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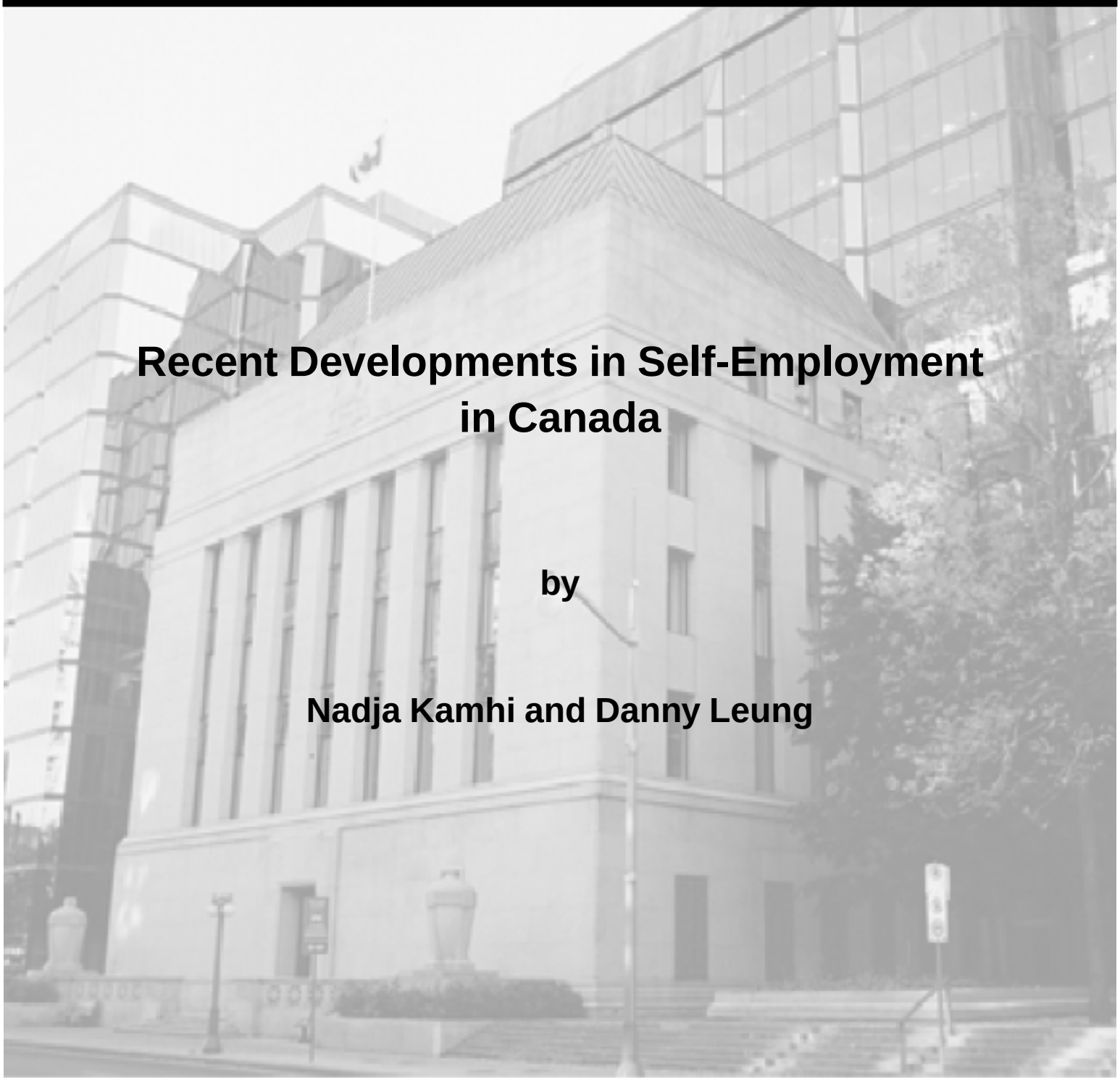

Recent Developments in Self-Employment in Canada

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Abstract

The authors document the recent evolution of the self-employment rate in Canada. Between 1987 and 1998, the self-employment rate rose 3.5 percentage points from 13.8 per cent to 17.3 per cent. In contrast, over the 1999 to 2002 period, the self-employment rate fell by 1.9 percentage points, returning the self-employment rate in 2002 to a level only 0.2 percentage points higher than in 1992. The authors explore the possible explanations for this reversal. They describe trends in self-employment by age, gender, and types of self-employment, and then decompose the changes in the self-employment rate into the fraction due to shifts in the industrial structure and the proportion due to changes within each industry. The authors also examine the role of the business cycle and other macroeconomic factors, such as tax rates.

JEL classification: J23, J24
Bank classification: Labour markets

Résumé

Les auteurs étudient l’évolution récente de la proportion des travailleurs autonomes au Canada. Entre 1987 et 1998, cette proportion a progressé de 3,5 points de pourcentage et est passée de 13,8 % à 17,3 %. De 1999 à 2002, par contre, elle a baissé de 1,9 point de pourcentage, de sorte qu’en 2002, elle ne dépassait plus que de 0,2 point le niveau de 1992. Les auteurs explorent les causes possibles de ce retournement. Ils examinent les tendances par tranche d’âge, sexe et catégorie de travailleurs autonomes, avant de faire ressortir l’influence des transformations de la structure sectorielle de l’emploi et l’incidence des changements observés au sein de chaque branche d’activité. Le rôle du cycle économique et d’autres facteurs macroéconomiques comme la fiscalité est aussi analysé.

Classification JEL : J23, J24
Classification de la Banque : Marchés du travail

1. Introduction

After rising steadily for almost two decades and reaching a peak of 17.3 per cent in 1998, the self-employment rate[1] in Canada fell back to 15.2 per cent in 2002.[2] In fact, the 3.0 per cent average annual rate of decrease between 1999 and 2002 is larger than the 2.3 per cent average annual rate of increase in the 1990–98 period that prompted a multitude of researchers to study the rise in self-employment.[3] A common weakness of many of their papers is that any variable that moved upward over time would be found to be a possible explanatory factor, since the self-employment rate exhibits an upward trend beginning in 1976. The fact that the self-employment rate declined for four consecutive years provides an opportunity to examine whether the relationships found by earlier researchers are spurious.

Interest in studying the self-employed was piqued by the dramatic rise in their numbers in the early 1990s. Learning the consequences of having one in six workers self-employed began with understanding why individuals chose to be self-employed. Since the real economy can be affected by either a rising or a falling rate of self-employment, a study of the recent decline in self-employment is also of interest.[4]

This paper contributes to the literature in two ways. First, it documents the recent decline in self-employment in Canada; trends in self-employment by age, gender, types of self-employment, and industry groups are described. We find that both the increase and decrease in self-employment occurred across all age and gender groups. While older workers of both genders (55+) and prime-age females contributed disproportionately to the increase, younger workers of both genders (15–24) and older females contributed disproportionately to the decline. We find that both the increase and decrease in the self-employment rate is primarily driven by the own-account self-employed.[5]

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[1] The fraction of self-employed in total employment. In Canada, the self-employed include both owners of incorporated and unincorporated businesses as well as unpaid family workers.

[2] Since 2002, the self-employment rate has stabilized around 15.3 per cent.

[3] Examples of Canadian studies include Roy and Gauthier (1997), Lin, Picot, and Yates (1999), Lin, Yates, and Picot (1999), Schuetze (2000), and Leung and Robinson (2002). Examples of international studies include Blau (1987), Blanchflower and Oswald (1998), Blanchflower (2000), and the OECD (1992, 2000).

[4] One example of the effect that the self-employed have on the economy is their impact on productivity. Studies such as that by Audretsch and Thurik (2001), which examine the determinants of productivity growth, often use self-employment as a proxy for entrepreneurial input. Furthermore, a recent paper by Baldwin and Chowhan (2003) links the expansion of self-employment to Canada's poor labour-productivity growth relative to that of the United States.

[5] Own-account self-employed are self-employed without employees.

Second, this paper replicates some of the analyses that we carried out to explain the rise in self-employment. The rise and decline in self-employment is decomposed into the fraction that occurred due to shifts in the industrial structure and the fraction that occurred due to changes within each industry. Also, the role of the business cycle, tax rates, and other macroeconomic factors are examined in regression analysis. The industry decompositions reveal that both the increase and the subsequent decrease in self-employment occurred in most industries. However, 82 per cent of the rise in the aggregate self-employment rate can be attributed to four industries: professional, scientific, and technical services; management, administrative, and other support services; educational services and health care; and finance, insurance, and real estate (FIRE). Likewise, a large fraction of the decline, 65 per cent, can be accounted for by the following four industries: agriculture; retail trade; educational services and health care; and manufacturing. Thus, industry-specific factors are important.

Nevertheless, the similarities in the direction of self-employment growth across age, gender, and industry groups suggest there may be common macroeconomic factors driving the aggregate trend. Thus, regression analysis is used to determine whether macroeconomic factors can explain the variation in annual provincial own-account self-employment rates. We find that individuals tend to enter self-employment when economic conditions (measured by the unemployment rate) are improved. The pattern of unemployment rates, however, predicts changes in the self-employment rate that are opposite to what is observed. Also, we find that the participation rate, the minimum wage, and a measure of marginal income taxes explain 30 per cent of both the increase in self-employment during the 1989–98 period and the decline in it during the 1998–2002 period. Since common macroeconomic factors explain a relatively small portion of the movements in the self-employment rate, the regression results underline the finding that industry-specific factors are important.

This paper is organized as follows. Section 2 describes the trend in self-employment by age, gender, type of self-employment, and industry group. Section 3 decomposes the decline in self-employment into the fraction due to shifts in the industrial structure and the proportion due to changes within each industry. The results are then compared with a similar decomposition for the earlier increase in self-employment. Section 4 examines the role of the business cycle and other macroeconomic factors, such as tax rates. Concluding remarks are offered in section 5.

2. Recent Developments in Self-Employment

This section provides an overview of the aggregate self-employment trends. Between 1976 and 1998, the self-employment rate rose 5.0 percentage points from 12.2 per cent to 17.2 per cent (Figure 1). The 3.4 percentage point rise in the self-employment rate in the last half of that period was more than two times higher than in the first half of the period. In contrast, over the 1999 to 2002 period, the self-employment rate fell by 1.9 percentage points, returning the self-employment rate in 2002 to a level only 0.2 percentage points higher than in 1992. A significant portion of the recent decline is due to the ongoing decline in the importance of the agricultural sector. Just as the decline in agriculture held back the rise in the overall self-employment rate during 1976–98, the falling importance of agriculture has speeded the decline of the overall self-employment rate, allowing the gap between the self-employment rate for the total economy and the non-agricultural sector to close.[6] However, since the reversal of the trend in the self-employment rate for the non-agricultural sector is as striking as that of the total economy, other factors must be involved.

The gradual shift away from the non-agricultural goods sector towards the services sector may have played a small role in the increase in self-employment during the 1987–98 period (Figure 2), but as Roy and Gauthier (1997) show, the majority of the increase was due to the rise in self-employment across many sectors. Regarding the decline in self-employment, four years may be too short a time for gradual changes in the industrial structure to have much effect. Moreover, Figure 2 shows that the self-employment rate for both the non-agricultural goods and service sectors fell between 1999 and 2002. Section 3 provides a more detailed examination of the experiences of different industries.

One of the interesting facts about the 1987–98 period is that, despite the widespread increase in self-employment across all age and gender groups, older males and females (55+) and prime-age females (25–54) contributed disproportionately. This has led some researchers to hypothesize that part of the increase in self-employment was due to females and older workers seeking more flexible labour market arrangements.[7] In contrast, Table 1 shows that younger workers of both genders (15–24) and older females (55+) contributed disproportionately to the decline, whereas the self-employment rate for older males hardly changed. While changes in the

[6] Self-employment rates by industry are available only from 1987.
[7] See, for example, Carr (1996), Boden (1999), and Leung (2005).

aggregate self-employment rate are primarily driven by the experience of prime-age workers, the findings in Table 1 suggest that the factors driving the increase in self-employment may be slightly different from the ones causing the decline.[8]

Another notable characteristic of the rise in self-employment is that it was concentrated among the unincorporated and own-account self-employed (Figures 3 and 4). In fact, the increase in own-account self-employment accounted for the entire increase in self-employment during the 1987–98 period, and the decrease in own-account self-employment accounted for 61 per cent of the decline in the self-employment rate. This concentration has led some researchers to hypothesize that individuals during the 1987–98 period entered self-employment to avoid or evade either income or payroll taxation.[9] Since the recent decline was also concentrated in the unincorporated and own-account self-employed, income and payroll taxes may help explain the decrease if these tax rates have fallen recently. This hypothesis is examined in more detail in section 4.

Various researchers have discussed the role of "push" and "pull" factors in self-employment. If the number of self-employed is rising while the number of employees is falling or growing at a much slower rate, it may suggest workers are being "pushed" into self-employment because of poor job opportunities. On the other hand, if the growth in the number of employees is strong, but growth in self-employment is even stronger, this might suggest individuals are being "pulled" into self-employment because of better pecuniary or non-pecuniary benefits. Figure 5 shows the indexes for the number of employees and self-employed in all industries. If the hump in the self-employment index between 1996 and 2001 and the dip in the employee index during the 1990–93 period are ignored, then it appears the number of self-employed and employees grew at the same rate. The deterioration in labour market conditions for employees increased the self-employment rate in the early 1990s. As the economy recovered, the growth rate of self-employed and employees converged until 1997, when the growth in the number of self-employed accelerated. In contrast to the early 1990s, Figure 5 suggests that the increase in the self-employment rate in the late 1990s was more likely due to the increased attractiveness of the self-employment sector, rather than depressed conditions for employees. Likewise, the subsequent decline in the self-employment rate after 1998 appears to be the result

[8] A decomposition, similar to that presented in the next section, shows that the changing distribution of individuals across age and gender groups contributes little to the explanation of the movements in the self-employment rate.
[9] See Schuetze (2000) and Leung and Robinson (2002).

of a reversal in the attractiveness of self-employment. We investigate the cyclical aspect of the self-employment rate more rigorously in section 4.

3. Industry Self-Employment Rates and Their Contribution to the Aggregate Trend

Changes in the aggregate self-employment rate may be the result of changes in only certain industries. Moreover, the industries that are responsible for the increase may be different from the ones causing the decrease. Identifying these industries helps us understand the underlying factors that are driving the aggregate self-employment rate. In this section, we examine each industry's contribution to the aggregate trend.

Changes in the aggregate self-employment rate can be decomposed into changes due to shifts in the relative importance of each industry in the economy (measured by changes in the industry's share of total employment), and changes in the self-employment rate within each industry. Let the self-employment rate and employment share of industry i at time t be represented by SE_{it} and E_{it}, respectively. The change in the aggregate self-employment rate, ΔSE_t, can be written as:

$$\Delta SE_t = \sum_{i=1}^{N} E_{it-1}\Delta SE_{it} + \sum_{i=1}^{N} SE_{it-1}\Delta E_{it} + \sum_{i=1}^{N} \Delta SE_{it}\Delta E_{it},$$

where N is the number of industries and Δ denotes a change between t and t-1. The first term on the right-hand side represents the change in the aggregate self-employment rate due to changes in the self-employment rates within the individual industries. The second term on the right-hand side represents the change in the aggregate self-employment rate due to changes in the employment shares of individual industries. The last term on the right-hand side is a cross-product term that is usually added to one of the previous terms on the right-hand side. An individual industry's contribution to the change in the aggregate self-employment rate is simply the sum of the terms in the above equation that pertain to industry i:

$$E_{it-1}\Delta SE_{it} + SE_{it-1}\Delta E_{it} + \Delta SE_{it}\Delta E_{it}.$$

As with Roy and Gauthier (1997), we find that the rise in self-employment was due almost entirely to increasing self-employment rates across all industries. While shifts in the industrial structure of the economy did occur, the effects tended to cancel out. Movements out of industries with high incidences of self-employment, such as agriculture and construction, were

counteracted by the decline in public administration and movements into other high-incidence self-employment industries, such as professional, scientific, and technical services, and management, administrative, and other support services.

Analysis of the 1999–2002 period yields similar results. The continuing decline in the agricultural industry was counteracted by the increasing importance of professional, scientific, and technical services, and management, administrative, and other support services, and a rebound in the importance of construction. Therefore, rather than show the results for the decomposition, Table 2 shows the total contribution (the effect of the change in the self-employment rate within the industry, and the effect of the change in the importance of that industry) of each industry to the change in the self-employment rate over the 1987–98 and 1998–2002 periods.[10]

It is clear that the increase and subsequent decrease in self-employment was widespread across many industries. However, the majority of the rise and decline can be attributed to some key industries. The majority of the rise in self-employment can be attributed to the professional, scientific, and technical services; educational services and health care; management, administrative, and other support services; and FIRE. On the other hand, the top four industries that contributed to the decline are: agriculture; retail trade; educational services and health care; and manufacturing. The importance of educational services and health care is common across the two periods.[11] Furthermore, professional, scientific, and technical services, which contributed the most to the rise (36 per cent), would have been in the top four industries that contributed to the decline if its employment share did not rise as much as it did, or if agriculture was excluded. Although there are some commonalities, the fact that retail tade and manufacturing accounted for only 5 per cent of the increase but 27 per cent of the decline suggests that the underlying factors that caused self-employment to rise are not identical to the ones that caused it to fall.

Overall, Table 2 shows that most industry self-employment rates followed the aggregate rate, rising between 1987 and 1998 and falling during the 1998–2002 period.[12] This suggests that there were macroeconomic or structural factors common to all industries driving the aggregate

[10] The full decomposition is presented in the appendix, Tables A1 and A2.
[11] More detailed analysis indicates that the health care and social assistance portion of the educational services and health care industry was primarily responsible for the changes in the self-employment rate within the broader industry group.
[12] The exception is the self-employment rate for other services, which rose in both the 1987–98 and the 1998–2002 periods.

self-employment rate. However, the large variance in the amount of increase across industries suggests that these common factors may have had differential effects on specific industries, or that there may have been some sector-specific factors at work.[13]

4. Macroeconomic Factors

Many cyclical and structural factors have been tested in previous studies to determine whether they explain the rise in self-employment. Most researchers conclude that no single factor can account for the rise in self-employment.[14] This section examines whether changes in the unemployment, participation, payroll tax, income tax, and minimum-wage rates can explain the evolution of the own-account self-employment rates in Canada.[15] Annual provincial own-account self-employment rates from the Labour Force Survey are taken and their variation over the 1976–2002 period is explained via a fixed-effect regression:

$$SE_{it} = \alpha + \beta' x_{it} + \eta_i + \varepsilon_{it},$$

where SE_{it} is the self-employment rate for province i in year t, x_{it} is a vector of explanatory variables, η_i is a province-specific effect that is fixed over time, and ε_{it} is an error term. The regression analysis focuses on the own-account self-employed because, as Figure 4 shows, the movements in the own-account self-employment rate are driving the total self-employment rate.[16]

[13] An example of a sector-specific factor is the entrance of many large "big-box" retailers into the retail trade sector over the latter half of the 1990s and beyond. Examples include the spread of Wal-Mart; growth of the large book retailer, Chapters-Indigo; and the move towards one-stop shopping. Anecdotal evidence suggests these large retailers are causing the number of smaller independent retailers to decline. This anecdotal evidence is supported by the fact that the self-employment rate in retail trade fell 23 per cent or 3.5 percentage points between 1997 and 2002.

[14] See Le Blansch et al. (1998) and OECD (2000).

[15] Another possible macroeconomic factor that may explain the self-employment rate is the interest rate. Meyer (1990) and Holtz-Eakin, Joulfaian, and Rosen (1994) have shown that liquidity constraints have a statistically significant effect on the probability of becoming self-employed. A more recent paper by Hurst and Lusardi (2004), however, shows that it is only after the 95th percentile that a positive relationship between wealth and self-employment can be found. Furthermore, they find that wealth matters only for businesses that require higher initial capital. Since entry into own-account self-employment likely requires less capital than entry into self-employment where employees are hired, a measure of the cost of borrowing money is omitted from the regression.

[16] Furthermore, the limited variation in the self-employment rate for the self-employed with employees makes analyzing its movements problematic.

4.1 Explanatory variables

The following explanatory variables are used in the regression. Each variable varies over province and time:

Unemployment and participation rate: (1976–2002)

The unemployment rate is a cyclical indicator. Since increases in the unemployment rate can be due to an increase in the number of individuals looking for work, the participation rate is also included to yield more precise cyclical effects. The empirical evidence is mixed on whether self-employment is pro or counter cyclical.[17]

Cyclically adjusted employment dispersion indicator: (1977–2002)

Following Yuen (2003), Lilien's (1982) indicator of sectoral shifts is purged of business cycle effects.[18] The residual sectoral shifts are an indicator of the degree of structural change and transitory sector-specific shocks. It has been argued that structural change, due to increased openness to trade and government downsizing, displaced many workers and may have contributed to the increase in the number of self-employed.

Relative income: (1980–2001)

Average self-employment income as a fraction of average wage-employment income for economic units whose family heads are between the ages of 25 and 54.[19] The averages are calculated for recipients only. Self-employment income refers only to net income from unincorporated self-employment.

[17] A drawback of using the unemployment rate as a cyclical indicator is that changes in the unemployment rate can be due to structural factors, such as the closing of the cod fishery in the Maritime provinces. Alternatively, an output-gap measure, such as the Bank of Canada's output gap from its Quarterly Projection Model (QPM), can be used. In contrast to the unemployment rate, movements in the output gap can clearly be interpreted as a change in cyclical conditions. Unfortunately, QPM does not produce output-gap measures at the provincial level. A provincial output-gap measure can be constructed by using the Hodrick-Prescott filter of provincial gross domestic product (GDP) to obtain a measure of potential or trend provincial GDP. Regression results using this provincial output-gap measure yield similar results to those shown below that use the unemployment rate.

[18] Lilien's (1982) employment dispersion index (EDI) is the weighted standard deviation of the relative employment growth rate across sectors:

$$\mathrm{EDI}_t = \left(\sum_i \left(e_{it} / E_t\right)\left(\Delta \log e_{it} - \Delta \log E_t\right)^2 \right)^{0.5},$$

where t indexes time, E is total employment, and e_i is employment in industry i. The index is purged of cyclical influences by regressing each industry's relative employment growth rates against the output gap from QPM, subtracting the effect of the output gap in each of the employment growth series, and then using the adjusted employment growth series to form EDI. In contrast to Yuen (2003), the index is constructed for each province using annual data.

[19] These data can be obtained from Statistics Canada's CANSIM (http://cansim2.statcan.ca).

Effective payroll tax rate: (1976–2002)

Supplementary labour income divided by wages and salaries.[20] Bruce (2000) and Stabile (2004) argue that, since many self-employed are exempt from part or all payroll taxes, individuals may choose to become self-employed to avoid paying those taxes.

Average effective marginal income tax rate: (1980–2001)

For each quintile, the effective marginal tax rate is calculated for an individual with no dependents earning the average income in the quintile.[21] An average using either equal weights or the quintiles' share of total income is taken. The latter captures changes in the tax structure at higher incomes, while the former captures changes at lower incomes. Since there are arguably more opportunities to avoid or evade income taxes in self-employment, it might be expected that income tax rates would be positively correlated to the self-employment rate. However, as stated in OECD (2000), this result is not always found.

Real effective minimum wage: (1980–2002,1992 dollars)

The maximum between the federal and provincial minimum wages deflated by the provincial consumer price index.[22] Blau (1987) argues that the wage rigidity imposed by higher minimum wages leads more workers to resort to self-employment when they lose their jobs as employees.

Employment composition: (1976–2002)

The fraction of employed workers who are aged 15–24, those aged 55+, those who have 0–8 years of schooling, and those who have a bachelor's degree or higher. Self-employment is more prevalent among older individuals, individuals with a bachelor's degree or higher, and individuals with 0–8 years of schooling.[23]

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[20] Supplementary labour income comprises employers' contributions to health and welfare schemes, pension plans, workers' compensation, employment insurance, Canada/Quebec pension plans, and retirement allowances. Since supplementary labour income includes items such as employers' contributions to private pension plans, which are not payroll taxes, and excludes employees' portions of payroll taxes, supplementary income divided by wages and salaries is not, per se, a measure of effective payroll taxes. This measure, however, is found to be highly correlated to that of Lin, Picot, and Beach (1996) and Lin (2001), where data on the components of supplementary income are used and employees' contributions are taken into account. Their series is not used in this paper because it stops in 1997 and we are interested in studying the decline in self-employment after 1998.

[21] Combined federal and provincial marginal tax rates for a single individual with no dependents are taken from various editions of *National Finances* and *Finances of the Nation*, both published by the Canadian Tax Foundation. The average total income in constant dollars of unattached individuals in each quintile and the quintiles' share of total income for unattached individuals are from CANSIM. The consumer price index is used to transform the constant dollar incomes into nominal terms before the marginal tax rates are assigned.

[22] The effective minimum wage is also an average within the year, taking into account changes that do not occur at the beginning of the calendar year. The minimum wages are from the *Labour Law Update* and *Workplace Gazette*, both published by Human Resources Development Canada.

[23] In 2002, the self-employment rate for those aged 55+ was 29.9 per cent, compared with 4.3 per cent for those aged 15–24. Furthermore, the self-employment rate was 25.7 per cent, 18.2 per cent, and 14.9 per cent for those with 0–8 years of education, a bachelor's degree or higher, and all others, respectively.

Industrial structure: *(1976–2002)*	Industry employment as a fraction of total employment. Self-employment is more prevalent in some industries than in others.[24]
Provincial fixed effects:	A full set of provincial dummies are entered into the regression. Given their geographic location and their unique cultural histories, some provinces may have higher self-employment rates than others.

Figures 6 through 14 show the evolution of some of the explanatory variables for Canada as a whole.[25] Data for Canada are shown in the figures for simplicity. Variations across provinces and time are used in the regression. Figures 6 and 7 show the unemployment rate and participation rate, respectively. The unemployment rate rose to relatively high levels during the recessionary periods of the early 1980s and 1990s, and it fell during the recoveries of the late 1980s and 1990s. Rising rates of female participation drove the increase in the aggregate participation rate before 1990. More recently, the participation rate increased again due to older workers.

Figure 8 shows the unadjusted and cyclically adjusted employment dispersion indexes. As expected, the cyclically adjusted index is less volatile than the unadjusted index. Specifically, the spikes in the unadjusted employment dispersion index in 1982 and 1991 were due to cyclical factors. Furthermore, the series appears to be more volatile before 1991. The reduced volatility in the post-1991 period reveals a slight upward trend in the cyclically adjusted employment dispersion index that might be interpreted as an increase in the pace of structural change.[26]

Figure 9 shows the average unincorporated self-employment income of an economic unit as a fraction of the average wage-employment earnings of an economic unit. The average unincorporated self-employment income is low; it is not higher than 46 per cent of the average wage-employment income. This is not surprising, since the higher earnings of the incorporated self-employed are included in the average for the wage-employed. Furthermore, since an economic unit is included in the average if it reports any unincorporated self-employment income, the average unincorporated self-employment income would be lowered further by units whose members hold secondary jobs in self-employment. Finally, there is a clear break in the

[24] For example, the self-employment rate in agriculture was 64.1 per cent in 2002, while in manufacturing it was 4.1 per cent.
[25] For the minimum wage and average marginal tax rates, a weighted average across provinces is taken in each year; the weights are the provinces' shares of national employment.
[26] See Yuen (2003) for more details.

series in 1996. This is likely due to the fact that the source of this series on CANSIM changed from the Survey of Consumer Finances to the Survey of Labour and Income Dynamics. Given this break in the series, data from 1980 to 1995 are used only in the regression.

Figures 10 and 11 show the effective payroll tax rate and the minimum wage, respectively. The payroll tax rate rose slowly between 1976 and 1990, and then rose rapidly until 1995. Afterwards, the payroll tax rate declined gradually.[27] The real minimum wage follows a similar pattern. High inflation in the early 1980s substantially eroded the value of the real minimum wage. It then stabilized at approximately $5.30 until 1991. The real minimum wage then rose to over $6.00 by 1996. Since then it has declined gradually.

Figure 12 shows the average marginal income tax rates using equal and income weights. There is a clear break between 1986 and 1987 due to the reduction of income tax brackets in 1987. Given this break in the series, data from 1987 onwards are used only in the regression. Between 1987 and 1999, marginal income tax rates rose for those with higher incomes, while it rose and remained relatively constant for those in lower tax brackets. Since 1999, marginal income tax rates have fallen for individuals in all tax brackets.

Unlike the case for the relative income measure, there is no fundamental reason to exclude some of the data. Still, it is difficult to believe tax rates dropped that much in 1987 alone. The large drop is likely due to the fact that only five points on the tax structure are used to calculate the average marginal tax rate. The series should be smoother if a larger number of points are used.

Figures 13 and 14 show employment by age group and education group, respectively. Compared with the past, employed workers in 2002 are less likely to come from the 15–24 age group and more likely to be better educated. Tables A1 and A2 in the appendix show the fraction of employed in each industry for certain years.

[27] Since some payroll taxes, such as employment insurance and the Canada/Quebec pension plans, have yearly maximums, the effective payroll tax rate may be countercyclical. When the economy is above capacity and incomes are relatively high, the effective payroll tax rate should be lower. On the other hand, if many lower-paid individuals find employment when the economy is doing well, this may raise the effective payroll tax rate. A simple fixed-effect regression of provincial effective payroll tax rates on lagged provincial unemployment rates suggests that the former effect dominates.

4.2 Regression results

Since the explanatory variables are arguably all endogenous, lagged values are used as instruments.[28] Regressions are performed using a few different sample periods because some variables are not available over the entire 1976–2002 time period.[29]

The regression results in Table 3 suggest that own-account self-employment is procyclical. The coefficient on the unemployment rate is negative and significant for the own-account self-employment regressions in almost all cases; the exception is the 1981–96 period. In that case, if the statistically insignificant relative income variable is dropped from the regression, the unemployment rate becomes significant at the 10 per cent level.[30] There are theoretical arguments for both a pro and countercyclical relationship. Individuals may be "pulled" into self-employment when the chance of success is higher during an expansion, or they may be "pushed" into self-employment during a recession when alternatives as an employee are scarce.[31] Evidently, individuals are pulled into own-account self-employment. Interestingly, the unemployment rate's effect on the self-employment rate is roughly the same magnitude in terms of absolute value across the different regressions; the coefficient on the unemployment rate ranges between -0.11 and -0.06.

The participation rate is also consistently statistically significant in the own-account self-employment regressions. A percentage point increase in the participation rate leads to a 0.20–0.27 percentage point decrease in the own-account self-employment rate. The negative relationship between the participation rate and self-employment rate can be rationalized in a number of ways. Cyclical movements in the participation rate can be due to the changes in the number of people who are marginally attached to the labour force. Since starting one's own business involves a certain degree of commitment, it is not surprising that a lower proportion of marginal workers would opt for self-employment. Alternatively, the negative relationship may be related to the fact that, over the entire period, the participation rate has risen for females and

[28] It is clear that some variables, such as the unemployment rate, are endogenous. Others, such as the employment composition variables, are endogenous because they are fractions of total employment and not fractions of the population.
[29] Tests show evidence of groupwise (by province) heteroscedasticity. Therefore, results using generalized least squares allowing groupwise heteroscedasticity are presented. The estimates presented do not vary substantially from the ones that allow for more general forms of heteroscedasticity, autocorrelation, or ordinary least squares with robust standard errors.
[30] If relative income is dropped, the coefficient on the unemployment rate drops to -0.0605 (p-value = 0.067).
[31] See Lin, Yates, and Picot (1999) or Lin, Picot, and Yates (1999) for further discussion of this point.

fallen for males. Given that females are less likely to be self-employed than males, the participation rate may be picking up the effect of the declining fraction of males in employment.

Contrary to the arguments of Bruce (2000) and Stabile (2004), we find that payroll taxes are uncorrelated to the own-account self-employment rate in all regressions. Since only the unincorporated self-employed are exempt from certain payroll taxes, our findings may be the result of using self-employment rates that do not make a distinction between the incorporated and unincorporated self-employed. We find, however, that payroll taxes are not statistically significant even when the unincorporated self-employment rate is used as the dependent variable. A possible explanation for this result is that an individual's occupational choice depends on the costs of paying the payroll tax net of its benefits. For example, it is unlikely that an increase in the payroll tax rate would induce seasonal workers to become self-employed and give up the benefits of employment insurance. An increase in payroll tax rates would be more likely to cause an increase in self-employment if the benefits of programs that the taxes fund are not denied to individuals once they are self-employed.[32]

The cyclically adjusted employment dispersion index is entered as a regressor in the 1978–2002 regression. It is not statistically significant and hence not entered into subsequent regressions. The cyclically adjusted employment dispersion index was meant to account for the effects of the pace of structural change. The volatility of this measure, as Figure 8 shows, may hinder the identification of that effect.

Similarly, the relative income between self- and wage-employment is entered into the 1981–96 regression and is found to be insignificant. While potential earnings should be a factor in occupational choice, many individuals enter self-employment because of the non-pecuniary effects. Hamilton (2000) argues that these non-pecuniary benefits are substantial, as the earnings differential between the wage- and self-employed cannot be explained by the selection of low-ability individuals into self-employment.

Increases in the minimum wage are found to increase the own-account self-employment rate in all of the regressions. This is consistent with the story that individuals at the low end of the labour market who are unemployed enter self-employment as an alternative to

[32] Stabile (2004) studies the effect that the introduction of the Employer Health Tax in Ontario in 1990 had on an individual's choice to become self-employed. Since the self-employed were initially exempt from that tax, and because the availability of provincial health care benefits did not depend on whether one was self-employed, it is not surprising that Stabile finds that the tax increased the probability of choosing self-employment.

unemployment. Furthermore, the small magnitude of the relationship (a full dollar increase in the minimum wage increases the own-account self-employment rate by only 0.48–0.60 percentage points) indicates that the minimum wage directly affects only a small fraction of the labour market.

The effects of the two income tax measures are estimated in separate regressions to avoid a collinearity problem. While the equally weighted average marginal tax rate is found to be positive but insignificant, the income-weighted average marginal tax rate is positive and significant. There are two opposing arguments for the effects of income taxes on the self-employment rate. Schuetze (2000) argues that the self-employment rate and marginal tax rates should be positively correlated because there are more opportunities to avoid or evade income taxes in self-employment. On the other hand, Robson and Wren (1999) argue that higher income taxes may have a negative effect on the self-employment rate because individuals often enter self-employment to obtain extra income through extra effort. Higher marginal tax rates reduce this incentive to enter self-employment. Since the income-weighted average marginal tax rate captures changes in the tax structure at higher incomes, it could be the case that Schuetze's argument is more applicable to individuals with higher incomes. Perhaps the opportunities to avoid income taxes are greater for businesses that generate more income, or the willingness to evade taxes via self-employment rises with income as an individual's degree of risk aversion likely declines.

4.3 Explaining the own-account self-employment rate

Table 4 reports the fraction of the change in the own-account self-employment rate for Canada explained by the unemployment rate, participation rate, minimum wage, and income-weighted average marginal tax rate. Coefficients from the 1989–2002 regression that include the income-weighted average marginal tax rate are used to calculate the contributions. The unemployment rate rose between 1989 and 1998, and fell between 1998 and 2002. Given that the coefficient on the unemployment rate is negative, the unemployment rate actually explains a negative fraction of the changes in the own-account self-employment rate. In the 1989–98 period, the participation rate, minimum wage, and income tax rate are able to explain 13 per cent, 11 per cent, and 3 per cent of the change in the own-account self-employment rate, respectively. These three variables are able to explain much more of the decline in own-account self-

employment. Jointly, they explain 50 per cent of the change in self-employment over the 1998–2002 period. The participation rate explains the most (22 per cent), followed by the income tax rate (20 per cent) and then the minimum wage (8 per cent).

The fact that the movements in own-account self-employment account for the entire increase in the total self-employment rate during the 1989–98 period, and for 60 per cent of the decrease during the 1998–2002 period, implies that participation, income, and the minimum wage rate explain 30 per cent of both the increase and decrease in the total self-employment rate (1 times 30 per cent in the 1989–98 period, and 0.6 times 50 per cent in the 1998–2002 period).

5. Conclusion

Our analysis in sections 2 to 4 has shown that the factors that caused the increase in self-employment are probably different from the ones that caused the decrease. Section 2 also showed that older workers and prime-age females contributed disproportionately to increases in self-employment, while younger workers and older females contributed disproportionately to the decline. Furthermore, changes in own-account self-employment accounted for the entire increase in the self-employment rate, and for 60 per cent of the decline.

Section 3 showed that, while the self-employment rate increased within all industries and decreased within almost all industries, the industries primarily responsible for the rise in the self-employment rate differed from the ones that were responsible for the decline. The professional, scientific, and technical services; educational services and health care; management, administrative, and other support services; and FIRE industries accounted for 82 per cent of the increase, but for only 18 per cent of the decline. The majority of the decline, 65 per cent, can be attributed to the agricultural, retail trade, and manufacturing industries. This dichotomy suggests that industry-specific factors drove the trends in self-employment. An example of an industry-specific factor is the entrance of many large "big-box" retailers into the retail trade sector over the latter half of the 1990s and beyond. Examples include the spread of Wal-Mart; the growth of the large book retailer, Chapters-Indigo; and the move towards one-stop shopping.

Nevertheless, in section 4 we attempted to find macroeconomic factors that could explain the self-employment rate, since the movements in it for each industry, age, and gender group have so much in common. We found that the self-employment rate is procyclical: individuals tend to enter self-employment when economic conditions (measured by the unemployment rate)

are better. Since the unemployment rate was higher in 1998 than in 1989, and subsequently declined after 1998, this suggests that cyclical factors cannot explain the rise and decline of the self-employment rate. We also found that the participation rate, the minimum wage, and a measure of marginal income taxes explained 30 per cent of both the increase in self-employment during the 1989–98 period and the decline in it during the 1998–2002 period. Since common macroeconomic factors explain a relatively small portion of the movements in the self-employment rate, the result underlines the previous conclusion that the factors that caused the self-employment rate to rise are likely not the same ones that caused it to decline, and that industry-specific factors are important. Regression analysis that examines the variation in industry self-employment rates may yield some insight into what these factors might be; this is left for future work.

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Table 1: Non-Agricultural Self-Employment Rates by Age and Gender (%)						
		1987	Percentage change between 1987 and 1998	1998	Percentage change between 1998 and 2002	2002
Male	15–24	5.3	+5.8	5.6	-33.9	3.7
	25–54	15.1	+23.8	18.7	-8.9	17.1
	55+	22.9	+42.4	32.6	-0.3	32.6
	All	14.1	+30.0	18.4	-7.2	17.0
Female	15–24	5.4	+27.8	6.9	-43.5	3.9
	25–54	8.6	+41.4	12.2	-8.2	11.2
	55+	13.4	+69.2	22.7	-14.1	19.5
	All	8.3	+47.9	12.2	-11.2	10.9
Total	All	11.6	+34.2	15.5	-8.8	14.2

Table 2: Industry Self-Employment Rates (%) and Industry Contribution to Aggregate Rate					
Industry	1987	Contribution to change 1987–98	1998	Contribution to change 1998–2002	2002
Agriculture	68.1	**-0.16**	69.2	**0.38**	64.1
Other primary	14.9	0.00	17.1	0.03	16.5
Utilities	0.0	0.00	0.0	0.00	0.0
Construction	26.5	0.06	34.0	-0.01	31.4
Manufacturing	3.7	0.05	5.4	**0.10**	4.1
Wholesale trade	15.9	0.01	17.4	0.02	14.9
Retail trade	13.5	0.00	14.5	**0.17**	11.6
Transportation and warehousing	12.5	0.07	17.6	0.03	17.0
FIRE	8.6	**0.11**	15.0	0.03	14.7
Professional, scientific, and technical services	27.2	**0.36**	38.1	**0.08**	33.0
Management, administrative, and other support services	19.1	**0.14**	26.3	-0.05	25.9
Educational services and health care	7.1	**0.21**	10.8	**0.12**	9.2
Information, culture, and recreation	12.1	0.05	15.1	-0.01	14.6
Accommodation and food services	10.3	0.04	11.1	0.05	9.6
Other services	29.0	0.04	32.3	0.06	33.6
Public administration	0.0	0.00	0.0	0.00	0.0
All industries	13.8	1.00	17.2	1.00	15.2

Table 3: Regression Results								
	Own-account self-employment							
	1977–2002		1978–2002		1981–2002		1981–96	
	Coef.	*P*-value	Coef.	*P*-value	Coef.	*P*-value	Coef.	*P*-value
Unemployment rate	-0.0598	0.040	-0.0941	0.002	-0.1007	0.001	-0.0470	0.150
Participation rate	-0.2290	0.000	-0.2785	0.000	-0.2748	0.000	-0.1983	0.009
Payroll tax rate	0.0435	0.326	0.0269	0.560	0.0121	0.792	0.0890	0.064
Minimum wage					0.0059	0.000	0.0048	0.002
Emp. disp. index			-0.0451	0.176				
Relative income							-0.0026	0.673
	Own-account self-employment							
	1989–2002							
	Coefficient		*P*-value		Coefficient		*P*-value	
Unemployment rate	-0.1063		0.001		-0.1046		0.006	
Participation rate	-0.2724		0.000		-0.2390		0.000	
Payroll tax rate	0.0142		0.755		0.0129		0.000	
Minimum wage	0.0060		0.000		0.0059		0.000	
Income tax rate (equal weights)	0.0212		0.189					
Income tax rate (income weights)					0.0539		0.006	

Note: Lagged values of the explanatory variables are used in the regression.

Table 4: Explaining the Movements in the Own-Account Self-Employment Rate					
	1989	Contribution to change 1989–98	1998	Contribution to change 1998–2002	2002
Own-account self-employment rate	7.2%	1.00	11.0%	1.00	9.8%
Unemployment rate	7.7%	-0.04	9.0%	-0.16	7.2%
Participation rate	67.1%	0.13	65.1%	0.22	66.2%
Minimum wage	$5.28	0.11	$5.99	0.08	$5.83
Income tax rate	34.1%	0.03	36.4%	0.20	31.9%

Note: Coefficients from the 1989–2002 regression that includes the income-weighted average marginal tax rate are used to calculate the contributions.

Figure 1: Total and Non-Agricultural Self-Employment Rates

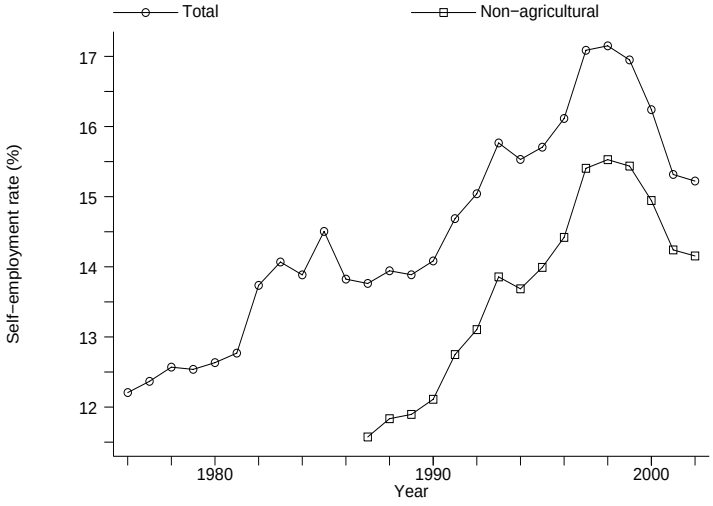


Figure 2: Non-Agricultural Goods versus Service Sector

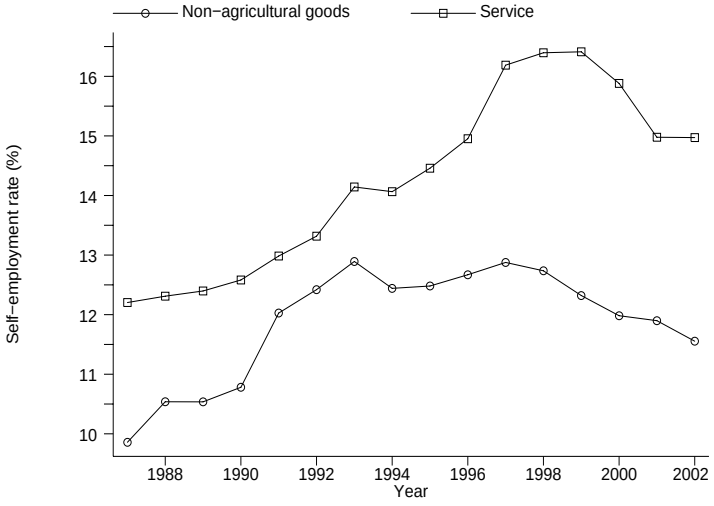


Figure 3: Incorporated versus Unincorporated

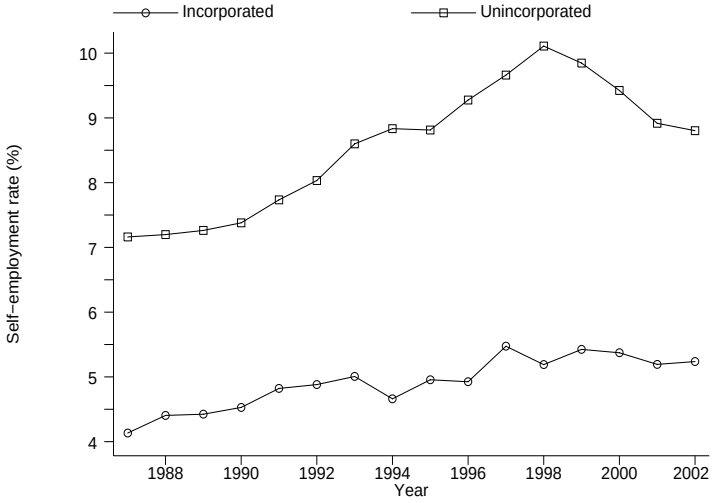


Figure 4: Employer versus Own-Account

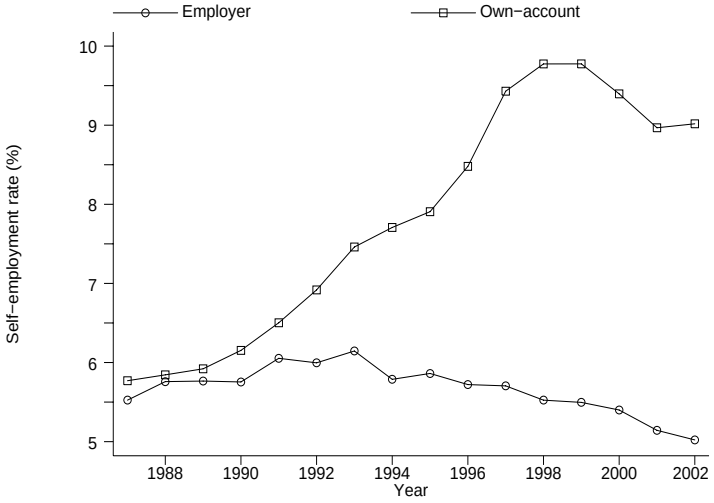


Figure 5: Self-Employment/Employee Levels

Figure 6: Unemployment Rate

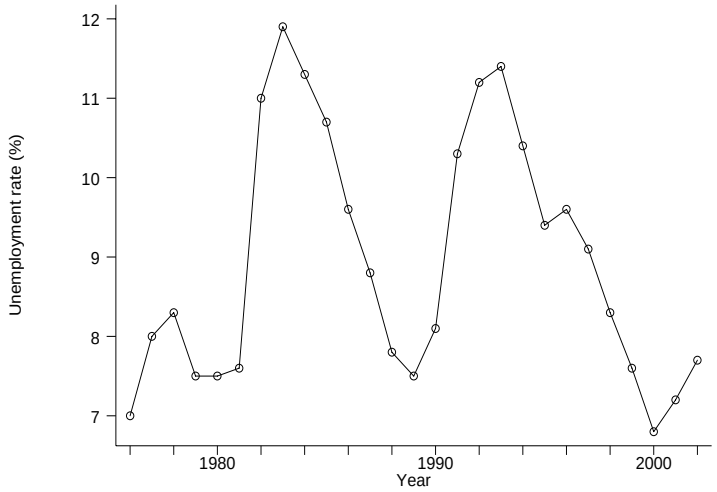


Figure 7: Participation Rate

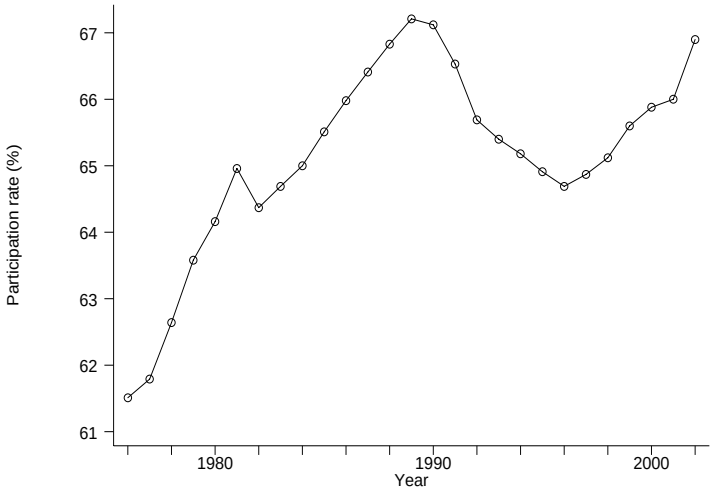


Figure 8: Employment Dispersion Indexes

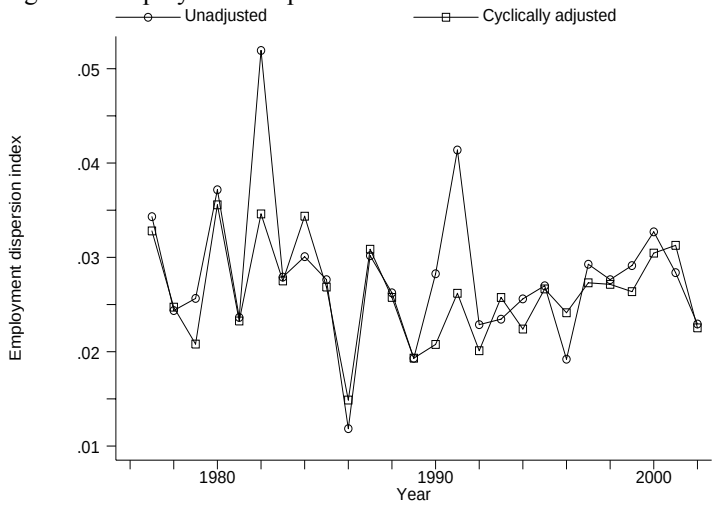


Figure 9: Relative Income

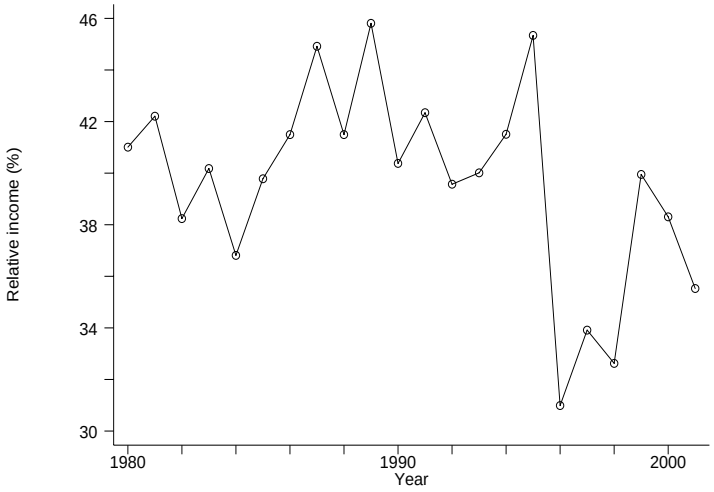


Figure 10: Effective Payroll Tax Rate

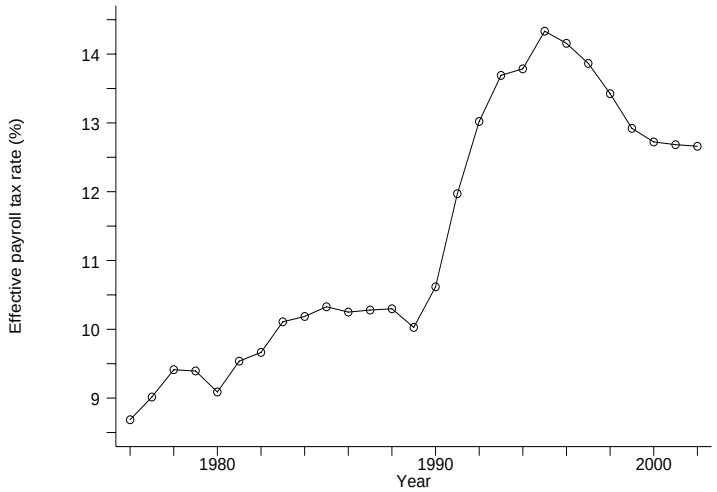


Figure 11: Real Minimum Wage

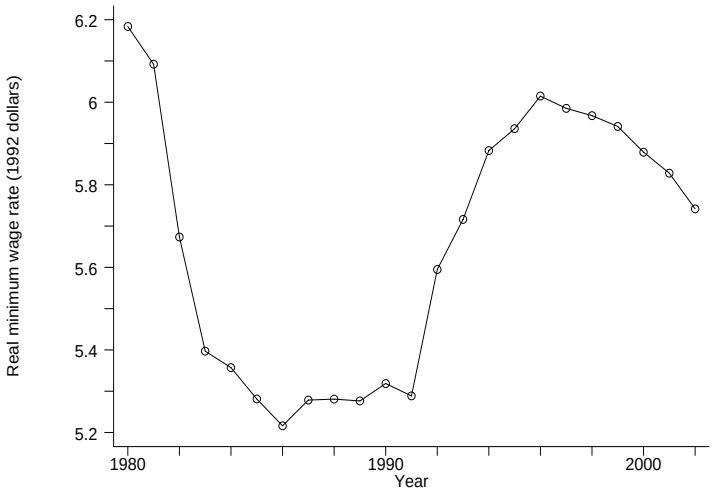


Figure 12: Average Marginal Income Tax Rates

Figure 13: Employment by Age Group

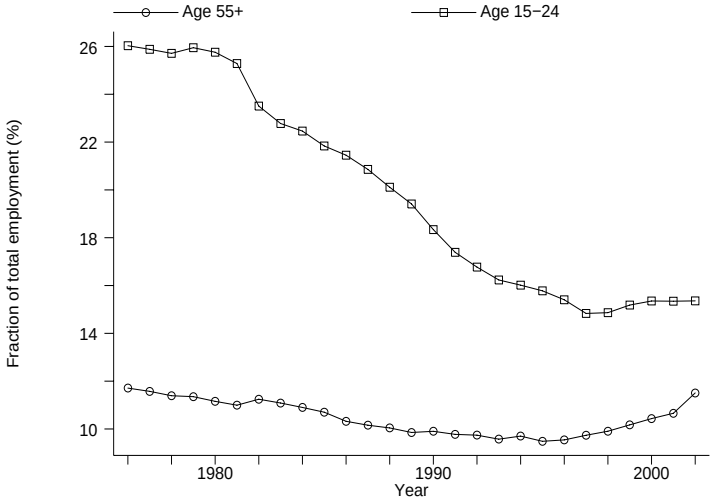
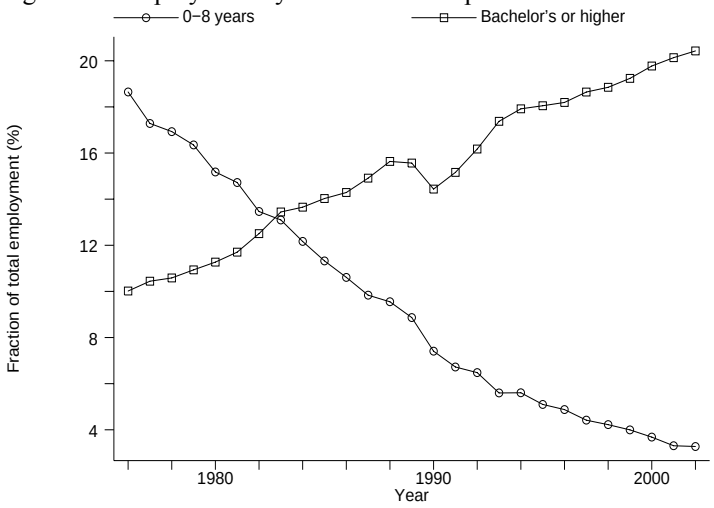


Figure 14: Employment by Education Group



Appendix

Table A1: Industry Self-Employment Rates (%) and Industry Contribution to Aggregate Trend, 1987–1998

Industry	E_{i87}	E_{i98}	SE_{i87}	SE_{i98}	$\Delta SE_i * E_{i87}$	$\Delta E_i SE_{i87}$	$\Delta SE_i \Delta E_i$	Contribution to change (%)
Agriculture	0.0387	0.0303	68.1	69.2	0.04	-0.57	-0.01	-16.0
Other primary	0.0238	0.0208	14.9	17.1	0.05	-0.04	-0.01	0.0
Utilities	0.0097	0.0082	0.0	0.0	0.00	0.00	0.00	0.0
Construction	0.0593	0.0523	26.5	34.0	0.44	-0.19	-0.05	6.0
Manufacturing	0.1656	0.1495	3.7	5.4	0.27	-0.06	-0.03	5.4
Wholesale trade	0.0338	0.0326	15.9	17.4	0.05	-0.02	0.00	0.9
Retail trade	0.1276	0.1199	13.5	14.5	0.12	-0.10	-0.01	0.4
Transportation and warehousing	0.0518	0.0507	12.5	17.6	0.26	-0.01	-0.01	7.1
FIRE	0.0614	0.0604	8.6	14.0	0.39	-0.01	-0.01	11.1
Professional, scientific, and technical services	0.0389	0.0601	27.2	38.1	0.42	0.58	0.23	36.2
Management, administrative, and other support services	0.0216	0.0340	19.1	26.3	0.16	0.24	0.09	14.2
Educational services and health care	0.1572	0.1670	7.1	10.8	0.59	0.07	0.04	20.6
Information, culture, and recreation	0.0401	0.0436	12.1	15.1	0.12	0.04	0.01	5.1
Accommodation and food services	0.0569	0.0653	10.3	11.1	0.05	0.09	0.01	4.1
Other services	0.0512	0.0503	29.0	32.3	0.17	-0.03	0.00	4.2
Public administration	0.0624	0.0552	0.0	0.3	0.02	0.00	0.00	0.5
All industries	1.00	1.00	13.8	17.2	3.17	-0.03	0.25	100.0

Note: SE_{it} and E_{it} are, respectively, the self-employment rate and employment share of industry i in period t, where t = 1987, 1998. Δ denotes the change between 1987 and 1998.

Table A2: Industry Self-Employment Rates (%) and Industry Contribution to Aggregate Trend, 1998–2002								
Industry	E_{i98}	E_{i02}	SE_{i98}	SE_{i02}	$\Delta SE_i * E_{i98}$	$\Delta E_i SE_{i02}$	$\Delta SE_i \Delta E_i$	Contribution to change (%)
Agriculture	0.0303	0.0214	69.2	64.1	-0.16	-0.61	0.05	37.5
Other primary	0.0208	0.0176	17.1	16.5	-0.01	-0.05	0.00	3.4
Utilities	0.0082	0.0085	0.0	0.0	0.00	0.00	0.00	0.0
Construction	0.0523	0.0573	34.0	31.4	-0.14	0.17	-0.01	-1.2
Manufacturing	0.1495	0.1509	5.4	4.1	-0.19	0.01	0.00	9.7
Wholesale trade	0.0326	0.0359	17.4	14.9	-0.08	0.06	-0.01	1.7
Retail trade	0.1199	0.1217	14.5	11.6	-0.34	0.03	-0.01	16.8
Transportation and warehousing	0.0507	0.0491	17.6	17.0	-0.03	-0.03	0.00	3.0
FIRE	0.0604	0.0581	14.0	14.7	-0.02	-0.03	0.00	2.6
Professional, scientific, and technical services	0.0601	0.0645	38.1	33.0	-0.30	0.17	-0.02	8.2
Management, administrative, and other support services	0.0340	0.0384	26.3	25.9	-0.01	0.12	0.00	-5.2
Educational services and health care	0.1670	0.1702	10.8	9.2	-0.26	0.03	-0.01	12.2
Information, culture, and recreation	0.0436	0.0457	15.1	14.6	-0.02	0.03	0.00	-0.5
Accommodation and food services	0.0653	0.0651	11.1	9.6	-0.10	0.00	0.00	5.2
Other services	0.0503	0.0450	32.3	33.6	0.07	-0.17	-0.01	5.8
Public administration	0.0552	0.0505	0.3	0.0	-0.02	0.00	0.00	0.8
All industries	1.00	1.00	17.2	15.2	-1.62	-0.29	-0.01	100.0

Note: SE_{it} and E_{it} are, respectively, the self-employment rate and employment share of industry i in period t, where t = 1998, 2002. Δ denotes the change between 1998 and 2002.

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