that part-time work may be the only viable arrangement for less educated women, for whom child care and pre-compulsory education services may be prohibitively expensive.

The decline in labour supply among youths is closely associated with an increase in school enrolment and improving educational attainment. Low participation is not a problem to the extent that youngsters opt to delay entry into the labour market in order to spend more time in education, and if returns to formal education are higher than those to seniority. But there are countries in the OECD area, such as the Netherlands and the United Kingdom, that have managed to combine high educational attainment with high participation among youths. It is likely that more youths will need to work to finance, at least in part, the cost of their studies as post-secondary enrolment rises further and against a dearth of government support. Therefore, there may be scope for policy action to make it easier for youths to join the labour force, if they so wish, while remaining in education.

Most youths aged 15–19 years study and do not work, a share which increased considerably during 1990–2003 for both males and females. By contrast, the percentage of young men who work, instead of studying, remains higher than that of females, but is much lower in 2003 than it was in 1990. Coupled with an increase in the share of youngsters who study while working, these trends are consistent with rising returns to higher education, as well as the increasing premium the labour market is putting on skills. But the proportion of youths who are neither studying nor working remains high. This is particularly worrying in the case of women aged 20–24 years, despite a steady decline during 1990–2003.

III. The Determinants of Labour Force Participation and Employment

The canonical model of participation is derived from a utility-maximization process, according to which individuals choose whether or not to work. They compare the utility derived from both actions and choose the one with the highest utility. Several variables enter the individual utility functions, including years of education, age, number of children and household income. The utility functions can therefore be written as

$$U^k = U^k(X'\beta^k + \varepsilon), \quad \text{for } k = 0, 1 \tag{1}$$

where k is equal to one, if the individual decides to work, and zero, otherwise.

Equation 1 defines a random-utility model. Only the final outcome is observed by the econometrician, instead of the utility levels for the different participation statuses. As a result, a probit model is conventionally used on the basis of data on actual participation rates. Parameters β^0 or β^1 are not observable either; the econometrician can only estimate their change from a participation status to another. The same model can be used for estimating the employment equations.

The determinants of labour force participation and employment are estimated for prime-age (25–54 years) males and females, and youth (15–24 years) for 1990, 1996 and 2003. The regressions are estimated by probit, because the main variables of

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Table 2. Labour force participation equations: prime-age individuals, probit models, 1990, 1996 and 2003

	Males			Females		
	1990	1996	2003	1990	1996	2003
Years of schooling						
8–11	0.019**	0.020**	0.034**	0.005**	0.069**	0.066**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
12	0.031**	0.029**	0.041**	0.112**	0.151**	0.165**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
12+	0.018**	0.019**	0.026**	0.319**	0.328**	0.315**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Age	0.016**	0.013**	0.019**	0.023**	0.013**	0.017**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age squared	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household						
Less than 3 years	0.008**	0.011**	0.014**	−0.084**	−0.095**	−0.090**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
3–5 years	0.011**	0.014**	0.014**	−0.064**	−0.060**	−0.062**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
6–10 years	0.006**	0.009**	0.007**	−0.053**	−0.052**	−0.057**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
11–17 years	0.002**	0.000	0.005**	−0.002**	−0.009**	−0.012**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of elderly individuals in the household	0.001	−0.004**	−0.006**	0.089**	0.108**	0.050**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Household per capita nonlabour income	−0.001**	−0.001**	−0.002**	0.010**	0.014**	−0.008**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head of household	0.091**	0.083**	0.076**	0.304**	0.301**	0.284**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Rural areas	0.024**	0.009**	0.006**	−0.164**	−0.155**	−0.141**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Number of observations	2 367 356	2 756 380	3 122 811	2 625 127	2 958 500	3 311 258
Adj. R^2	0.10	0.14	0.14	0.13	0.12	0.11

Notes: SEs are reported in parentheses.
** Denotes statistical significance at the 1% level. The regressions include regional dummies (not reported).

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interest – participation and employability – are binary and may therefore be expressed in terms of probabilities.

Prime-age individuals

The results of the probit estimations for prime-age females, reported in Table 2, indicate that educational attainment, measured by years of schooling, increases the probability of participation. The participation effect is particularly strong for individuals with at least 12 years of schooling. Age contributes positively to participation in a nonlinear manner, underscoring the presence of strong lifecycle effects in labour supply. The number of children in the household affects negatively the probability of participation, especially for those aged less than 3 years. The number of elderly individuals in the household affects positively the probability of participation. The effect of household income on labour supply changed over time: it was positively correlated with participation in 1990 and 1996, but the estimated coefficient turned negative in 2003. The probability of participation is also higher for women who are heads of household, lower in rural areas than in urban areas, and higher in the metropolitan region of Santiago than in the rest of the country. The results are similar for the employability regressions (Table 3).

In the case of prime-age males, the regression results show a strong participation effect associated with educational attainment, although it is less so for most educated men than it is for women. Participation increases with age, albeit in a nonlinear fashion, the number of children in the household, especially children aged 6–10 years, and residency in rural areas. Conversely, participation falls with the number of elderly people in the household and household income. As in the case of females, the results are similar for the employability equations.

Table 3. Employment equations: prime-age individuals, probit models, 1990, 1996 and 2003

	Males			Females		
	1990	1996	2003	1990	1996	2003
Years of schooling						
8–11	0.028**	0.034**	0.048**	0.007**	0.067**	0.067**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
12	0.057**	0.052**	0.072**	0.118**	0.152**	0.161**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
12+	0.050**	0.045**	0.060**	0.312**	0.330**	0.314**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.026**	0.016**	0.030**	0.029**	0.017**	0.020**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age squared	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household						
Less than 3 years	0.009**	0.013**	0.016**	−0.069**	−0.096**	−0.074**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
3–5 years	0.010**	0.017**	0.012**	−0.054**	−0.061**	−0.056**
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
6–10 years	0.002**	0.014**	−0.002**	−0.045**	−0.049**	−0.057**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
11–17 years	0.003**	0.003**	0.004**	−0.004**	−0.006**	−0.010**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of elderly individuals in the household	−0.001*	−0.011**	−0.008**	0.082**	0.093**	0.042**
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Household per capita nonlabour income	0.001**	−0.001**	−0.002**	0.013**	0.017**	−0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head of household	0.135**	0.113**	0.144**	0.277**	0.292**	0.262**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Rural areas	0.043**	0.030**	0.029**	−0.140**	−0.135**	−0.103**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Number of observations	2 367 356	2 756 380	3 122 811	2 625 127	2 958 500	3 311 258
Adj. R^2	0.07	0.10	0.10	0.11	0.12	0.09

Notes: SEs are reported in parentheses.
** and * denote statistical significance at the 1 and 5% levels, respectively. The regressions include regional dummies (not reported).

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Youth

The results of the probit estimations for female youth, reported in Table 4, show that the probability of participation rises with educational attainment in 2003, although the effect was the converse for some educational levels in 1990 and 1996. Participation tends to fall with the number of children in the household, especially for those aged less than 3 years. The association between youth participation and the number of elderly individuals in the household is not robust across time periods. Household income was found to be negatively correlated with the probability of participation in 1996 and 2003. Being the head of household raises the probability of participation, while living in a rural area decreases it. Again, as in the case of prime-age individuals, the results are similar for employability (Table 5).

In the case of male youths, for whom both participation and employment rates fell during 1990–2003, the estimation results suggest that there is a negative relationship between participation and educational attainment. The number of young children in the household, especially those aged less than 6 years, increases the probability of participation, while the converse is true for children aged 6–17 years. Household income decreases the probability of participation, while being the head of the household increases it. Living in rural areas increases the probability of participating in the labour market. The results of the employability regressions are similar to those for participation.

Summary of the main findings

Educational attainment is among the key determinants of labour supply for both males and females.

Table 4. Labour force participation equations: youths, probit models, 1990, 1996 and 2003

	Males			Females		
	1990	1996	2003	1990	1996	2003
Years of schooling						
8–11	−0.163**	−0.249**	−0.044**	−0.014**	−0.044**	0.100**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
12	−0.254**	−0.291**	−0.038**	0.061**	0.079**	0.236**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
12+	−0.495**	−0.569**	−0.409**	0.018**	−0.061**	0.032**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Age	0.513**	0.509**	0.578**	0.404**	0.304**	0.435**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age squared	−0.010**	−0.009**	−0.011**	−0.009**	−0.006**	−0.009**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household						
Less than 3 years	0.117**	0.070**	0.102**	−0.068**	−0.062**	−0.038**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
3–5 years	0.042**	0.092**	0.024**	−0.025**	0.004**	−0.013**
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
6–10 years	−0.008**	0.050**	−0.005**	0.042**	0.038**	−0.004**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
11–17 years	0.024**	−0.014**	−0.016**	0.036**	0.018**	−0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of elderly individuals in the household	−0.073**	−0.026**	−0.035**	0.037**	−0.006**	−0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Household per capita nonlabour income	−0.025**	−0.014**	−0.028**	0.005**	−0.003**	−0.031**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head of household	0.273**	0.354**	0.262**	0.067**	0.160**	0.152**
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Rural areas	0.227**	0.084**	0.106**	−0.070**	−0.061**	−0.056**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Number of observations	1 238 528	1 271 887	1 404 420	1 279 224	1 258 138	1 344 917
Adj. R^2	0.37	0.38	0.38	0.15	0.16	0.21

Notes: SEs are reported in parentheses.
** and * denote statistical significance at the 1 and 5% levels, respectively. The regressions include regional dummies (not reported).

The effect of educational attainment is particularly strong for prime-age females with at least 12 years of schooling. For prime-age males, the effect is strongest for those individuals with up to 12 years of schooling. In the case of youth, educational attainment is a powerful deterrent to male participation, given the trend towards rising school enrolment and falling participation over the years, but it is not the case for females, whose participation rates are on the rise together with an increase in educational attainment. These findings are broadly in line with those reported by Bravo and Contreras (2004) using a labour market survey conducted by the University of Chile for the metropolitan region of Santiago since 1957.

The presence of young children in the household discourages female participation both for prime-age and young women. This effect is particularly strong for those with children aged less than 3 years. The converse is true in the case of males, as expected, for whom participation rises with the number of children in the household. The adverse effect for young females suggests that they may be expected to contribute to intra-household arrangements for child care. This is consistent with the finding that female participation raises with the number of elderly individuals in the household, which suggests that intra-household arrangements are important for child care so that mothers with young children can return to the labour force.

Household income is another important determinant of participation and employability, especially for females (prime-age and youths). Participation tends to be lower for women living in more affluent households, although that has not always been the case, and to a certain extent the same is true for men. The probability of participation also rises for prime-age women who are heads of household.

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Table 5. Employment equations: youths, probit models, 1990, 1996 and 2003

	Males			Females		
	1990	1996	2003	1990	1996	2003
Years of schooling						
8–11	−0.123**	−0.197**	−0.048**	−0.021**	−0.046**	0.064**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
12	−0.147**	−0.221**	−0.040**	0.034**	0.047**	0.164**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
12+	−0.338**	−0.460**	−0.286**	0.006**	−0.058**	0.032**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Age	0.455**	0.477**	0.463**	0.288**	0.236**	0.257**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Age squared	−0.009**	−0.009**	−0.009**	−0.006**	−0.005**	−0.005**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household						
Less than 3 years	0.090**	0.056**	0.071**	−0.065**	−0.050**	−0.034**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
3–5 years old	0.046**	0.079**	0.018**	−0.013**	0.008**	−0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
6–10 years old	−0.018**	0.038**	−0.006**	0.032**	0.029**	−0.009**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
11–17 years old	0.018**	−0.017**	−0.015**	0.024**	0.023**	0.001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Number of elderly individuals in the household	−0.056**	−0.019**	−0.037**	0.025**	−0.002	−0.006**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Household per capita nonlabour income	−0.016**	−0.010**	−0.021**	0.011**	0.003**	−0.017**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head of household	0.244**	0.344**	0.233**	0.069**	0.148**	0.122**
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Rural areas	0.267**	0.121**	0.135**	−0.047**	−0.035**	−0.013**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Number of observations	1 238 528	1 271 887	1 404 420	1 279 224	1 258 138	1 344 917
Adj. R^2	0.30	0.34	0.31	0.14	0.16	0.18

Notes: SEs are reported in parentheses.
** Denotes statistical significance at the 1% level. The regressions include regional dummies (not reported).

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Moreover, as expected, labour supply rises with age, albeit in a nonlinear fashion for both prime-age males and females, and is lower in rural areas than in urban areas for prime-age and young females. It is also higher in the metropolitan region of Santiago than in the rest of the country.

IV. Decomposition Analysis

The methodology

The results of the probit models can be used to decompose changes in participation and employment during 1990–2003 between changes in their main determinants and in the estimated coefficients. It is therefore possible to assess the impact on participation/employability of structural changes in the economy (captured by changes in estimated coefficients) relative to that of changes in individual and market characteristics (captured by changes in variables). Intuitively, changes in coefficients measure to some extent structural changes in the economy, such as structural reform in product markets, trade liberalization, amendments to the labour code, etc. Changes in variables, on the other hand, are related predominantly to the individual and market-related characteristics, such as those related to demography, household status, residency location and human capital accumulation.

Several methodologies are now available for such a decomposition, including that of Yun (2004). The basic idea is that participation/employability, denoted by Y, is a function of several market-related and individual characteristics, such that it can be written as

$$Y = F(X'\beta)$$

Table 6. Decomposition of female labour force participation, 1990 and 2003.

	Youths				Prime-age females			
	Variables	ΔF (%)	Coefficients	ΔF (%)	Variables	ΔF (%)	Coefficients	ΔF (%)
Years of schooling								
8–11	−0.06	2.20	0.00	0.02	0.00	−0.01	−38.95	276.99
12	−0.85	30.09	−0.07	2.30	−0.96	6.84	−40.00	284.48
12+	−0.05	1.94	0.00	0.14	−1.70	12.08	−10.45	74.29
Age	7.10	−251.51	−0.80	28.29	−3.09	21.95	605.59	−4306.38
Age squared	−5.98	211.98	0.33	−11.65	3.83	−27.23	−502.65	3574.39
Number of children								
Less than 3 years	−1.04	36.88	−0.01	0.36	−0.57	4.03	2.42	−17.22
3–5 years	−0.35	12.45	0.00	0.08	−0.78	5.52	−1.13	8.05
6–10 years	0.06	−1.99	0.02	−0.64	−0.20	1.45	3.68	−26.15
11–17 years	0.26	−9.11	0.04	−1.45	0.00	0.01	15.28	−108.63
Number of elderly	−0.06	1.97	0.01	−0.19	−0.06	0.42	12.19	−86.66
Head of household	−0.09	3.02	0.00	0.07	−1.39	9.92	−2.16	15.36
Urban	−0.56	19.81	0.00	0.08	−0.65	4.64	−10.07	71.60
Household income	−0.23	7.98	0.05	−1.93	−0.23	1.64	52.24	−371.50
Total	−1.7	61.7	−0.5	16.9	−5.9	41.6	−7.6	54.4

Notes: Based on the estimations reported in Tables 2 and 4 ($\Delta F = -2.8$ for youths and −14.1 for prime-age females). The regional effects are not reported.

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where F is a normally distributed cumulative density function, as in a probit model, X is a set of regressors, which includes the main determinants of participation/employability, and β is a vector of estimated coefficients.

The decomposition exercise consists of re-writing Y as follows:

$$\begin{aligned}\bar{Y}_t - \bar{Y}_{t+1} &= \overline{F(X_t'\beta_t)} - \overline{F(X_{t+1}'\beta_{t+1})} \\ &= \overline{F(X_t'\beta_t)} - \overline{F(X_{t+1}'\beta_t)} \\ &\quad + \overline{F(X_{t+1}'\beta_t)} - \overline{F(X_{t+1}'\beta_{t+1})}\end{aligned}$$

Changes in Y – denoted by $Y_t - Y_{t+1}$ – can therefore be written as a sum of two components. The first term – $\overline{F(X_t'\beta_t)} - \overline{F(X_{t+1}\beta_t)}$ – accounts for changes over time in the variables (the determinants of participation/employment included in X), whereas the second term – $\overline{F(X_{t+1}'\beta_t)} - \overline{F(X_{t+1}'\beta_{t+1})}$ – accounts for changes in the estimated coefficients (β).

Labour force participation

The results of the decomposition analysis are reported in Table 6 for both prime-age females and youths. During 1990–2003, prime-age female participation increased by 14 percentage points. Changes in both variables and coefficients contributed to this increase. Most of the changes in variables were due to changes in educational attainment, which contributed to the increase in participation, age effects, the number of young children in the household and head-of-household status. As for changes in coefficients, the findings are less clear-cut, but changes in educational attainment suggest that returns to education increased considerably during the period of analysis. Changes in the number of children aged less than 3 years and between 6 and 17 years reduced participation, possibly suggesting that obstacles related to access to child care became more stringent in 2003 relative to 1990. Changes in regional coefficients (not reported) were also important. In the case of female youths, the participation rate rose by almost 3 percentage points during 1990–2003. Changes in variables accounted for the bulk of this increase, especially educational attainment, the number of young children in the household (less than 6 years of age) and residency in urban areas. In the case of coefficients, most of the overall change is explained by age effects.

With regard to males, the results of the decomposition analysis are reported in Table 7. In the case of prime-age individuals, participation increased by 0.2 percentage points during 1990–2003 due essentially to changes in variables. The variable whose change contributed the most is educational attainment, while age effects and changes in head-of-household status decreased participation. With regard to youth, there was a sizeable drop in the participation rate, although it remains higher than that of females. Changes in variables accounted for most of this trend, especially in the case of educational attainment (above 11 years

Table 7. Decomposition of male labour force participation, 1990 and 2003

	Youths				Prime-age males			
	Variables	ΔF (%)	Coefficients	ΔF (%)	Variables	ΔF (%)	Coefficients	ΔF (%)
Years of schooling								
8–11	−0.28	−2.84	0.11	1.13	−0.01	5.12	−0.04	27.23
12	1.49	15.31	0.14	1.40	−0.38	250.62	−0.03	21.79
12+	1.33	13.68	0.01	0.11	−0.14	93.19	−0.02	14.68
Age	4.13	42.35	3.90	40.01	−2.99	1969.07	−1.30	858.87
Age squared	−3.27	−33.61	−1.54	−15.84	3.24	−2137.47	0.44	−292.62
Number of children								
Less than 3 years	0.61	6.27	0.00	−0.04	0.12	−77.22	−0.01	5.89
3–5 years	0.21	2.16	0.00	−0.03	0.21	−135.56	0.00	3.13
6–10 years	−0.01	−0.09	0.00	0.02	0.05	−31.07	−0.01	3.84
11–17 years	0.16	1.59	−0.08	−0.82	0.01	−3.87	−0.01	6.87
Number of elderly	0.04	0.43	0.01	0.09	0.00	0.92	0.01	−3.66
Head of household	0.73	7.52	0.00	−0.04	0.53	−352.60	0.00	−0.11
Urban	0.98	10.01	−0.04	−0.37	0.22	−141.79	0.02	−10.09
Household income	0.79	8.15	−0.01	−0.11	0.05	−30.29	0.01	−3.81
Total	6.8	70.2	2.4	25.0	0.9	−573.5	−1.0	672.8

Notes: Based on the estimations reported in Tables 2 and 4 ($\Delta F = 9.7$ for youths and $\Delta F = -0.2$ for prime-age males). The regional effects are not reported.

Table 8. Decomposition of female employment, 1990 and 2003

	Youths				Prime-age females			
	Variables	ΔF (%)	Coefficients	ΔF (%)	Variables	ΔF (%)	Coefficients	ΔF (%)
Years of schooling								
8–11	−0.10	58.01	1.52	−913.00	0.00	−0.02	1.00	−8.63
12	−0.50	298.78	1.68	−1008.44	−1.03	8.91	0.76	−6.55
12+	−0.02	10.47	0.26	−159.14	−1.68	14.50	0.10	−0.89
Age	5.25	−3154.09	−9.41	5652.01	−3.96	34.28	−24.24	209.59
Age squared	−4.29	2576.01	5.68	−3413.36	4.41	−38.11	17.52	−151.52
Number of children								
Less than 3 years	−1.03	618.89	0.31	−184.28	−0.48	4.15	−0.02	0.18
3–5 years	−0.18	109.40	0.06	−38.90	−0.68	5.89	0.01	−0.07
6–10 years	0.04	−26.02	−0.52	313.53	−0.18	1.54	−0.28	2.43
11–17 years	0.18	−106.81	−0.84	505.89	0.00	0.02	−0.23	1.97
Number of elderly	−0.04	23.42	−0.14	84.67	−0.06	0.49	−0.35	3.02
Head of household	−0.09	52.97	0.04	−25.46	−1.27	10.99	−0.08	0.73
Urban	−0.39	233.30	0.18	−107.71	−0.57	4.97	0.38	−3.29
Household income	−0.53	318.67	−1.40	840.13	−0.30	2.59	−1.28	11.09
Total	−1.6	982.8	2.0	−1228.4	−5.8	50.6	−5.1	44.0

Notes: Based on the estimations reported in Tables 3 and 5 ($\Delta F = -0.2$ for youths and $\Delta F = -11.6$ for prime-age females). The regional effects are not reported.

of schooling), age effects, residency in an urban area and household income. Changes in coefficients also reduced participation, predominantly through age effects.

Employability

The results of the decomposition analysis are reported in Table 8 for both prime-age females and youth. The sharp increase in prime-age female employment during 1990–2003, as in the case of participation, was due to a combination of changes in variables and coefficients. As for changes in variables, differences in educational attainment and in the number of young children in the household (less than 10 years old), head-of-household status and the number of elderly individuals in the household explain most of the increase in employment. In the

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Table 9. Decomposition of male employment, 1990 and 2003

	Youths				Prime-age males			
	Variables	ΔF (%)	Coefficients	ΔF (%)	Variables	ΔF (%)	Coefficients	ΔF (%)
Years of schooling								
8–11	−0.25	−2.62	0.10	1.00	−0.01	−2.29	0.00	−0.60
12	1.06	10.96	0.10	1.02	−0.65	−140.09	0.00	−0.43
12+	1.12	11.58	−0.02	−0.24	−0.40	−85.45	0.00	−0.29
Age	4.40	45.60	5.52	57.31	−4.67	−1006.28	−0.08	−16.67
Age squared	−3.61	−37.41	−2.17	−22.54	4.80	1034.26	0.02	3.92
Number of children								
Less than 3 years	0.57	5.87	0.00	−0.04	0.12	26.86	0.00	−0.12
3–5 years	0.28	2.90	−0.01	−0.08	0.19	41.15	0.00	−0.03
6–10 years	−0.02	−0.25	0.01	0.11	0.02	3.63	0.00	0.16
11–17 years	0.14	1.49	−0.11	−1.10	0.01	1.58	0.00	−0.09
Number of elderly	0.04	0.40	0.00	0.05	0.00	0.64	0.00	0.08
Head of household	0.71	7.37	0.00	0.00	0.85	183.15	0.00	−0.77
Urban	1.31	13.57	−0.05	−0.51	0.35	76.40	0.00	0.19
Household income	0.60	6.20	−0.04	−0.37	−0.03	−6.43	0.00	0.23
Total	6.2	64.7	3.1	31.7	0.5	117.4	−0.1	−14.6

Notes: Based on the estimations reported in Tables 3 and 5 ($\Delta F = 9.3$ for youths and $\Delta F = 0.5$ for prime-age males). The regional effects are not reported.

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case of coefficients, most of the increment in employment is explained by age effects. In the case of female youth, employment remained relatively stable during the period of analysis. While changes in variables (especially the number of young children in the household and household income) contributed to raising employment, those in coefficients (especially educational attainment) acted to decrease it.

With regard to males, the results of the decomposition analysis are reported in Table 9. The fall in prime-age male employment by about 0.5 percentage points during 1990–2003 is explained essentially by changes in variables. Changes in educational attainment increased employment: the sum of all educational changes is equivalent to more than 1 percentage point increment in employment. This was nevertheless offset by other effects, especially changes in head-of-household status. Employment also fell for male youths, especially through changes in variables. Changes in educational attainment, age and residency in an urban area are the most important changes in variables. In case of changes in coefficients, age effects were most important.

Summary of the main findings

The decomposition exercise suggests that, in the case of labour supply, structural changes in the economy (captured by the estimated coefficients of the participation equations for 1990 and 2003) have been the main determinants of rising participation for prime-age individuals (Table 10). The converse is nevertheless true for youth, for whom long-term trends in the underlying individual and market-related determinants, especially those associated with rising human capital, explain most of the change in participation during 1990–2003. With regard to labour demand, on the other hand, long-term trends in the underlying determinants of employability, rather than structural changes in the economy, tend to explain most of the changes in employment rates for both prime-age individuals and youth.

Policy discussion

Chile's low female labour force participation stands out in international comparisons. There are cultural reasons why women may prefer to focus on household responsibilities, rather than to engage in gainful activities outside the home. Evidence based on survey data shows that conservative social attitudes towards working women are an important deterrent to female labour force participation, an effect that is estimated to far outweigh the positive impact of educational attainment on a woman's propensity to work outside the home (Contreras and Plaza, 2006). But there is also scope for policy action in this area, especially by facilitating access by working mothers to child care and pre-school education. Mothers with younger children, especially those in low-pay jobs, often find it prohibitive to work while having to pay for these services out of pocket. According to the 2003 CASEN survey, 16% of women aged 25–39 stated that they did not look for a job in the previous 2 months

Table 10. Participation and employability: decomposition analysis, 1990–2003.

	Males		Females	
	Youths	Prime-age individuals	Youths	Prime-age individuals
Change in participation	9.7	−0.2	−2.8	−14.1
Change in variables	6.8	0.9	−1.7	−5.9
Change in coefficients	2.4	−1.0	−0.5	−7.6
Change in employment	9.6	0.5	−0.2	−11.6
Change in variables	6.2	0.5	−1.6	−5.8
Change in coefficients	3.1	−0.1	2.0	−5.1

Notes: Based on the regression results reported in Tables 5–8.
Changes are defined as the difference between the participation/employment rates in 1990 and in 2003. A negative (positive) number denotes an increase (decline) in participation/employment.

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because they did not have an option for child care (Politeia, 2007). This problem is worse for low-income mothers, affecting about 22% of women aged 20–29 years in the bottom income quintile, against less than 5% for those in the top quintile.

Chilean legislation mandates enterprises with at least 20 female employees to provide child care facilities (in the work place or outside it) for children aged less than 2 years. But this provision affects only a small proportion of enterprises (about 17% in 2004). Most mothers, especially those with a comparatively weak attachment to the labour force and on precarious jobs, therefore need to rely on publicly provided facilities (including Junta Nacional de Jardines Infantiles (JUNJI) and *Fundación Integra*), especially among the low-income groups. For older children, access to pre-school education is on the rise. About 57% of children aged 3–5 were engaged in pre-school education in 2003 (against 36% in 1990), whereas only just over 6% of those aged 0–3 were in child care (2.5% in 1990). Facilitating access to publicly funded child care is important not only from the viewpoint of encouraging female labour supply, but also because international experience suggests that access to early childhood education can improve school outcomes later in life, strengthening educational attainment.

Of course, the net economic benefit of reducing the costs of child care borne by parents depends ultimately on the labour-supply response. This is an empirical question. But an increase in the availability of affordable child care may affect participation not only for prime-age women, but also among other household members. This is the case of the elderly, for example, whose presence in a household is strongly correlated with prime-age female participation on the basis of the empirical analysis reported above. Older household members can be relied upon for child care through informal intra-household arrangements. This is also the case of female youths, whose participation is discouraged by the presence of young children in the household, which suggests that they too contribute to child care. This may explain to some extent the high percentage of young women who neither study nor work. If this is the case, the payoff of policies aimed at facilitating access to child care services would go far beyond the increase in participation among prime-age females, because they would unlock opportunities for both young women and older household members to engage in gainful occupations. The fact that informal arrangements for child care within the household are likely to change when the younger cohorts, who have higher participation rates, grow older also needs to be taken into account. Moreover, because female employability depends strongly on educational attainment, the constraint imposed by a lack of affordable child care services may affect less-educated individuals disproportionately.

V. Conclusions

Chile's gender gap in labour supply is sizeable. Notwithstanding a gradual increase over the years, female labour force participation is well below the average of OECD and several Latin American countries. The estimation of probit models using household survey data for 1990, 1996 and 2003 shows that labour supply depends on educational attainment for both males and females, and that female participation is strongly discouraged by the presence of young children in the household. The decomposition exercise suggests that structural changes in the economy between 1990 and 2003 were the main determinants of changes in participation among prime-age individuals, but the converse is true for changes in employment, which seem to have been driven predominantly by changes in individual

characteristics. This article argues that there is scope for policy action to encourage female labour supply, especially by facilitating access by working mothers to affordable day care and pre-school education for their children, while recognizing the importance of cultural factors that may discourage women from seeking work opportunities outside the home.

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