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**The employment effects of North-South  
trade and technological change**

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## Preface

The primary goal of the ILO is to contribute with member States to achieve full and productive employment and decent work for all, including women and young people, a goal which has now been widely adopted by the international community.

In order to support member States and the social partners to reach the goal, the ILO pursues a Decent Work Agenda which comprises four interrelated areas: Respect for fundamental worker's rights and international labour standards, employment promotion, social protection and social dialogue. Explanations of this integrated approach and related challenges are contained in a number of key documents: in those explaining and elaborating the concept of decent work,<sup>1</sup> in the Employment Policy Convention, 1964 (No. 122),<sup>2</sup> and in the Global Employment Agenda.

The Global Employment Agenda was developed by the ILO through tripartite consensus of its Governing Body's Employment and Social Policy Committee. Since its adoption in 2003 it has been further articulated and made more operational and today it constitutes the basic framework through which the ILO pursues the objective of placing employment at the centre of economic and social policies.<sup>3</sup>

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The *Employment Working Papers* series is designed to disseminate the main findings of research initiatives undertaken by the various departments and programmes of the Sector. The working papers are intended to encourage exchange of ideas and to stimulate debate. The views expressed are the responsibility of the author(s) and do not necessarily represent those of the ILO.

José Manuel Salazar-Xirinachs  
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<sup>1</sup> See the successive Reports of the Director-General to the International Labour Conference: *Decent work* (1999); *Reducing the decent work deficit: A global challenge* (2001); *Working out of poverty* (2003).

<sup>2</sup> In 1964, ILO Members adopted Convention No. 122 on employment policy which states that "With a view to stimulating economic growth and development, raising levels of living, meeting manpower requirements and overcoming unemployment and underemployment, each Member shall declare and pursue, as a major goal, an active policy designed to promote full, productive and freely chosen employment".

<sup>3</sup> See <http://www.ilo.org/gea>. And in particular: *Implementing the Global Employment Agenda: Employment strategies in support of decent work*, "Vision" document, ILO, 2006.

<sup>4</sup> See <http://www.ilo.org/employment>.

## Foreword

Many advanced countries have seen the emergence of new types of contractual arrangements, undergone technological change and increased imports from developing countries during last decades of the twentieth century. The latter two developments, by shifting the composition of labour demand towards higher skills, ought to have exacerbated adversity in the labour market, especially for the less skilled. This paper finds that technological changes and increasing imports from developing countries have generally had an effect of shifting labour demand towards higher skills in advanced countries. Typically, when such a shift takes place it ought to reveal itself in increased unemployment, particularly amongst the less skilled. This is not found to be the case. It is argued in this paper that the reason why we do not detect these effects directly, is because the protection regime for labour, both for the unemployed and for the employed has been undergoing changes, and has given rise to adverse non-standard forms employment. These adverse forms of employment act like unemployment absorbers, and some of the employment related adjustments from Southern imports and changes in technology are likely to fall on these adverse employment forms. In short, the expected adverse impact of imports from the South and technological change on the employment situation is as is to be expected, and though it cannot be detected when we look at the unemployment rates, it is apparent when we look at adverse forms of employment.

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## Introduction

The last two decades have witnessed some significant changes in advanced economies that have impacted their employment situations. The general impression is that many advanced countries have seen the emergence of new types of contractual arrangements, as well as experiencing technological change and rising imports from developing countries. The latter developments, by shifting the composition labour demand towards higher skills, are supposed to exacerbate adversity in the labour market, especially for the less skilled.

Although this paper is concerned with the impact of imports from developing countries on the labour market in advanced economies, we need to make an assessment of this relationship in the context of technological change and labour market reforms. The impact of “trade” between North and South on the labour market in the North is a much wider question, because just as imports in the North from the South may adversely affect unskilled labour in the labour market, exports to the South from the North would create new higher skilled employment in the North. Our focus in this paper is on the former issue only.

In our view it is critical to recognize that labour market reforms have generally weakened regimes of labour protection in advanced economies and by doing so facilitated the rise of non-standard forms of employment. In fact, as we shall see, non-standard forms of employment – especially part-time and temporary forms of employment – have become important parts of contractual arrangements in many advanced economies. This is of course not to say that all non-standard forms of employment are adverse, but some of them definitely are. One implication of the emergence of these non-standard forms of employment is that categories of regular full-time employed and the unemployed are not the only categories to examine in an employment analysis that claims to take an *economy-wide* view of the employment situation. In particular, the association of *illfare* with the category of the unemployed is strictly appropriate in an economy-wide sense only in an environment where effective social insurance systems and robust protection regimes obtain, and there is a negligible incidence of adverse non-standard employment forms. When labour reforms that alter employment protection regimes themselves become *instrumental* in the emergence of non-standard contractual arrangements, some of which are clearly adverse, changes observed in the unemployment rate on its own would not tell us anything definitive about the adversity in the labour market as a whole. So, for example a decline in the rate of unemployment may be compatible with an increase in adverse forms of employment<sup>5</sup>. Therefore trends on these indicators must be first ascertained independently to form a fuller picture at a country level and country group level. In particular when examining a group of countries together, we need to take a view if some adverse non-standard forms of “employment” have systematic relationships with the unemployment rate itself, *prior* to judging if declining unemployment rates are classifiable in themselves as constituting an overall improvement in the “employment” situation.

Many advanced economies have to different extents witnessed an increased opening up of trade not only to each other but to parts of the developing world. This has been discussed in the literature<sup>6</sup>. In theory an increase in (relatively labour intensive) imports

<sup>5</sup> There is a need for a composite indicator of the adversity in the employment situation that takes in to account the unemployed, the involuntarily part-time as well as the temporarily employed. The lack of data, non exclusive measurements on which information is collected and potential problems of aggregation make this difficult. For such an attempt see Ghose, Majid and Ernst, 2008.

<sup>6</sup> The focus has been on the increase in manufactured imports from developing countries and the effects that it has had on employment and wage inequality. For a discussion of employment effects See Wood (1994), Leamer (1994).

from developing countries should reduce the demand for similar products that are produced in advanced economies which get competed out as a result. This ought to alter the skill composition of new labour demand in the advanced economy. It can be expected to be associated with reduced regular full-time employment and increased unemployment especially for the less skilled, at least in the shorter run<sup>7</sup>. Of course, if re-training and re-skilling transitions are very slow, this can become a longer run phenomenon. These imports from developing countries also ought to encourage investments that are required to make shifts towards the production of more skill intensive goods and services. In this mediated sense increased imports from the South may accelerate technological change as well. Clearly there are other factors that explain technological shifts and the aforementioned linkage with respect to imports from developing world is only one aspect of this process. Typically, we should expect a relative increase in demand for high skilled labour as a result of technological change, whatever its causes.

Clearly ascertaining the specific quantitative impacts of changes in technology and imports (from the developing world) in an environment where labour protection regimes are undergoing changes and non-standard types of contractual arrangements are legally on offer, is a complex undertaking. This requires extensive information bases and considerable modelling, preferably at a country level<sup>8</sup>. Our aim in this exercise is not to attempt such a complex feat, but rather to answer questions by associative empirical illustrations to ascertain likely directions of relationship when they obtain, for a data set covering some major advanced economies.

At an empirical level the response to such expectations of unskilled labour displacement has been two fold. One is to argue that the quantum of imports from the developing world is not high enough to warrant a displacement expectation; and second, that the evidence on falling unemployment rates suggests that even if the displacement of the less skilled was significant it would have been compensated by increasing higher skilled employment that technical change would typically bring about.

We shall try and argue three related points. The first is that non-standard forms of employment are significant in their incidence and are likely to be associated with the unemployment rate in such systematic ways, that a declining rate of unemployment in itself does not reveal the overall extent of adversity in the labour market.

The second point we will try to advance is that skill biases in demand for labour continue to be in evidence in advanced economies, and that these are indeed positively associated with increases in imports from developing countries and technological change.

Third, we will argue that given the links between the unemployment rate and non-standard forms of employment (whose emergence is contingent on changes in labour protection regimes), increases in (non-fuel) imports from the South and changes in technology while independently exacerbating skill biases in the demand for labour, are less likely to show up as impacting the unemployment rate but rather will show up as increases in the new adverse forms of employment. This is because adverse forms of employment obtaining in the economy absorb as the “employed” (to different extents in different countries) many of those persons who would have become unemployed in the absence of these adverse forms of employment.

<sup>7</sup> See Wood (1995) who argues that trade with the South hurts unskilled workers in the North. In this paper we do not specify the manufacturing led increase in North-South trade, but it is the case that competition in manufactured goods is what is unique about this period of globalisation. See Ghose (2003).

<sup>8</sup> On the import side this would entail, for each country, detailed factor content analysis at a sufficient degree of product disaggregation.

The paper is divided into two parts. The first part is concerned with the labour market, and examines changes in protection regimes and trends in unemployment rates and non-standard employment forms. The second part looks at levels and trends in Southern imports and technology indicators, and relates these to shifts in labour demand, and examines how these changes may impact unemployment and adverse forms on non-standard employment.

## **Part 1. The changing forms of employment, unemployment and labour protection regimes in advanced economies**

### **1.1. The unemployment rate: patterns and trends**

The trends in unemployment in the developed world are fairly clear. Following the oil crisis of the early 1970s, the unemployment rate started rising in most advanced economies, reaching a high level by the early 1980s. It remained stable at a high level till the mid-1990s and showed a downward trend thereafter. Despite the recent decline, unemployment still remains high in a majority of the countries in our group of advanced countries<sup>9</sup>. This is the general picture. The levels of unemployment in our group for 2003 are presented in Appendix Table 1. The unemployment rate is higher than 5 per cent in 12 of the 20 countries under review. And it is higher than 7 per cent in 7 countries. However, the rate of long-term unemployment (duration: one year or more) is low in most of the countries. This exceeds 2 per cent in only 6 of the 20 countries group. In contrast, the rate of short-term unemployment (duration: less than one year) exceeds 4 per cent in 12 countries. Today the overall unemployment rate in advanced economies has two features: high short-term unemployment and low long term unemployment. There is, of course, some degree of heterogeneity across countries; the long-term unemployment rate is higher than the short term rate in a few countries (e.g. Germany, Greece and Italy) but as a rule, a high level of overall unemployment reflects a high level of short-term unemployment in present day advanced economies.

Table 2 shows that overall unemployment rates declined in 12 cases out of 20 and rose in 4; and the remaining 4 cases were statistically insignificant. Table 3 shows that short-run unemployment rates also declined in 12 cases, it rose in 2 cases, while 6 were statistically insignificant. Table 4 shows that long-run unemployment declined in 10 cases, it rose in 4 while the remaining cases were statistically insignificant. Therefore the dominance is one of declines in the rates of overall, short and long-run unemployment.

There is also dynamic pattern within these trends. We have seen that longer run unemployment rates in general have lower weights in the overall unemployment rate; exceptions notwithstanding. These weights have generally been going down on trend in most countries as well. This means that short-run unemployment is not only more important than long-run unemployment in overall unemployment but it is becoming increasingly so over time.

<sup>9</sup> The choice of the 20 countries group has largely been driven by the availability of a reasonable amount of information on most of the variables that are being used in this analysis. These countries are Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom and United States.

## 1.2. Unemployment rates and the labour protection regime

Traditionally in an advanced economy with wide social insurance systems and employment protection legislation- in other words, a robust labour protection regime-the standard variable to assess adversity in employment has been the unemployment rate<sup>10</sup>. Changes are taking place in the strictness of legislation in employment protection (EPL) as well as in the generosity of unemployment insurance systems (UI generosity index) in these economies. These changes are components of labour market reforms. Table 6 shows that even for the short period of 1998 and 2003, of the 19 countries from the group of 20 on which we have data for the two years, 8 countries display no change in the EPL Index, 7 countries show a decline and 3 countries show an increase. The overall trend is towards no change or declines. In other words, if there is evidence it is one of reduced and not increased protective legislation. On the other hand, the UI generosity index for the 18 countries on which we have data for 1994 to 2001, shows 10 countries with a decline and 8 countries an increase. This change is more equivocal.

Taken together the trends in the two indicators can be subject to the following interpretation. In 8 cases there a decline in both or only in one indicator while the other is constant (these are the adverse cases). In 5 cases we have a rise in one and decline in the other indicator (these are the ambiguous cases). In 6 countries we have an increase in one indicator while the other is constant or where both indicators are rising. Therefore while is no strong general trend here, what is true is that in only a minority of countries could we say that there has been an enhancement of the labour protection regime.

Clearly when there are changes in the protection regime we need to be cautious about interpreting the unemployment rate. Appendix Table 7 shows selected correlation coefficients between employment protection legislation Index (EPL2) and the Unemployment Insurance generosity index (UI Index ) taken as institutional indicators of the protection regime; and unemployment rates (short term, long term and overall). What is clear is that the UI generosity index is not significantly related to any measure of unemployment rate. So a more or less generous unemployment insurance system in itself tends to have no link to rates of unemployment. On the other hand, we have interesting correlations with the EPL. A stronger EPL tends to be associated positively with long-run unemployment and this shows up in its relationship with the overall unemployment rate. The EPL is not linked to short-run unemployment. This means that stricter employment protection seems to exacerbate long-run unemployment. There are well known reasons that can partly explain this kind of finding, but basically high levels of employment protection, it could be argued, tend to increase reservation wages on the one hand and reinforce restrictions on entry on the other.

The main point that needs to be made here is that the short term unemployment rate, which as we saw is increasingly the dominant part of the unemployment problem in most advanced economies today, is more or less, *delinked* from the generosity of the unemployment benefits system as well as legislation for protection within employment that obtains in a country. In a sense, labour reforms have rendered the main part of the unemployment problem autonomous from the protection regime of welfare and employment rights. On the other hand, it is the long-run unemployment rate that tends to be higher the greater the EPL. Since we know that EPL index has either remained the same or weakened, its overall trend may have contributed to the generally declining long-run unemployment levels observed in some advanced countries today.

<sup>10</sup> See Boeri and Garibaldi (2007) for a comprehensive discussion on labour market protection in advanced economies.

### 1.3. On non-standard forms of employment

We now examine what is happening to non-standard forms of employment in order to provide the context for the declining unemployment rates. We assess trends on two (non-exclusive) non-standard types of employment that seem to be on the rise in more detail: part-time employment and temporary employment. The main point we wish to make in this context is that these adverse types of non-standard forms of employment tend to be associated with unemployment in their own systematic ways. This in turn makes it difficult to use the unemployment rate as reflective of the *overall* employment problem.

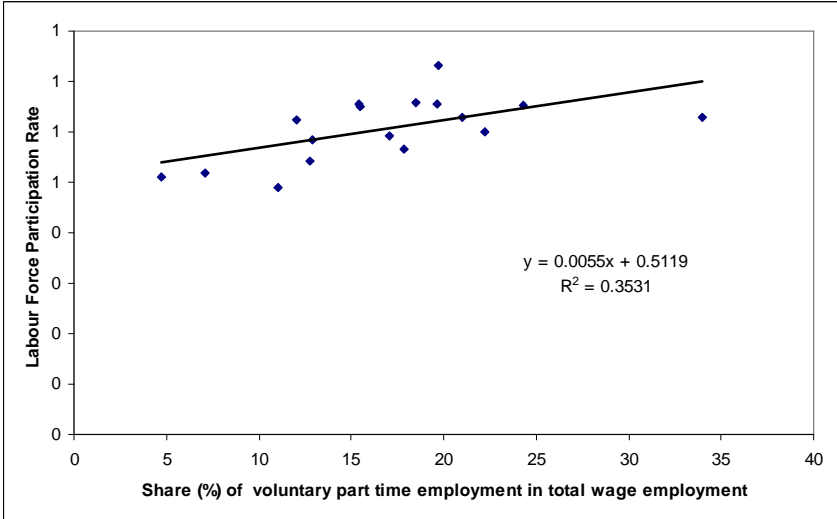
### 1.4. Part-time and voluntary part-time employment

Part-time employment is defined as involving working hours of less than 30 hours. Table 8 to 10 in Appendix are on part-time employment as a percentage of total employment for our 20 country set from 1990 onwards. Coverage periods do tend to vary by country.

Table 8 gives time trend coefficients. We find that the majority of countries in the group of 20 show increases in part-time employment (taken as a percentage of total employment). Denmark, Greece, Iceland, Norway, Sweden and the United States show trend declines, all other countries show significant trend increases barring Canada and France which have low and non significant coefficients. Secondly, Table 9 shows, while shares of part-time employment vary, these are by no means small percentages of total employment. Third, Table 10 shows, voluntary part-time employment as a percentage of total employment is increasing in 11 out of 16 cases. This is clearly also the bulk of part-time employment. We need to note that estimates of voluntary part-time employment are likely to be subject to some exaggeration for the obvious reason that all respondents are unlikely to be comfortable in identifying their status as involuntary. Nevertheless one thing is clear, if we want to take a view of these economies as a whole then the main trend in part-time employment is dominantly voluntary, and increasing. Moreover, its shares in total employment, while they do vary, are in many cases large.

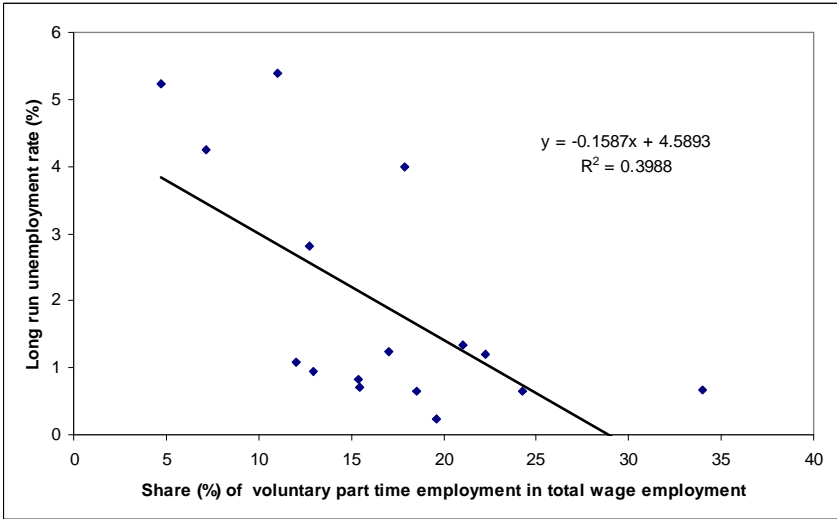
So on initial assessment, the perception on rising trends in part-time employment has some general validity. The qualification is that much of this employment is voluntary. This clears some confusion. In other words, the bulk of part-time employment reflects a large number of persons who are in any case unwilling or unable to take up full-time jobs. Voluntary part-time employment actually reflects work-sharing and ought to have an effect of increasing the quantum of labour that can be used in the economy and reducing long-run unemployment. This could happen in two ways. First, those who tend to remain outside the labour force because they cannot take up full-time employment get an opportunity to come in to the labour force to do part-time work, this would tend to increase participation rates. Second, those who are in the labour force in full-time jobs, but would prefer not to work full-time, can now remain in active employment as opposed to becoming unemployed. This in a counterfactual sense, would tend to reduce longer run unemployment rates. The idea that labour force participation goes up with rising shares of voluntary part-time employment is in fact borne out by the data. This is illustrated in Figure 1. It is also the case that long unemployment rate is depressed by voluntary part-time employment, and this is shown Figure 2.

**Figure 1. Labour Force participation rates and voluntary part-time employment shares, 2003**



Note: This finding is also consistently significant on cross-sections for other individual years (for which we have fewer observations) and at a country level over time. Fixed effects regression results that control for country effects confirm this as well.

**Figure 2. Voluntary part -time employment share in total employment and long-run unemployment rates, 2002**



Note: This finding is also consistently significant on cross sections for other individual years (for which we have fewer observations) and at a country level over time. Fixed effects regression results that control for country effects confirm this as well.

In general the existing situation on part-time employment as whole is a better characterized as more benign than adverse. This is of course due to the fact that the voluntary part is dominant.

**1.5. Involuntary part-time employment**

Even though the bulk of part-time employment is voluntary, we ought to still examine the “involuntary” aspects of growing part-time employment in advanced economies. It should be clear that this form is by definition more symptomatic of distress as it can be

assumed that a person taking up part-time employment is involuntarily available for full-time work, but is unable to get a full-time job. In fact these persons represent an addition to underemployment in the economy.

Our first concern is to see whether involuntary part-time employment as a percentage of total employment is growing systematically. On a time trend, (Table 11) shares of involuntary part-time employment in total employment have mixed trends. This is of course good, as it means that the distress associated section of part-time work is on the rise only in a minority of countries. In fact in the 18 countries on which we have data, 9 have statistically insignificant trend coefficients, 3 have significant positive signs, and 6 have statistically significant negative signs.

The shares of involuntary part-time employment in total employment are clearly smaller compared to those of voluntary part-time employment and they range from around 0.4 per cent to 5.1 per cent (Table 11).

If the impression regarding the distress related dimension of involuntary part-time employment is correct then unlike voluntary part-time employment we should expect involuntary part-time employment as a percentage of total employment to be positively related to both the long and short-run unemployment rates. In other words countries with high unemployment rates should also be ones in which involuntary employment shares in total employment are high. And precisely because of its involuntariness, it should be more related to short-run than to long-run unemployment rates. Table 13 shows that this is indeed the case. Involuntary part-time employment as a percentage of total employment is much more strongly and positively associated with short term unemployment than long-run unemployment.

The upshot of our discussion on part-time employment is that its two parts must be clearly separated. Its voluntary part, which is the dominant part, is good for increasing labour force participation and a reduction in long-run unemployment. Its involuntary part which is a smaller component everywhere is distress related, and it is positively related to unemployment, especially short-run unemployment. A source of some reassurance is that involuntary parts of part-time employment are not systematically increasing in a majority of countries. These are of course increasing in some countries.

## **1.6. Temporary employment**

The next form of employment that we examine is temporary employment. Temporary employment can of course be part-time or full-time and not only reveals that the duration of the contractual arrangement is short, but by the same token the conditions attached to it lack protection. Temporary employees include workers on fixed-term contracts, temporary agency workers, workers on contracts for a specific task, workers on replacement contracts, seasonal workers, on-call workers, daily workers, trainees or apprentices without guarantee of permanent contract and workers employed under job creation schemes.

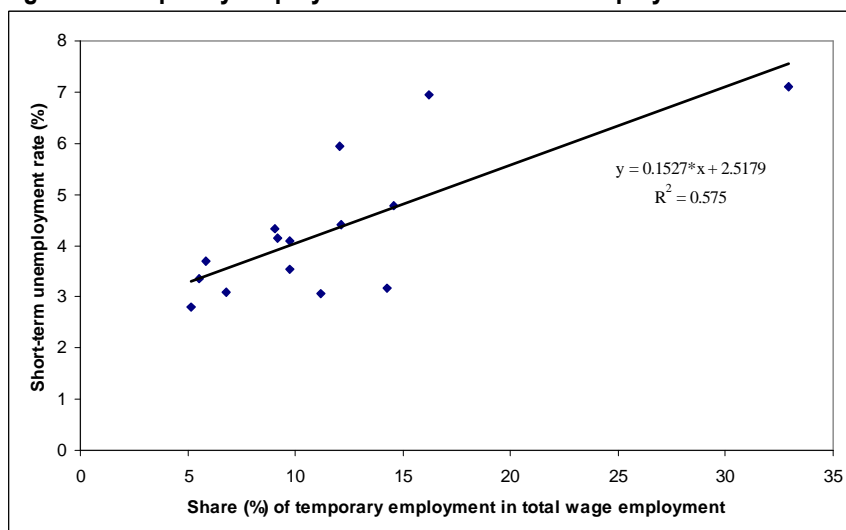
Moreover as should be clear temporary employment and part-time employment are not exclusive categories and overlap. Typically, temporary employment has fewer inbuilt security features within it in comparison to employment that is permanent or regular. In this sense, it is likely to have a significant distress dimension associated with it. In some sense temporary employment in terms of conditions is more akin to involuntary part-time employment.

For temporary employment as a percentage of total employment, we have data on 17 countries in our set of 20, and this percentage varies considerably in the periods covered. Of these 17 countries, 8 show statistically significant increases, 7 show declines and in two cases the coefficients are statistically insignificant (Table 14). Moreover while levels vary

these are not so low, 10 out of 17 countries have over 12 per cent temporary employment in total employment (Table 15). The picture on trends (like the one on shares of involuntary part-time employment in total employment) is equivocal. So if we want to take an overview the impression that temporary employment is “generally” increasing is not quite valid, but it is true that its levels are generally high enough not to be ignorable and it is increasing in some countries.

It is our contention that temporary employment is also systematically and positively related to “short-run” unemployment which is the core of the unemployment problem in advanced economies today. There is a distinct reason for this. When the incidence of temporary jobs increases in an economy and many workers find themselves in temporary jobs, the flows in an out of employment obviously become large, which in turn implies that frictional unemployment goes up. Frictional unemployment of course shows up in short term fluctuations in unemployment. In other words, if the foregoing reasoning is correct, countries where short-run unemployment is high will also be countries where the share of temporary employment is high. Figure 3 shows this for 2003 for the countries on which we have data in our selected group of countries.

**Figure 3. Temporary employment and short-run unemployment**



Note: This finding is also consistently significant for individual years preceding 2003 and at a country level over time. Fixed effects regression results confirm this as well.

At a more general level it stands to reason to expect temporary employment to be high where unemployment rates are high, but for the aforementioned reasons these are likely to be more strongly associated with the short-run unemployment. Table 16 shows this to be the case.

Like involuntary part-time employment as a percentage of total employment, the strengths of the coefficients on temporary employment as a percentage of total employment are according to expectations. Essentially, both adverse forms of non-standard employment show positive and the strongest associations with the short-run unemployment rate, which is the dominant source of unemployment in most advanced economies today.



## 1.7. Upshot

If we take an overview on the trends in the three selected indicators of adversity in the labour market, we find unemployment rates are generally declining in most cases, involuntary part-time employment (which is a smaller component of part-time employment) is not increasing in the majority of cases and temporary employment is declining in half of the countries and increasing in the others. While it is difficult to make an assessment of the overall adversity in the employment situation, the general picture may not be so adverse on account on trends in unemployment rates and part-time employment. However what emerges from all this is that due to reforms, labour markets in developed countries today are flexible, in that they offer ample opportunities for establishing non-standard employment contracts. While flexibility helps keep labour force participation at a high level and long-term unemployment at a low level, it also generates underemployment and insecurity for a substantial section of the workers.

The second general point worth making based on this discussion is that both the adverse forms of employment (overlapping in definition as they may be) are likely to be high in countries where unemployment rates, particularly short-run unemployment rates are also high. This means that in countries with serious employment problems, parts of new forms of employment are likely to be functioning to facilitate the redistribution of unemployment towards employment categories that are in fact adverse – thereby cosmetically reducing unemployment rates in a counterfactual sense (i.e. reducing unemployment rates that would have obtained in the absence of these forms). This issue also has obvious political dimensions insofar as declining unemployment rates are used by governments to show labour market success.

The third important implication regarding these changes in non-standard forms of employment is analytical. It concerns the use of the unemployment rate in employment analysis. The unemployment rate (which is a composite of short and long-run unemployment rates) ought not to be seen as a reliable or comprehensive indicator characterising adversity in employment situations obtaining in advanced economies. The reason as we have seen is that new forms of employment that are adverse are not only unignorable in their incidence but are systematically related to unemployment rates.

## Part 2. The skill composition of labour demand, Southern Imports and technological shifts

We now try to briefly establish trends in the skill composition of labour demand in advanced economies; variables associated with technological change, and imports from the developing world, and ask whether these are related in expected ways. In other words, do shifts towards higher technology and increases in southern imports move the demand for labour towards higher skills? Only after assessing if these expectations are empirically plausible, can we go back to the preceding discussion on unemployment and the new forms of labour, and integrate them in to the analysis.

### 2.1. The skill composition of labour demand

The simplest proxy for this category is the ratio of those persons with educational levels equal to or less than the primary level in the population of total employed<sup>11</sup>. The

<sup>11</sup> The falling trend in demand for unskilled labour has been discussed in the literature. For example see Freeman (1994). This is a longer run trend and is also related to fall in manufacturing sectors share in employment in the de-industrialization literature.

higher this percentage, the more jobs in the economy that are unskilled; the lower this percentage, the greater the number of jobs in the economy with higher skills. Since we have a data on employment levels by education this variable can be constructed. We are limited by time periods in this data set.

The trend in this indicator is quite unambiguous for a more recent period on which data is available. A negative sign for every country, with most of them statistically significant suggest that demand for labour is shifting towards higher skills (Table 17). It is also quite obvious that changes are taking place rapidly. Even in this short 5 year period for which we have comparable data, there were 8 countries which had more than 30 per cent of the employed classifiable as less skilled in 1998. In 2002 this number had gone down to 5 countries (Table 18).

## **2.2. Imports from developing countries in advanced economies**

The next variable we examine concerns imports from developing countries. The issue to explore here is how imports from the developing world alter the skill composition of employment in advanced economies which we saw above is shifting.

There are a host of indicators that can be taken to capture Southern imports. Each type has advantages as well as short comings. One type of indicator focuses on manufactured imports. Since we know that this is the category that has been the driver of rising imports from the developing world, it is quite valid to use it. We can for example have net imports of manufactured goods from developing countries as percentage of GDP. While this allows us to focus on manufactured goods, it cannot take in to account the fact that there are non-traded parts of GDP that have implications for employment. On the other hand we can have an import centric indicator that is not pegged to GDP. This could be imports from developing countries as a percentage of imports from all countries. This variable would have the advantage capturing increasing labour intensity. Because of rising imports from the developing world in relation to imports from the rest of the world, it would capture the pressure to displace less skilled labour; and given that increases in non-fuel imports from the South are manufacturing led, it would capture that dimension as well.

In order to isolate imports from developing countries we have constructed a proxy variable from the WITS data set<sup>12</sup>. The period for this data is the 1990s, and therefore analysis using this variable does not extend in to the 2000s. This is a measure of non-fuel imports from non-OECD countries as a percentage of all non-fuel imports that come in to a particular advanced economy. We refer to this share as the variable “southern imports share”. The first thing to do is to see if there are trends increases in this variable.

We find that this broad measure of southern imports share is on an increasing trend in most countries (Table 19). In 18 out of 20 countries there is a significant trend increase during the 1990s. As far as levels are concerned, these vary considerably (Table 20). The US and Japan have the highest percentages (around 40-50 per cent) and Switzerland and Sweden the lowest (around 13 per cent). Moreover, the situation is changing, in the sense that even if it were arguable in the 1980s that two thirds of non-fuel imports anywhere in the North were not from the South, this was clearly not true for many advanced economies by the end of the last decade.

<sup>12</sup> World Integrated Trade Solution (WITS) data is accessible from <http://wits.worldbank.org/witsweb/>.

As suggested if it were the case that imports from the South were more labour displacing than imports in general, then we should expect these trends to be reflected in the changing skill composition of the employed in advanced economies. This question is examined after we introduce the next category of technological change because we have suggested that technological change should have the same effect on the skill composition of labour demand.

### **2.3. Technological change in advanced economies**

Some indicators of technological shifts are examined below. The first is an addition of two measures of investment in R and D; and software respectively – each taken as a percentage of GDP. Out of 18 countries there is a statistically significant increase in fifteen cases, and a significant fall in one case (Tables 21 and 22). Although levels vary, there is a fairly clear rising trend here. So once again at least on this general measure, the perception that technical change is underway is well founded. Clearly given this we would expect a systematic negative effect on the skill composition of employment; that is a fall in share of less skilled workers in total employment.

The other indicator that we use is much more specific: This is the Zaim-Yörük index<sup>13</sup>. It measures the contribution of technological change to changes in output. In a sense this index represents the direct *realised* contribution of technological change on output. Reported in Table 23 are 4 year averages on the index for the period 1991-1994 and 1995-1999 respectively. We can see that 17 out of 19 cases show an increase in this index.

### **2.4. The effect of Southern imports and technological change on skill bias in employment**

Each of our indicators of southern imports share and technological shift variables show a generally rising trend, it is now required that we examine their relationships to the skill composition of labour demand.

The coefficients reported in Table 24 are based on fixed effects regressions which control for country effects. The signs are negative and significant. In other words technological change as well as imports from developing countries tend to be negatively associated with the dependent variable, that is to say these changes move employment demand towards higher skills. This is as should be the case.

Another way to look at this is to say that both technological change and imports from the South independently have the same effect- they push the effective composition of employment against less skilled workers. In short while trends in investment in technology, its contribution to output, and imports from the South are on the increase, it is also found that these increases are systematically associated with shifts the demand for labour against less skilled persons.

### **2.5. Adverse forms of labour and skill bias in employment**

This brings us to the last part of the argument. We had argued in first part of this paper that given that there are reasons to expect that non-standard forms of employment in advanced economies, large parts of which are adverse, are systematically (though in

<sup>13</sup> See Yörük and Zaim (2005).

different degrees for each country) related to the unemployment rate. It would therefore be problematic on analytical grounds to use the unemployment rate as a comprehensive indicator of the adversity in the employment situation. We found good evidence to confirm a positive association between unemployment rates and adverse forms of employment. It would follow from this that each indicator of labour market adversity ought to be used to ascertain how the employment situation is affected by technology and imports from the South respectively. Ideally we would want to have an a composite indicator that captures adversity in the labour market, taking in to account unemployment rates as well as adverse forms of employment that have been made possible by flexibility resulting from labour market reforms. Unfortunately we have two categories of non exclusive adverse employment forms and the unemployment rate; and we know that that there is a likelihood of persons shifting from one group to the other.

One thing that can be done is to examine the basic association between these indicators of labour market adversity (unemployment, involuntary part-time and temporary employment) as successive dependent variables on the one hand; and examine the relationship of each to our variables on Southern imports and technology. The idea behind such an exercise is to ascertain if increases in labour market adversity are more likely to be manifested in adverse employment forms than in rates of unemployment.

## **2.6. Unemployment rate, Southern imports and technology**

In a situation where the structure of the labour market was simply divided between the employed and the unemployed, we should have expected a positive relationship to obtain between unemployment rates on the one hand and these indicators of technological change and imports from the South on the other. However our evidence suggests that it would be unlikely or coincidental if these indicators on imports and technology were to directly show up in a positive relationship to the overall unemployment rate. Tables 25, 26 and 27 run fixed effects regressions with three indicators of adversity in the labour market: the unemployment rate; involuntary part-time employment as a percentage of total employment; and temporary employment as a percentage of total employment as dependent variables. The independent variables are our measures of Southern Imports, and two indicators of technological change.

Table 25 shows that there is no relationship between the overall rate of unemployment and our selected variables. In a sense this corroborates the view that given the changing forms of employment and their relationship with components of unemployment rate, we should expect no relationships here. Therefore while both Southern import shares as well as technology shifts bias labour demand towards higher skills, as we saw earlier, this does not show up as a significant increase in the unemployment rate.

On the other hand in Table 26 we find a plausible story with respect to the first of our adverse employment variables, involuntary part-time employment as a percentage of total employment. Technical change variables clearly affect the incidence of involuntary part-time employment in total employment positively; and this is also the case with the share of imports from the South. So both technological changes as well as imports from the South tend to exacerbate the share of involuntary part-time employment in total employment.

Lastly the associations are slightly but not entirely different for temporary employment shares in total employment which while tending to increase with greater imports from the South, are not significantly affected by technological changes. This difference between part-time involuntary and temporary employment is an issue to explore in future research. However given that as a percentage of total employment temporary employment is usually much larger than involuntary part-time employment, it is possible to

suggest that technological change is less important in explaining adverse employment as a whole.

## Conclusion

We find that technological changes and increasing (non-fuel) imports from developing countries have generally had an effect of shifting labour demand towards higher skills. Typically, when such a shift takes place it ought to reveal itself in increased unemployment, particularly amongst the less skilled. The reason why we think that we do not see these effects directly, is because the protection regime for labour, both for the unemployed and for the employed has been undergoing changes. This has been an important factor that has allowed the possibility of non-standard forms employment to legally exist. It is our view that given that these adverse forms of employment act like unemployment absorbers, many of the adjustments are likely to fall on these adverse employment forms. In short, the impact of imports from the South and technological change on the skill composition of demand for labour is according to expectation, and though the adversity associated with it cannot be detected when we look at the unemployment rates, it is apparent when we look at adverse forms of employment.



## **Appendix Tables**



**Table 1. Unemployment rates, 2003**

| Country              | Unemployment rate | Short-term unemployment rate | Long-term unemployment rate |
|----------------------|-------------------|------------------------------|-----------------------------|
| Australia            | 5.71              | 4.42                         | 1.29                        |
| Austria              | 4.21              | 3.08                         | 1.13                        |
| Canada               | 7.6               | 6.87                         | 0.73                        |
| Denmark              | 5.4               | 4.34                         | 1.06                        |
| Finland              | 9.05              | 6.93                         | 2.12                        |
| France               | 9.73              | 5.93                         | 3.8                         |
| Germany              | 9.27              | 4.4                          | 4.86                        |
| Greece               | 9.34              | 4.09                         | 5.26                        |
| Iceland <sup>a</sup> | 3.35              | –                            | –                           |
| Ireland              | 4.38              | 2.8                          | 1.58                        |
| Italy                | 8.65              | 3.54                         | 5.12                        |
| Japan                | 5.22              | 3.48                         | 1.74                        |
| Netherlands          | 4.2               | 3.16                         | 1.04                        |
| New Zealand          | 4.64              | 4.11                         | 0.53                        |
| Norway               | 4.42              | 4.14                         | 0.28                        |
| Spain                | 11.3              | 7.11                         | 4.19                        |
| Sweden               | 5.77              | 4.78                         | 0.99                        |
| Switzerland          | 4.13              | 3.07                         | 1.06                        |
| United Kingdom       | 4.84              | 3.71                         | 1.13                        |
| United States        | 5.99              | 5.28                         | 0.71                        |

Note: – data not available. <sup>a</sup> data for 2002

Source: OECD OLISNET database

**Table 2. Time trend coefficients on the overall unemployment rate**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | -0.305      | 0.000   |
| Austria        | 1994-2003 | 0.057       | 0.024   |
| Canada         | 1990-2004 | -0.264      | 0.001   |
| Denmark        | 1990-2004 | -0.394      | 0.000   |
| Finland        | 1995-2004 | -0.075      | 0.750   |
| France         | 1990-2004 | -0.043      | 0.604   |
| Germany        | 1990-2004 | 0.237       | 0.002   |
| Greece         | 1990-2004 | 0.217       | 0.001   |
| Iceland        | 1991-2004 | -0.137      | 0.059   |
| Ireland        | 1991-2004 | -0.981      | 0.000   |
| Italy          | 1990-2004 | -0.192      | 0.004   |
| Japan          | 1990-2004 | 0.259       | 0.000   |
| Netherlands    | 1990-2004 | -0.284      | 0.001   |
| New Zealand    | 1990-1999 | -0.386      | 0.000   |
| Norway         | 1990-2004 | -0.154      | 0.003   |
| Spain          | 1990-2004 | -0.690      | 0.008   |
| Sweden         | 1990-2004 | 0.042       | 0.793   |
| Switzerland    | 1990-2004 | 0.055       | 0.269   |
| United Kingdom | 1991-2004 | -0.361      | 0.000   |
| United States  | 1990-2004 | -0.117      | 0.047   |

**Table 3 . Time trend coefficients on the short-run unemployment rate**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | -0.176      | 0.000   |
| Austria        | 1994-2003 | -0.001      | 0.983   |
| Canada         | 1990-2004 | -0.212      | 0.000   |
| Denmark        | 1990-2004 | -0.243      | 0.000   |
| Finland        | 1995-2004 | -0.144      | 0.458   |
| France         | 1990-2004 | -0.059      | 0.214   |
| Germany        | 1990-2004 | 0.034       | 0.377   |
| Greece         | 1990-2004 | 0.064       | 0.010   |
| Iceland        | 1991-2004 | -0.113      | 0.076   |
| Ireland        | 1991-2004 | -0.226      | 0.017   |
| Italy          | 1990-2004 | -0.081      | 0.050   |
| Japan          | 1990-2004 | 0.155       | 0.000   |
| Netherlands    | 1990-2004 | -0.061      | 0.059   |
| New Zealand    | 1990-1999 | -0.240      | 0.000   |
| Norway         | 1990-2004 | -0.071      | 0.031   |
| Spain          | 1990-2004 | -0.196      | 0.021   |
| Sweden         | 1990-2004 | 0.016       | 0.878   |
| Switzerland    | 1990-2004 | 0.021       | 0.569   |
| United Kingdom | 1991-2004 | -0.165      | 0.000   |
| United States  | 1990-2004 | -0.112      | 0.023   |

**Table 4. Time trend coefficients on the long-run unemployment rate**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | -0.129      | 0.008   |
| Austria        | 1994-2003 | -0.024      | 0.328   |
| Canada         | 1990-2004 | -0.052      | 0.059   |
| Denmark        | 1990-2004 | -0.150      | 0.000   |
| Finland        | 1995-2004 | -0.387      | 0.000   |
| France         | 1990-2004 | 0.016       | 0.714   |
| Germany        | 1990-2004 | 0.203       | 0.000   |
| Greece         | 1990-2004 | 0.154       | 0.001   |
| Iceland        |           | -           | -       |
| Ireland        | 1991-2004 | -0.694      | 0.000   |
| Italy          | 1990-2004 | -0.111      | 0.106   |
| Japan          | 1990-2004 | 0.104       | 0.000   |
| Netherlands    | 1990-2004 | -0.185      | 0.006   |
| New Zealand    | 1990-1999 | -0.146      | 0.000   |
| Norway         | 1990-2004 | -0.083      | 0.000   |
| Spain          | 1990-2004 | -0.494      | 0.007   |
| Sweden         | 1990-2004 | 0.025       | 0.681   |
| Switzerland    | 1990-2004 | 0.035       | 0.094   |
| United Kingdom | 1991-2004 | -0.195      | 0.002   |
| United States  | 1990-2004 | -0.005      | 0.679   |

**Table 5. Time trend coefficients on weight of long-run unemployment rate in overall unemployment rate**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | -0.129      | 0.008   |
| Austria        | 1994-2003 | -0.024      | 0.328   |
| Canada         | 1990-2004 | -0.052      | 0.059   |
| Denmark        | 1990-2004 | -0.150      | 0.000   |
| Finland        | 1995-2004 | -0.387      | 0.000   |
| France         | 1990-2004 | 0.016       | 0.714   |
| Germany        | 1990-2004 | 0.203       | 0.000   |
| Greece         | 1990-2004 | 0.154       | 0.001   |
| Iceland        |           |             |         |
| Ireland        | 1990-2004 | -0.694      | 0.000   |
| Italy          | 1990-2004 | -0.111      | 0.106   |
| Japan          | 1990-2004 | 0.104       | 0.000   |
| Netherlands    | 1990-1999 | -0.185      | 0.006   |
| New Zealand    | 1990-2004 | -0.146      | 0.000   |
| Norway         | 1990-2004 | -0.083      | 0.000   |
| Spain          | 1990-2004 | -0.494      | 0.007   |
| Sweden         | 1990-2004 | 0.025       | 0.681   |
| Switzerland    | 1991-2004 | 0.035       | 0.094   |
| United Kingdom | 1990-2004 | -0.195      | 0.002   |
| United States  | 1990-2004 | -0.694      | 0.000   |

**Table 6. Employment protection legislation and unemployment insurance coverage**

| Country        | EPL Version 2 |       | UI generosity measure |      |
|----------------|---------------|-------|-----------------------|------|
|                | 1998          | 2003  | 1994                  | 2001 |
| Australia      | 1.469         | 1.469 | 27                    | 24.5 |
| Austria        | 2.382         | 2.154 | 32.5                  | 31.5 |
| Canada         | 1.132         | 1.132 | 19.3                  | 15.3 |
| Denmark        | 1.831         | 1.831 | 64.9                  | 50.9 |
| Finland        | 2.181         | 2.122 | 35.8                  | 34.8 |
| France         | 2.839         | 2.893 | 37.4                  | 43.5 |
| Germany        | 2.637         | 2.47  | 26.3                  | 29.6 |
| Greece         | 3.491         | 2.901 | 14.7                  | 13   |
| Iceland        | .             | .     | .                     | .    |
| Ireland        | 1.168         | 1.324 | 26.3                  | 35.8 |
| Italy          | 3.062         | 2.437 | 19.3                  | 34.1 |
| Japan          | 1.942         | 1.786 | 10.2                  | 9.1  |
| Netherlands    | 2.266         | 2.266 | 52.3                  | 52.9 |
| New Zealand    | 0.783         | 1.291 | .                     | .    |
| Norway         | 2.719         | 2.615 | 38.8                  | 42   |
| Spain          | 2.961         | 3.065 | 39                    | 36.5 |
| Sweden         | 2.618         | 2.618 | 26.9                  | 23.6 |
| Switzerland    | 1.597         | 1.597 | 30                    | 37.5 |
| United Kingdom | 0.979         | 1.1   | 17.8                  | 16.6 |
| United States  | 0.653         | 0.653 | 11.9                  | 13.5 |

Note: EPL2 from OECD Employment Outlook 1999, 2003. UI Generosity Measure is taken from Boeri and Garibaldi, (2007). This measure is the OECD summary generosity measure (average of net replacement rates for 3 categories of individuals in the first 4 years of unemployment)

**Table 7. Correlation coefficients between selected employment indicators and EPL2 and UI Index**

|              | Unemployment rate -overall | Unemployment rate <1 year Short term | Unemployment rate >1 year Long term |
|--------------|----------------------------|--------------------------------------|-------------------------------------|
| EPL2         | 0.430***                   | 0.0608                               | 0.6569***                           |
| P-value      | 0.0056                     | 0.7170                               | 0.0000                              |
| Observations | 40                         | 38                                   | 38                                  |
| UI Index     | 0.0195                     | 0.0256                               | 0.0616                              |
| P-value      | 0.9101                     | 0.8824                               | 0.7251                              |
| Observations | 36                         | 36                                   | 35                                  |

**Table 8 . Time trend coefficients on part-time employment as a percentage of total employment**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | 0.290       | 0.000   |
| Austria        | 1995-2004 | 0.421       | 0.000   |
| Canada         | 1990-2002 | 0.035       | 0.476   |
| Denmark        | 1991-2004 | -0.222      | 0.004   |
| Finland        | 1990-2004 | 0.274       | 0.000   |
| France         | 1990-2004 | 0.095       | 0.116   |
| Germany        | 1990-2004 | 0.590       | 0.000   |
| Greece         | 1990-2004 | -0.125      | 0.088   |
| Iceland        | 1991-2002 | -0.197      | 0.015   |
| Ireland        | 1990-2004 | 0.693       | 0.000   |
| Italy          | 1990-2004 | 0.318       | 0.000   |
| Japan          | 1990-2004 | 0.460       | 0.000   |
| Netherlands    | 1990-2004 | 0.606       | 0.000   |
| New Zealand    | 1990-2004 | 0.170       | 0.000   |
| Norway         | 1990-2004 | -0.101      | 0.001   |
| Spain          | 1990-2004 | 0.253       | 0.000   |
| Sweden         | 1990-2004 | -0.082      | 0.019   |
| Switzerland    | 1991-2004 | 0.212       | 0.000   |
| United Kingdom | 1991-2004 | 0.233       | 0.000   |
| United States  | 1991-2004 | -0.087      | 0.000   |

**Table 9. Part-time employment as a % total employment**

| Country        | Part-time employment<br>as % of total<br>employment 1991 | Part-time employment<br>as % of total<br>employment 2002 |
|----------------|--|--|
| Australia      | 22.73  | 26.16  |
| Canada         | 18.15  | 18.75  |
| Denmark        | 18.71  | 16.21  |
| Finland        | 7.83   | 10.96  |
| France         | 11.51  | 13.71  |
| Germany        | 11.72  | 18.79  |
| Greece         | 6.88   | 5.58   |
| Iceland        | 22.20  | 20.10  |
| Ireland        | 10.28  | 18.22  |
| Italy          | 8.98   | 11.80  |
| Japan          | 19.54  | 24.56  |
| Netherlands    | 28.08  | 34.58  |
| New Zealand    | 20.45  | 22.36  |
| Norway         | 21.67  | 20.39  |
| Spain          | 4.21   | 7.63   |
| Sweden         | 14.31  | 13.55  |
| Switzerland    | 22.11  | 24.76  |
| United Kingdom | 20.47  | 23.45  |
| United States  | 12.65  | 11.64  |

**Table 10. Voluntary Part-time employment as a % total employment**

| Country        | Voluntary part-time<br>employment as a % total<br>employment 1993 | Voluntary part-time<br>employment as a % total<br>employment 2002 |
|----------------|---|---|
| Australia      | 18.82   | 21.04   |
| Austria        | -   | 12.92   |
| Canada         | 15.47   | 15.47   |
| Denmark        | 17.93   | 15.41   |
| Finland        | -   | -   |
| France         | 11.70   | 12.73   |
| Germany        | 12.56   | 17.86   |
| Greece         | 6.47  | 4.75  |
| Iceland        | 21.85   | 19.74   |
| Ireland        | 11.31   | 17.06   |
| Italy          | 9.46  | 11.03   |
| Japan          | 20.10   | -   |
| Netherlands    | 27.07   | 33.97   |
| New Zealand    | 16.75   | 18.50   |
| Norway         | 20.20   | 19.61   |
| Spain          | 5.67  | 7.13  |
| Sweden         | 12.95   | 12.02   |
| Switzerland    | 22.89   | 24.29   |
| United Kingdom | 20.73   | 22.23   |
| United States  | -   | -   |

**Table 11 . Time trend coefficients on involuntary employment shares in total employment**

| Country        | Period    | oefficients | P-value |
|----------------|-----------|-------------|---------|
| Australia      | 1990-2004 | 0.132       | 0.000   |
| Austria        | 1995-2004 | 0.008       | 0.645   |
| Canada         | 1990-2002 | 0.033       | 0.452   |
| Denmark        | 1991-2004 | 0.006       | 0.722   |
| Finland        | 1990-2004 | -           | -       |
| France         | 1992-2004 | -0.038      | 0.131   |
| Germany        | 1990-2004 | 0.083       | 0.000   |
| Greece         | 1990-2004 | 0.017       | 0.181   |
| Iceland        | 1992-2002 | -0.040      | 0.022   |
| Ireland        | 1990-2004 | -0.027      | 0.242   |
| Italy          | 1990-2004 | 0.057       | 0.000   |
| Japan          | 1990-2001 | 0.040       | 0.000   |
| Netherlands    | 1990-2004 | -0.056      | 0.013   |
| New Zealand    | 1990-2004 | 0.000       | 0.994   |
| Norway         | 1990-2004 | -0.050      | 0.020   |
| Spain          | 1990-2004 | 0.020       | 0.016   |
| Sweden         | 1990-2004 | 0.019       | 0.506   |
| Switzerland    | 1991-2004 | 0.031       | 0.006   |
| United Kingdom | 1991-2004 | 0.026       | 0.408   |
| United States  | 1991-2004 | -           | -       |

**Table 12. Involuntary employment shares in total employment, 1992 and 2002**

|                | 1992  | 2002  |
|----------------|-------|-------|
| Australia      | 4.290 | 5.120 |
| Austria        | -     | 0.350 |
| Canada         | 3.320 | 3.280 |
| Denmark        | 0.950 | 0.800 |
| Finland        | -     | -     |
| France         | 0.880 | 0.980 |
| Germany        | 0.170 | 0.930 |
| Greece         | 0.630 | 0.830 |
| Iceland        | 0.540 | 0.360 |
| Ireland        | 1.310 | 1.160 |
| Italy          | 0.410 | 0.770 |
| Japan          | 0.450 | -     |
| Netherlands    | 0.640 | 0.610 |
| New Zealand    | 4.250 | 3.860 |
| Norway         | 1.530 | 0.780 |
| Spain          | 0.250 | 0.500 |
| Sweden         | 2.000 | 1.530 |
| Switzerland    | 0.180 | 0.470 |
| United Kingdom | 1.063 | 1.217 |
| United States  | -     | -     |

**Table 13 . Fixed effects regression coefficients on unemployment rates with involuntary part-time employment as a percentage of total employment as the dependent variable**

| Independent variables       | Coefficient | P-value | Observations |
|-----------------------------|-------------|---------|--------------|
| Overall unemployment rate   | 0.049       | 0.000   | 255          |
| Long-run unemployment rate  | 0.055       | 0.000   | 245          |
| Short-run unemployment rate | 0.104       | 0.000   | 255          |

**Table 14. Time trend coefficients on temporary employment as a percentage total employment**

| Country        | Period    | Coefficient | P-value |
|----------------|-----------|-------------|---------|
| Austria        | 1995-2004 | 0.211       | 0.013   |
| Canada         | 1997-2004 | 0.195       | 0.008   |
| Denmark        | 1984-2004 | -0.120      | 0.005   |
| Finland        | 1997-2004 | -0.278      | 0.005   |
| France         | 1983-2004 | 0.515       | 0.000   |
| Germany        | 1984-2004 | 0.114       | 0.000   |
| Greece         | 1983-2004 | -0.371      | 0.000   |
| Iceland        | 1991-2002 | -0.362      | 0.000   |
| Ireland        | 1983-2004 | -0.158      | 0.000   |
| Italy          | 1983-2004 | 0.291       | 0.000   |
| Japan          | 1983-2004 | 0.167       | 0.000   |
| Netherlands    | 1987-2004 | 0.427       | 0.000   |
| Norway         | 1996-2004 | -0.367      | 0.010   |
| Spain          | 1987-2004 | 0.524       | 0.011   |
| Sweden         | 1997-2004 | -0.052      | 0.506   |
| Switzerland    | 1991-2004 | -0.087      | 0.070   |
| United Kingdom | 1983-2004 | 0.021       | 0.370   |
| United States  |           | -           | -       |

**Table 15. Temporary employment as a percentage total employment**

|                      | 1990  | 1995  | 2004  |
|----------------------|-------|-------|-------|
| Australia            | -     | -     | 4.33  |
| Austria              |       | 5.99  | 8.86  |
| Canada               | -     | -     | 12.76 |
| Denmark              | 10.79 | 12.09 | 9.79  |
| Finland              | -     | -     | 16.24 |
| France               | 10.53 | 12.33 | 12.27 |
| Germany              | 10.53 | 10.41 | 12.44 |
| Greece               | 16.55 | 10.15 | 12.43 |
| Iceland              | -     | 12.73 | -     |
| Ireland              | 8.49  | 10.24 | 3.40  |
| Italy                | 5.22  | 7.22  | 11.89 |
| Japan                | 10.61 | 10.46 | 13.86 |
| Netherlands          | 7.61  | 10.90 | 14.57 |
| New Zealand          | -     | -     | -     |
| Norway               | -     | -     | 9.94  |
| Spain                | 29.82 | 35.01 | 32.07 |
| Sweden               | -     | -     | 15.13 |
| Switzerland          | -     | 13.05 | 12.22 |
| United Kingdom       | 5.24  | 6.99  | 5.72  |
| <i>United States</i> | -     | 5.11  | .     |

**Table 16. Fixed effects regression coefficients on unemployment rates with temporary employment as a percentage of total employment as the dependent variable**

| Independent variables       | Coefficient | P-Value | Observations |
|-----------------------------|-------------|---------|--------------|
| Overall unemployment rate   | 0.190       | 0.000   | 225          |
| Long-run unemployment rate  | 0.271       | 0.000   | 214          |
| Short-run unemployment rate | 0.370       | 0.000   | 225          |



**Table 17. Time trend coefficients of the percentage of employed with primary education or less to total employed**

| Country        | Period    | Coefficient | P-Value |
|----------------|-----------|-------------|---------|
| Australia      | 1997-2003 | -1.1419     | 0.0004  |
| Austria        | 1997-2003 | -0.5582     | 0.0000  |
| Canada         | 1997-2003 | -0.6330     | 0.0000  |
| Denmark        | 1998-2003 | -0.7001     | 0.1204  |
| Finland        | 1997-2003 | -0.9937     | 0.0001  |
| France         | 1991-2003 | -0.9824     | 0.0000  |
| Germany        | 1997-2003 | 0.2628      | 0.1715  |
| Greece         | 1997-2003 | -1.4042     | 0.0002  |
| Iceland        | 1996-2002 | -0.2552     | 0.5673  |
| Ireland        | 1997-2003 | -1.8722     | 0.0134  |
| Italy          | 1998-2002 | -0.8233     | 0.0146  |
| Japan          | 1997-2003 | -0.5418     | 0.0011  |
| Netherlands    | 1998-2002 | -0.1100     | 0.4510  |
| New Zealand    | 1997-2003 | -0.4833     | 0.0006  |
| Norway         | 1997-2003 | -0.4183     | 0.0002  |
| Spain          | 1997-2003 | -1.4758     | 0.0000  |
| Sweden         | 1997-2003 | -0.9416     | 0.0006  |
| Switzerland    | 1997-2003 | -1.3233     | 0.0285  |
| United Kingdom | 1994-2003 | -0.5841     | 0.0002  |
| United States  | 1997-2003 | -0.1937     | 0.0125  |

**Table 18. Employed with primary education (or less) as a percentage of the total employed**

| Country        | Primary educated or less in total employed 1998 | Primary educated or less in total employed 2002 |
|----------------|---|---|
| Australia      | 33.56   | 29.63   |
| Austria        | 18.54   | 16.50   |
| Canada         | 20.10   | 17.64   |
| Denmark        | 22.32   | 18.69   |
| Finland        | 26.99   | 22.40   |
| France         | 31.76   | 28.45   |
| Germany        | 12.46   | 13.99   |
| Greece         | 49.49   | 44.01   |
| Iceland        | 35.32   | 30.76   |
| Ireland        | 45.24   | 36.47   |
| Italy          | 52.34   | 48.93   |
| Japan          | 19.49   | 16.98   |
| Netherlands    | 31.04   | 30.39   |
| New Zealand    | 21.38   | 20.25   |
| Norway         | 12.13   | 10.72   |
| Spain          | 61.79   | 55.58   |
| Sweden         | 23.18   | 19.21   |
| Switzerland    | 17.19   | 10.50   |
| United Kingdom | 11.11   | 10.03   |
| United States  | 14.99   | 14.15   |

**Table 19. Time trend coefficients on non-fuel imports from non-OECD countries as a percentage of total non-fuel imports (southern imports share) during 1990s**

| Country        | Period    | Coefficient | P-Value |
|----------------|-----------|-------------|---------|
| Australia      | 1983-1999 | 0.7999      | 0.0000  |
| Austria        | 1983-1999 | 0.2789      | 0.0001  |
| Canada         | 1983-1999 | 0.5060      | 0.0000  |
| Denmark        | 1983-1999 | 0.4923      | 0.0005  |
| Finland        | 1983-1999 | 0.4369      | 0.0000  |
| France         | 1983-1999 | 0.2673      | 0.0000  |
| Germany        | 1983-1999 | 0.3102      | 0.0346  |
| Greece         | 1983-1999 | 0.3312      | 0.0002  |
| Iceland        | 1983-1999 | 0.4295      | 0.0769  |
| Ireland        | 1983-1999 | 1.0406      | 0.0000  |
| Italy          | 1983-1999 | 0.4121      | 0.0000  |
| Japan          | 1983-1999 | 0.7011      | 0.0000  |
| Netherlands    | 1983-1999 | 0.6019      | 0.0019  |
| New Zealand    | 1983-1999 | 0.6662      | 0.0000  |
| Norway         | 1988-1999 | -0.1014     | 0.6695  |
| Spain          | 1983-1999 | -0.0379     | 0.7007  |
| Sweden         | 1983-1999 | 0.1059      | 0.0581  |
| Switzerland    | 1983-1999 | 0.1548      | 0.0007  |
| United Kingdom | 1983-1999 | 0.5242      | 0.0001  |
| United States  | 1983-1999 | 0.9988      | 0.0000  |

**Table 20. Levels of non-fuel imports from non OECD countries as a percentage of total non-fuel imports (southern imports) between 1983\* and 1999**

| Country        | Southern imports share<br>1983 | Southern imports share<br>1999 |
|----------------|--------------------------------|--------------------------------|
| Australia      | 18.40676                       | 32.39093                       |
| Austria        | 12.08268                       | 16.01683                       |
| Canada         | 8.732796                       | 16.18122                       |
| Denmark        | 13.09901                       | 17.33098                       |
| Finland        | 15.56579                       | 22.30203                       |
| France         | 15.94431                       | 20.53362                       |
| Germany        | 22.3474                        | 28.13845                       |
| Greece         | 12.53516                       | 17.39691                       |
| Iceland        | 5.804849                       | 13.63816                       |
| Ireland        | 6.754533                       | 20.86731                       |
| Italy          | 16.99103                       | 23.03702                       |
| Japan          | 39.00125                       | 50.95478                       |
| Netherlands    | 17.10103                       | 27.50648                       |
| New Zealand    | 12.56671                       | 23.4167                        |
| Norway         | 8.358256                       | 18.08915                       |
| Spain          | 19.66647                       | 18.42981                       |
| Sweden         | 12.30812                       | 13.39349                       |
| Switzerland    | 9.425625                       | 12.56414                       |
| United Kingdom | 19.09154                       | 28.82543                       |
| United States  | 33.58244                       | 46.63926                       |

Note: \*Norway figures are for 1988

**Table 21: Time trend coefficients on Investment in software and research and development as a percentage of GDP**

| Country        | Period    | Coefficient | P-Value |
|----------------|-----------|-------------|---------|
| Australia      | 1991-1998 | 0.0594      | 0.0016  |
| Austria        | 1991-1998 | 0.0905      | 0.0003  |
| Canada         | 1991-1998 | 0.0936      | 0.0005  |
| Denmark        | 1991-1998 | 0.0864      | 0.0011  |
| Finland        | 1991-1998 | 0.1609      | 0.0003  |
| France         | 1991-1998 | 0.0331      | 0.0005  |
| Germany        | 1991-1998 | 0.0232      | 0.2773  |
| Greece         | 1991-1998 | 0.0332      | 0.0004  |
| Ireland        | 1991-1998 | 0.0747      | 0.0016  |
| Italy          | 1991-1998 | -0.0268     | 0.0067  |
| Japan          | 1991-1998 | 0.0603      | 0.0739  |
| Netherlands    | 1991-1998 | 0.0694      | 0.0019  |
| New Zealand    | 1991-1998 | 0.0340      | 0.0569  |
| Spain          | 1991-1998 | 0.0116      | 0.2553  |
| Sweden         | 1991-1998 | 0.2050      | 0.0003  |
| Switzerland    | 1991-1998 | 0.0841      | 0.0003  |
| United Kingdom | 1991-1998 | 0.0266      | 0.0334  |
| United States  | 1991-1998 | 0.0483      | 0.0226  |

Note: Data provided by M. Khan from the data base in M. Khan "Investment in Knowledge", OECD STI Review No.27

**Table 22: Investment in software and research and development as a percentage of GDP levels 1991 and 1998**

| Country        | software and RND as a % of GDP 1991 | software and RND as a % of GDP 1998 |
|----------------|-------------------------------------|-------------------------------------|
| Australia      | 2.17                                | 2.70                                |
| Austria        | 1.99                                | 2.69                                |
| Canada         | 2.41                                | 3.23                                |
| Denmark        | 2.75                                | 3.44                                |
| Finland        | 2.85                                | 4.06                                |
| France         | 3.10                                | 3.35                                |
| Germany        | 3.26                                | 3.48                                |
| Greece         | 0.50                                | 0.78                                |
| Ireland        | 1.38                                | 1.94                                |
| Italy          | 1.65                                | 1.50                                |
| Japan          | 3.68                                | 4.10                                |
| Netherlands    | 3.07                                | 3.61                                |
| New Zealand    | 2.53                                | 2.93                                |
| Spain          | 1.19                                | 1.36                                |
| Sweden         | 4.05                                | 5.70                                |
| Switzerland    | 3.63                                | 4.30                                |
| United Kingdom | 2.93                                | 3.16                                |
| United States  | 3.72                                | 4.10                                |

**Table 23 Trends in Zaim Index - 4 year averages**

|                | 1991-1994 | 1995-1999 |
|----------------|-----------|-----------|
| Australia      | 0.9968    | 0.9990    |
| Austria        | 0.9914    | 0.9972    |
| Canada         | 0.9923    | 0.9981    |
| Denmark        | 0.9985    | 0.9993    |
| Finland        | 1.0074    | 0.9982    |
| France         | 0.9902    | 0.9976    |
| Germany        | 0.9924    | 0.9982    |
| Greece         | 0.9982    | 0.9991    |
| Iceland        | 0.9979    | 0.9987    |
| Ireland        | 0.9979    | 0.9993    |
| Italy          | 0.9902    | 0.9977    |
| Japan          | 0.9897    | 0.9966    |
| Netherlands    | 0.9961    | 0.9997    |
| New Zealand    | 0.9981    | 0.9988    |
| Norway         | 1.0359    | 0.9957    |
| Spain          | 0.9978    | 0.9988    |
| Sweden         | 0.9978    | 0.9987    |
| United Kingdom | 0.9983    | 0.9989    |
| United States  | 0.9988    | 0.9996    |

**Table 24: Fixed effects regression coefficients: Primary educated or less as a % of employment. Late 1990s**

| Independent variables                               | Primary educated or less as a % of employment |             |         |         |
|---|---|-------------|---------|---------|
|   |   | coefficient | -0.0074 |         |
| Southern imports share                              | P-Value                                       | 0.000*      |         | 0.028*  |
|   | coefficient                                   | -0.0577     |         |         |
| Rand D and software investment as a % of GDP        | P-Value                                       | 0.039*      |         |         |
|   | coefficient                                   |             | -0.9429 | -0.710  |
| Technical change contribution to output, Zaim index | P-Value                                       |             | 0.033*  | 0.086** |
|   | observations                                  | 67          | 42      | 45      |
|   |   |             | 45      | 45      |

**Table 25. Fixed effects regression coefficients: Unemployment rate, southern imports and technological change**

| Independent variables                               |              | Overall unemployment rate |        |     |     |
|---|--------------|---------------------------|--------|-----|-----|
| Southern imports share                              | coefficient  | - .605                    | -.0378 |     |     |
|   | P-Value      | 0.406                     | .460   |     |     |
| Rand D and software investment as a % of GDP        | coefficient  | .371                      | .106   |     |     |
|   | P-Value      | .637                      | .875   |     |     |
| Technical Change contribution to output, Zaim index | coefficient  | -16.877                   | -7.432 |     |     |
|   | P-Value      | 0.394                     | 0.638  |     |     |
|   | observations | 135                       | 197    | 144 | 170 |

**Table 26. Fixed effects regression coefficients: Involuntary part-time employment as a % of total employment, southern imports and technological change**

| Independent variables                               |              | Involuntary part-time employment as a % of total employment |          |     |     |
|---|--------------|---|----------|-----|-----|
| Southern imports share                              | coefficient  | .0331   | .0448    |     |     |
|   | P-Value      | 0.005***  | 0.000*** |     |     |
| Rand D and software investment as a % of GDP        | coefficient  | .380  | .597     |     |     |
|   | P-Value      | 0.006***  | 0.000*** |     |     |
| Technical Change contribution to output, Zaim index | coefficient  | 3.754   | 6.526    |     |     |
|   | P-Value      | 0.304   | 0.073*   |     |     |
|   | observations | 114   | 169      | 123 | 144 |

**Table 27. Temporary employment as a % of total employment, southern imports and technological change**

| Independent variables                               |              | Temporary employment as a % of total employment |         |     |     |
|---|--------------|---|---------|-----|-----|
| Southern imports share                              | coefficient  | .188  | .121    |     |     |
|   | P-Value      | 0.000***  | 0.023** |     |     |
| Rand D and software investment as a % of GDP        | coefficient  | .140  | .863    |     |     |
|   | P-Value      | .856  | .204    |     |     |
| Technical Change contribution to output, Zaim index | coefficient  | -4.300  | -15.402 |     |     |
|   | P-Value      | .856  | 0.110   |     |     |
|   | observations | 92  | 201     | 101 | 152 |



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