

Labor Market Characteristics and Cross-Country Differences in Cost Stickiness

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Abstract: This paper examines the impact of country-specific labor market characteristics on the degree of asymmetric cost behavior manifested in the stickiness of firms' operating costs. Bargaining power of trade unions, extent of centralization and coordination in collective bargaining, level of unemployment benefits, and strictness of employment protection legislation that characterize labor markets in different countries are hypothesized to be factors that affect the flexibility of firms in adjusting labor resources, and hence the cost changes in response to activity level changes. Analysis of a large cross-sectional sample of 12,666 firms from 19 OECD countries over the period 1996-2005, after controlling for firm-level determinants of cost stickiness, documents that cross-country variations in the stickiness of operating costs are significantly associated with labor market characteristics as hypothesized. Labor market structure and policies thus are revealed to be important forces influencing cost behavior.

Keyword: Cost stickiness; Labor market characteristics; Cross-country comparison.

1. Introduction

Recent studies have examined the empirical validity of a key assumption underlying the traditional model of cost behavior -- the assumption that activity costs change *proportionately* with activity volume changes (Noreen and Soderstrom 1994, 1997). Using data from a large cross-sectional sample of U.S. firms, Anderson, Banker and Janakiraman (2003) documented that selling, general, and administrative (SG&A) costs exhibit sticky behavior -- costs increase more with an activity increase than they decrease with an activity decrease of the same magnitude. This asymmetric cost behavior is generally attributed to managers making deliberate resource allocations considering adjustment costs when faced with a change in the activity level. Consistent with this resource-adjustment-based explanation, Anderson et al. (2003) and subsequent studies (Weidenmeir and Subramaniam, 2003; Balakrishnan et al., 2004; Anderson et al., 2006) have shown that the degree of cost stickiness is associated cross-sectionally with *firm-specific* characteristics that capture organizational constraints on resource adjustment, such as asset intensity, employee intensity, magnitude of volume changes, industry membership, and capacity utilization.

In this study, we build on this alternative theory of cost behavior by examining *cross-country* differences in the sticky behavior of operating expense¹ and explore whether *country-specific* labor market characteristics help explain such differences. Our basic premise is that cost behavior reflects firms' resource adjustment decisions that are driven to varying extent by economy-wide factors. Thus, an understanding of the differences in cost behavior across countries requires an analysis of these macro-level structural variables. Specifically, we expect features of the labor market, such as collective bargaining arrangements in setting

¹ Operating expense includes both cost of goods sold and selling, general, and administrative expense.

wages and government policies on unemployment insurance and on employment protection, play a significant role in creating or limiting the flexibility of firms in adjusting their labor resources and wage rates. Therefore, we expect the variability of operating expense and its asymmetric behavior are systematically associated with characteristics of labor markets in different countries.

Our study is among the first to examine cross-country differences in cost behavior. Anderson et al. (2003) and other subsequent studies that provide statistical evidence on sticky costs have focused primarily on U.S. firms. One study that examines non-U.S. firms is by Medeiros and Costa (2005), who confirmed that stickiness in SG&A costs exists for a sample of Brazilian firms. To the best of our knowledge, Calleja et al. (2006) is the only prior study that has conducted a cross-country comparison of cost stickiness. Comparing the degree of stickiness in operating costs for a sample of U.S., U.K., French and German firms, they found that costs are more sticky in French and German firms than in U.S. and U.K. firms and attributed the difference in stickiness to differing corporate governance regimes (common-law system vs. civil-law system)² across these four countries. Our study differs from Calleje et al. (2006) in several significant aspects. First, we provide a more comprehensive international comparison (across 19 major industrialized countries) of cost stickiness of operating expense. Second, we focus on the role of labor markets in shaping managers' resource adjustment decisions. Specifically, we directly examine the association of four important characteristics of labor markets with the degree of cost stickiness. Finally, our hypotheses are derived from

² Calleja et al. (2006) provide the following reasoning for their argument that corporate governance systems affect cost behavior: "Given the focus on shareholder (rather than stakeholder) value, we expect managers in UK and US companies to come under closer scrutiny and therefore to be more motivated to cut costs in the event of a revenue decrease or to be less likely to enter into contracts which may make them vulnerable in the event of a revenue decline. In contrast, we expect the costs of French and German companies to be stickier given the increased co-determinant, the security of labor, and the obligations to wider set of constituents."

economic theories on how differences in institutional arrangements of labor markets affect the flexibility of firms in adjusting labor resources.

We focus on characteristics of labor markets to explain cross-country differences in cost stickiness for several reasons. First, the flexibility of managers to adjust labor resources that determines sticky cost behavior is affected by macro-level labor market forces, such as regulations, government policies, and unions. To the extent that operating expense includes many labor-related costs, we expect that the observed pattern of behavior in operating expense at individual firm level is driven in part by forces shaping a country's labor markets. Second, there is an extensive literature in labor economics on the impact of various labor market arrangements and policies on several aspects of macroeconomic performance, most notably unemployment (Layard, Nickell, and Jackman, 1991; Siebert, 1997; Nickell, Nunziata and Ochel, 2005). As our research question is fundamentally related to economic factors influencing labor adjustment, we are able to draw upon some of the theories and insights developed from the extant labor economics literature. Finally, data on key labor market characteristics are readily available for most industrialized countries over an extended period of time (OECD 2004; Nickell et al. 2005). This, coupled with the availability of financial data for a large global sample of publicly traded companies (Compustat Global & Emerging Markets), enables us to conduct a comprehensive, cross-country analysis of the effect of labor markets on cost behavior.

Using a sample of 65,691 firm-year observations (12,666 unique firms) from 19 countries that are members of the Organization for Economic Co-operation and Development (OECD) during the period 1996-2005, we document that the degree of stickiness in operating expense varies significantly across firms in different countries. More importantly, we find that

the variation in cost stickiness is significantly associated with a set of labor market variables, after controlling for firm-level determinants of cost stickiness. First, our evidence indicates that two indicators of collective bargaining have significant yet opposite effect on the degree of cost stickiness. While greater bargaining power of unions (as proxied by trade union density) is associated with greater cost stickiness, more centralized and coordinated collective bargaining arrangement causes less cost stickiness. In addition, we find that the level of unemployment insurance benefits and the strictness of employment protection legislation also have significant impact on cost stickiness. Specifically, the degree of stickiness in operating expense decreases with the level of unemployment benefits and increases with the strictness of employment protection legislation.

These findings are consistent with our hypotheses that these macro-level labor market characteristics influence the flexibility of firms' labor resource adjustment decisions, resulting in cross-country differences in the degree of cost stickiness. By analyzing and empirically documenting the linkage between important features of labor markets and cost behavior, our study provides a broad context for understanding cost behavior and, in particular, how institutional arrangements and government policies associated with labor markets shape firms' cost structures.

The paper proceeds as follows. Section 2 discusses the effect of labor market characteristics on cost stickiness and develops our research hypotheses. Section 3 describes the research methodology, including variable measurement, sample selection, and regression models. Section 4 discusses our principal results and their robustness. Finally, Section 5 concludes the paper with suggestions for future research.

2. Labor Market Characteristics and Cost Stickiness

Traditional cost models in management accounting postulating fixed and variable costs varying with volume assume that variable costs automatically change proportionately and symmetrically with changes in the activity driver, regardless of the direction of the activity change. In contrast, the theoretical model of sticky cost behavior postulates a key role for managers making rational decisions trading off the cost of resource adjustments against the cost of slack resources. This results in activity costs falling less with decreases in activity volume than rising with increases. While the notion that costs may be “sticky” was suggested in earlier literature (Cooper and Kaplan, 1998; Noreen and Soderstrom, 1997), systematic empirical evidence on cost stickiness did not emerge until only recently (Anderson, Banker, and Janakiraman, 2003; Balakrishnan, Peterson, and Soderstrom, 2004).

Costs do not change automatically. Changes result from discretionary decisions made by managers adjusting the level of activity resources in response to changes in expected activity levels. If managers behave rationally, such decisions are likely to be influenced by adjustment costs, or frictions that exist in the resource-adjustment process. For example, in the context of a firm’s decision to reduce its labor force, adjustment costs may include the costs of administering a layoff program, severance pay, and even litigation in case of a legal battle with the labor union. In addition, there are potential costs of ramping up the labor force again if the demand rebounds. A firm adding to its labor force faces adjustment costs that may take the form of recruitment of qualified workers, training of new employees, and organizational changes to accommodate the additions. To the extent managers perceive expected adjustment costs to be higher for a downward adjustment than for an upward adjustment, activity costs are likely to exhibit “sticky” behavior.

Anderson et al. (2003) provided evidence consistent with sticky cost behavior for a large cross-section of U.S. firms over a period of 20 years. They also used the underlying theoretical framework of sticky cost behavior to hypothesize that the degree of cost stickiness is determined by several factors that affect the relative magnitudes of adjustment costs. In particular, they hypothesized that cost stickiness is lower in the second year of consecutive sales declines, and greater in periods of macroeconomic growth, and for firms with high intensity of assets or employees relative to sales. Their empirical evidence was consistent with the general proposition that the degree of cost stickiness is driven by the expected level of adjustment costs that vary systematically across firms and over time. Motivated by the same resource adjustment based theoretical framework of cost behavior, Balakrishnan et al. (2004) studied the impact on cost stickiness of two other factors -- the magnitude of activity changes and the level of capacity utilization. In contrast to Anderson et al. (2003), they tested their hypotheses using operational data from a single firm operating a chain of physical therapy clinics. Despite differences in the research design, Balakrishnan et al. (2004) also provides empirical support for the proposition that adjustment costs are an important determinant of cost behavior.

In this study, we extend the prior research on cost stickiness by expanding the scope of inquiry. We conduct a comparative examination of cost stickiness in 19 different countries with developed economies. Comparison of cost behavior across countries has received only scant attention in past research. Unlike previous studies of cost stickiness that examined only firm-specific aspects of the adjustment process, our focus instead is on macro, country-specific characteristics of labor markets that may constrain or facilitate the labor resource adjustment decisions in most firms in a country. To develop our research hypotheses, we

adopt the theoretical framework that views cost behavior in general and cost stickiness in particular as a result of deliberate resource adjustment decisions by managers. Labor market characteristics in a country may increase or decrease the cost of reducing the size of the labor force and accordingly the degree of cost stickiness.

We also draw on the extant literature in labor economics to help develop our hypotheses about how labor market characteristics may influence the degree of asymmetric cost behavior. Based on this literature, the following four aspects of labor markets are likely to impact firms' ability to adjust labor related resources corresponding to sales change: (1) the power of trade unions in the collective bargaining wage-setting process, (2) the degree of centralization and coordination in collective bargaining, (3) the level of unemployment insurance benefits, and (4) the strictness of employment protection legislation.

Collective bargaining is the process of wage-setting negotiation between labor unions and employers. The bargaining often covers various terms and conditions of employment, such as wages, hours of work, working conditions, and grievance procedures. Although bargaining takes place in many forms in different OECD countries, two important characteristics of the wage-setting collective bargaining system in a country are most likely to have a significant impact on labor adjustment and flexibility. First, the bargaining power of trade unions in a country is often considered an important factor contributing to labor market rigidities (Nickell, 1997; Siebert, 1997). Rigidities generally refer to the lack of flexibility in firms' labor resource adjustments in response to external demand shocks. Second, in the labor economics literature on macro-level labor market performance, much attention is focused on the level at which wages are formally set in collective bargaining *and* the degree of

coordination of bargaining among negotiating parties. In what follows, we separately analyze the effect of each of these two dimensions of collective bargaining on cost behavior.

The primary goals of union involvement in collective bargaining in setting workers' wages are to ensure job security, seek equity in pay, and improve employees' welfare. The research literature in labor economics recognizes unionization as an institutional mechanism through which owners share the value created with workers. The demands of unions representing employees' interest often raise concerns from the standpoint of both the management of individual firms and the economy as a whole because it restricts flexibility in the deployment of labor (Nickell and Layard, 1999; Booth, et al., 2000). Such lack of flexibility in adjusting wage levels or in terminating employment makes it difficult for management to cope with external demand shocks. As a result, the nature of union participation in collective bargaining to determine wage aspects of employment contracts is likely to influence cost stickiness, the degree of downward inflexibility in costs in response to a demand decrease.

In collective bargaining, labor unions rarely bargain directly about employment levels. Instead, bargains tend to cover issues on wages, layoff criteria (whose jobs are terminated in the event of layoffs), unemployment payments (beyond what is legally required), and work conditions (Oswald, 1987; Layard et al. 1991). Bargaining over wage levels and non-statutory unemployment payments are likely to affect managers' assessment of the cost of labor resource adjustment. Powerful unions are less likely to grant concessions to the management. Such resistance from more powerful trade unions is likely to lead to less complete downward adjustment in employment levels in response to negative demand shocks, resulting in greater cost stickiness. Similarly, powerful unions are more likely to secure higher severance pays

and benefits for employees to be laid off, thus increasing the firms' adjustment costs, leading to greater cost stickiness. Based on these arguments, we hypothesize:

H1: Ceteris paribus, the degree of cost stickiness of firms increases with the wage bargaining power of trade unions in their country.

Another important structural dimension of labor markets is the extent of bargaining centralization and coordination among unions. In a country with highly centralized and coordinated bargaining, wages are often not determined at the firm level but at the industry level or even at the economy-wide level. Highly centralized and coordinated collective bargaining is found to yield more desirable macroeconomic outcomes such as lower unemployment rates because large and all-encompassing trade unions are aware of the full macro-level effect of their contract agreements, and tend to facilitate more responsive adjustment in aggregate wages and employment commensurate with macroeconomic conditions (Calmfors and Driffill, 1988; Calmfors 1993; Flanagan 1997).

Highly centralized and coordinated collective bargaining is thus likely to facilitate firms' resource adjustment process, particularly in periods of declining activity levels. While unions may seek to protect jobs and wage levels, prolonged labor disputes over layoffs and wages may be detrimental to the welfare of union members and other workers. The bargaining outcome results from a tradeoff between short-term job losses and wage benefit reductions and long-term decline in employment security and wage levels when businesses seek to recover from temporary slowdowns or declines. When bargaining is centralized and coordinated, it is easier for the long-term impact of firms' resource adjustment decisions to be taken into account in the collective bargaining process (Calmfors and Driffill, 1988). The negotiating parties are more likely to arrive at a bargaining outcome that achieves the level of

flexibility in downward labor adjustment desired by the management in response to a decline in sales. Since the conflict of interests in labor bargaining is likely to be more internalized under centralized and coordinated collective bargaining, it has the effect of aligning the incentives of managers and employees in making temporary labor adjustments in the labor force with the objective of ensuring long term viability of their firms and job opportunities. In contrast, localized union bargaining generally does not permit such an alignment of interests (Soskice, 1990; Aidt and Tannatos, 2002). We state this hypothesis in the following alternative form:

H2: Ceteris paribus, the degree of cost stickiness of firms decreases with the level of collective bargaining centralization and coordination in their country.

An important way in which government affects labor market policy is the extent of unemployment insurance benefits. Unemployment benefit is financial compensation provided by the government or a compulsory insurance system to laid-off or otherwise unemployed workers. These benefits are generally given only to those registering as unemployed, and are often conditional on the requirement that they seek work and do not currently have a job.

As part of their social security systems, different countries have developed a wide range of unemployment insurance systems, some with only limited levels of coverage, while others provide greater benefits as a proportion of previous earnings. Benefit systems have two different objectives. Insurance-type unemployment benefits provide insurance and improve equity in the face of unpredictable job loss. Assistance-type benefits, on the other hand, are often the main component in a minimum income system for adults of working age and reduce the incidence of severe poverty. In either case, since unemployment benefits are in essence a welfare system, they create incentives to delay job search for unemployed workers and to

delay immediate and steeper cuts in the labor force for a firm facing a decline in demand (Carling et al., 1999; Hunt, 1995; Meyer, 1995).

Empirical research in labor economics documents that a generous unemployment insurance policy, in the form of either high or prolonged unemployment leads to a high unemployment rate (Nickell and Layard, 1999; Scarpetta, 1996; Elmeskov et al., 1998; Ham and Rea, 1987; Katz and Meyer, 1990; Carling et al., 1996). This effect is mainly attributed to the fact that unemployment insurance lowers the urgency to find a new job, especially for the low-wage workers, making it more likely they will stay unemployed for longer periods of time (Holmlund, 1998; Meyer, 1990; Bover et al., 2002). Unemployment insurance also causes temporary layoffs, with laid-off workers returning to their former employer at the end of an unemployment spell (Feldstein, 1976; Topel, 1983). Since high levels of unemployment insurance benefits make temporary layoffs more attractive to workers, they also alleviate some of the constraints and costs faced by firms that need to reduce labor resource levels. Conversely, the adjustment costs of laying off workers (in the form of either firm-provided compensation or resistance from workers and their unions) are likely to be higher for firms in countries with meager government-supplied unemployment benefits. If managers trade off adjustment costs in laying off workers against costs associated with retaining labor slack, higher (lower) unemployment benefits lead firms to make more (less) complete downward adjustment of labor forces in periods of declining demand, resulting in labor costs being less (more) sticky in equilibrium. Thus, we have the following hypothesis:

H3: Ceteris paribus, the degree of cost stickiness in a country decreases with the level of unemployment insurance benefits.

Finally, we expect the strictness of employment protection in a country to have a significant negative impact on the flexibility of resource adjustment. Employment protection legislation describes rules about the dismissal of employees, such as restrictions on firing after some period of service, the compulsory payment of redundancy payments, and the length of notice required before dismissal. Such legislation is typically put in place to protect employees from arbitrary, unfair or discriminatory actions on the part of employers (Nickell 1997). Acting as a tax on dismissals, employment protection has the direct effect of imposing firing costs on employers (Long and Siebert, 1983; Pissarides, 1999). The main argument for employment protection relates to employee security at work, in employment and income, and the advantage of a stable employment relationship that encourages investment in human capital. While acknowledging its welfare value, economists generally view employment protection as a component of labor market “rigidities”, or lack of labor market flexibility, because it may constrain firms’ downward adjustment of labor resources to adverse macro economic shocks.

Following a similar line of argument, we posit that employment protection legislation adds to the adjustment costs for firms when they are scaling down their labor force. Firing restrictions under employment protection provisions make it difficult for firms to reduce labor costs by laying off workers. The more stringent these restrictions are, the more costly it is for managers to make a complete adjustment in labor resources down to slack-minimizing levels, and hence labor costs exhibit greater stickiness. Conversely, in a country where employment protection is weak, there is likely to be little adjustment friction brought about by the need for firms to comply with such legislation and managers are likely to be more inclined to reduce labor resources when necessary. Therefore, we expect a positive association between the

strictness of employment protection and the degree of cost stickiness. This hypothesis is stated as follows:

H4: Ceteris paribus, the degree of cost stickiness of firms increases with the strictness of employment protection legislation in their country.

3. Research Methodology

3.1 Measures of Labor Market Characteristics

We choose to empirically examine the effect of country-specific labor market characteristics on the degree of cost stickiness for firms incorporated or legally registered in OECD (Organization for Economic Co-operation and Development) member countries. We select this research setting because OECD includes all the major industrialized nations with a free market economy. Furthermore, measures of country-specific labor market characteristics are reliably and systematically reported for 19 OECD countries. We restrict our investigation to firms in these 19 countries which include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, U.K., and U.S. Availability of systematically collected and reliable data enables us to empirically test theoretical hypotheses about differences in cost stickiness across countries. There exists a rich literature in labor economics that examines labor market characteristics for these OECD countries and in the previous section we have drawn upon that literature extensively in formulating our hypotheses about cost stickiness and selecting specific measures of labor market characteristics.

To ensure the construct validity of our measures, for each of our four hypotheses, we use only those measures of labor market characteristics that are identified by prior studies in labor economics and are reported for the 19 OECD countries in recent OECD official reports. Next we describe these measures and their sources.

Trade union density (TUD) measures the overall wage bargaining power of unions in a country (OECD, 2004). TUD is the percentage of all wage and salary earners that are trade union members. OECD has provided estimates of TUD for its member countries four times in the past 40 years: 1970, 1980, 1990 and 2000 (OECD 2004). The first two columns of Table 1 present data on TUD for 1990 and 2000 for the 19 OECD countries in our sample. In all but four countries (Belgium, Spain, Finland, and France), union density has decreased between 1990 to 2000, consistent with the longer term trend of declining union membership in OECD countries since 1970 (OECD 2004). There are significant variations in union density among the 19 OECD countries in our sample, influenced by differences in the political effectiveness of the various union movements (Ebbinghaus and Visser, 2000.). The Nordic countries of Sweden, Finland, Norway, and Denmark, and Belgium are the most unionized, with TUD ranging from 54% to 79% in 2000. In comparison, the countries that are the least unionized are France, U.S., Spain, and Switzerland, all with TUD below 20%. Although the level of TUD has decreased substantially in all countries, the correlation between TUD reported for 1990 and for 2000 is 0.97, indicating that the differences in union density across OECD countries have remained relatively stable during the 1990s. Since our objective is to explain cross-country differences rather than inter-temporal differences in cost behavior, we

use the data on TUD for 2000 in our main analysis to measure the general level of trade union power during the period 1996-2005.³

In addition to union power in bargaining, the extent to which collective bargaining is centralized and coordinated is another important dimension of the bargaining structure in a country. Bargaining centralization refers to the level at which collective contracts are negotiated and formally set. Bargaining coordination refers to the extent to which pay negotiations are coordinated across different firms and across different industries through mechanisms that take into account its aggregate employment implications.

Three levels are usually distinguished for bargaining centralization (OECD, 2004). First, firms and workers may negotiate over terms and conditions of employment at the level of the individual firm. Labor and management in Canada, Japan and U.S. have historically bargained at this level. At the other extreme, national unions and employer associations engage in inter-industry bargaining at the national level, covering the entire economy or most parts of it. This feature is historically characteristic of the Nordic countries, but also in a somewhat different form a characteristic of the arbitration system in Australia. Most continental European countries have traditionally favored intermediate forms of negotiation, mainly at the sectoral level. The empirical classification of countries by bargaining level, however, is complicated by the fact that in many countries bargaining occurs at multiple levels. OECD thus uses a five-category classification scheme to take into account the possibility of multiple-level negotiations. These five categories are, in the order of increasing centralization: (1) company and plant level predominant; (2) combination of industry and company/plant level, with a large proportion of employees covered by company bargains; (3)

³ In sensitivity analysis reported later, we also use data on the 1990 TUD for observations in the period 1994-1999 and the 2000 TUD for observations during the period 2000-2005. Results are qualitatively similar to our main analysis.

industry-level predominant; (4) predominantly industrial bargaining, but also recurrent central-level agreements; and (5) central-level agreements of overriding importance (OECD, 1997, 2004. Also see Appendix). Each country is assigned a centralization index, an ordinal score ranging from 1 to 5 that corresponds to the above five categories of bargaining centralization level. Since 1970, OECD has published bargaining centralization scores for five 5-year periods (1970-74, 1975-79, 1980-84, 1985-89, and 1990-94) and one 6-year period (1995-2000). We use the data on the most recent OECD centralization index reported for 1995-2000 for our entire sample.

Bargaining coordination is generally considered to be conceptually different from bargaining centralization (Soskice, 1990; OECD, 2004). A high degree of coordination is not guaranteed by a high degree of centralization. For example, sometimes several rival unions bargain at the central level, and sometimes central-level contracts are undermined by conflicting behavior at lower levels. In fact, centralization is not even a necessary condition for coordination since the latter could be achieved through the presence of coordinating institutions which assist bargaining parties at lower levels. OECD distinguishes five levels of coordination. Like the centralization index, the coordination indicator is also an ordinal score ranging from 1 to 5, with higher scores representing a higher degree of bargaining coordination. The five levels of coordination are: (1) fragmented company/plant bargaining, with little or no coordination by upper-level associations; (2) fragmented industry and company-level bargaining, with little or no pattern-setting; (3) industry-level bargaining with irregular pattern-setting and moderate coordination among major bargaining actors; (4) coordinated bargaining by peak confederations, including government-sponsored negotiations, or government imposition of wage schedules; and (5) coordination of industry-

level bargaining by an encompassing union confederation (OECD, 2004. Also see Appendix). The two upper levels (4 and 5) integrate various features of economy-wide coordination, such as pattern-setting by key industries, as well as different forms of government involvement in wage setting. The correlation between the OECD centralization and coordination scores for our sample is 0.703. Decentralized countries are usually characterized by fragmented bargaining with little or no coordination, with the important exception of Japan, where wage-setting is highly coordinated. Germany, where negotiations are usually at the combined regional and sectoral levels, is characterized by a pilot agreement in one key industry, usually the metallurgy sector, which serves as a template for other bargaining agents. Belgium, Denmark, Italy and the Netherlands are among other countries that tend to get higher scores on the coordination than on the centralization dimension, because of different forms of central-level coordination of sectoral bargaining (OCED, 2004).

Prior research in labor economics has usually combined the centralization and coordination indexes into one bargaining centralization and coordination (BCC) index for each country by averaging the bargaining centralization and coordination scores ⁴ Accordingly, we construct a similar single BCC index to maintain connection with the labor economics literature.

Taken together, the data on trade union density (TUD) and bargaining centralization and coordination (BCC) shown in Table 1 paint the following general picture of the collective bargaining arrangements for our sample of OECD countries. Labor contracts in the U.S. approximate those determined by a free market process; Labor bargaining is decentralized, with low levels of unionization and low levels of coordination of wage changes across the

⁴ Results (not reported here) are qualitatively similar even if the centralization index and the coordination index are considered separately.

economy. However, labor negotiations in European countries exhibit characteristics that move wage formation away from the free market process. Wages are often not determined at the firm level but at the industry level or even at the economy-wide level (OECD, 2004). Of course, there is also considerable variation among the European countries.

OECD has also collected systematic data on the unemployment benefit replacement ratio (unemployment benefits expressed as a percentage of earnings before tax) for three different family types (single, with dependent spouse, and with spouse at work) in three different duration categories (1st year, 2nd and 3rd years, 4th and 5th years). The last year for which these data are available is 1999. Using these OECD data on replacement ratios, Nickell (2005) derived two aggregate measures of unemployment benefits systems. The first is the benefit replacement ratio (RATIO) defined as the average over family types in the 1st year duration category. The second (DUR) is an index of benefit duration $[=0.6*(2^{nd} \text{ and } 3^{rd} \text{ year replacement ratio}) + 0.4*(4^{th} \text{ and } 5^{th} \text{ year replacement ratio}) / (1^{st} \text{ year replacement ratio})]$ interpreted as the level of benefit in the later years of an unemployment spell normalized on the benefit in the first year of that spell. The two measures, replacement ratio (RATIO) and duration index (DUR), for 1999 are presented in Table 1 for the 19 OECD countries in our sample. Scandinavian and continental European countries tend to have higher replacement ratios (e.g., 66% for Denmark, 70% for Netherlands, 74% for Sweden, and 74% for Switzerland). In contrast, countries with the lowest replacement ratios include U.K. (17%), Australia (25%), and U.S. (29%). There is also a large variation in benefit entitlement duration across countries. Australia, Denmark, and U.K. have the longest benefit entitlement duration, whereas the duration indices of Italy, Japan and Sweden are close to 0. Some of the countries with the most generous first year benefit levels have strictly time-limited systems,

notably in Scandinavia. For instance, Sweden has a replacement ratio of 0.74 but a duration index of only 0.02.

To gauge the overall level of unemployment benefits, we construct a measure (BNFT) that is a weighted average of replacement ratios of 1st year, 2nd and 3rd years, and 4th and 5th years, with higher weights placed on earlier years than on later years of an unemployment spell as in Nickell (2005). BNFT is measured as a combination of the replacement ratio (RATIO) and the duration index (DUR): $BNFT = RATIO + RATIO * DUR = \text{replacement rate in 1}^{st} \text{ year} + 0.6 * (\text{replacement rate in 2}^{nd} \text{ and 3}^{rd} \text{ year}) + 0.4 * (\text{replacement rate in 4}^{th} \text{ and 5}^{th} \text{ year})$.

OECD evaluates the strictness of employment protection legislation (EPL) based mainly on legislative provisions governing the hiring and firing process (OECD, 2004). The OECD Jobs Study defines “employment protection” as follows: “Employment protection legislation relates to ‘hiring and firing’ rules governing unfair dismissal, lay-offs for economic reasons, severance payments, minimum notice periods, administrative authorization for dismissals and prior discussion with labor representatives.” For each country, employment protection legislation is described along 18 basic items, classified into three main areas: (1) employment protection of regular workers against individual dismissal; (2) specific requirements for collective dismissals; and (3) regulation of temporary forms of employment. Starting from these 18 basic pieces of information, OECD has developed a four-step procedure that has been developed for constructing a cardinal summary indicator of EPL strictness that allows meaningful comparisons to be made, both across countries and between different years (Annexure 2.A1, OECD Employment Outlook, 2004). The EPL summary indicator is normalized to range from 0 to 6, with higher scores representing stricter regulation. OECD

has published summary measures of EPL at three points in time: the late 1980s, the late 1990s, and the year 2003. Since our sample period ranges from 1996 to 2005, we use the EPL summary measure for the late 1990s in our analysis. EPL strictness of OECD countries has remained largely stable between the late 1990s and 2003, the correlation between the two EPL indicators is 0.98 (OECD, 2004). Table 1 reports the EPL strictness indicator for the 19 OECD countries in our sample. There is considerable variation between countries, with U.S., U.K., and Canada being the least regulated countries while the southern European countries such as Portugal, Spain, and Italy have the strictest employment protection legislation.

3.2 Sample Statistics

We collect annual firm-level accounting data for non-financial firms from Standard & Poor's Computstat Global Industrial/Commercial database. We impose the following requirements for selecting our sample: (1) Firms are incorporated or legally registered in any of the 19 OECD countries for which all four measures of labor market characteristics are available; (2) Firms have data available on Net Sales or Turnover (#1) for the current year and two previous years,⁵ on Operating Expense (#3) for the current and previous years, and on Total Net Fixed Assets (#76) and Number of Employees (#162) for the current year. We choose 1996-2005 as our sample period because it corresponds to the measurement windows of country-specific labor market variables that we consider. To reduce the effect of outliers on the analysis and to focus on firms under normal operating conditions, we exclude observations with extreme values on annual changes in sales and operating expenses (the top and bottom 5% of distribution). We also winsorize other independent variables (fixed asset

⁵ We require sales revenues for the previous two years in order to compute the variable DEC_{t-1} , which is a dummy variable representing a sales decline in year $t-1$.

intensity and employee intensity, both to be defined in Section 3.3) to the 5th and 95th percentile of the respective distribution. After all of these data-screening procedures, we are left with a sample of 65,691 firm-year observations (12,666 unique firms) over the period 1996-2005.

We report sample distribution in the first two columns of Table 3. As expected, the number of firms and firm-year observations vary significantly across countries, with the number of firms ranging from just below 60 (Ireland and Portugal) to over 3,500 (U.S. and Japan), and the number of firms-years ranging from below 300 (Ireland and Portugal) to about 20,000 (U.S. and Japan.). Table 3 also reports the median changes in sales revenue and operating expense for each of the 19 countries and the sample as a whole. The median annual change in sales revenue (operating expense) ranges from a low of 1.9% (1.3%) for Japanese firms to a high of 12.8% (13.3%) for Irish firms. The median changes in sales revenue and operating expense are 4.9% and 4.7%, respectively.

3.3 Model Specification

Consistent with the prior research on cost stickiness, we specify the following empirical model to estimate the sticky behavior of operating expense (Anderson et al., 2003; Noreen and Soderstrom, 1997; Balakrishnan et al., 2004).

Model (1a)

$$\log\left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}}\right] = \alpha_0 + \alpha_1 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] + \alpha_2 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t + \varepsilon$$

where OPEX_t and SALES_t are operating expense and sales revenue, respectively, in period t . DEC_t is a dummy variable equal to 1 when sales decrease in period t , and 0 otherwise. In

model (1a), coefficient α_1 measures the percentage increase in operating expense with a 1% increase in sales revenue, and the sum of the coefficients $\alpha_1 + \alpha_2$ measures the percentage increase in operating expense with a 1% decrease in sales. Cost stickiness thus implies $(\alpha_1 + \alpha_2) < \alpha_1$, or $\alpha_2 < 0$. We refer to α_2 as the stickiness coefficient whose magnitude reflects the degree of cost stickiness.

To test for the impact of country-specific labor market characteristics on the degree of cost stickiness, we expand model (1a) by expressing the stickiness coefficient α_2 as a linear function of the four labor market characteristics we consider. To allow for further variations in cost stickiness unrelated to labor market characteristics, we also include five variables identified in prior research. Following Anderson et al. (2003) we include a dummy variable representing a decrease in sales revenue in the prior period (DEC_{t-1}), and variables measuring the rate of macroeconomic growth (GDP), the fixed assets intensity (AINT) and the employee intensity (EINT). In addition, we include an indicator variable of the legal tradition of corporate governance structure (LAW), as in Calleja et al. (2006). Of the 19 OECD countries in our sample, five are identified as common-law countries (Australia, Canada, Ireland, U.K., and U.S.) and the remaining fourteen belong to the civil law tradition (La Porta et al. 1998).

$$\alpha_2 = \gamma_0 + \gamma_1 * DEC_{t-1} + \gamma_2 * GDP + \gamma_3 * AINT + \gamma_4 * EINT + \gamma_5 * LAW + \gamma_6 * TUD + \gamma_7 * BCC + \gamma_8 * BNFT + \gamma_9 * EPL \quad (2)$$

- where α_2 = the stickiness coefficient from model (1a).
 DEC_{t-1} = a dummy variable for a sales decrease in the previous year. DEC_{t-1} takes the value 1 if $SALES_{t-1} < SALES_{t-2}$, and 0 otherwise.
GDP = the real GDP growth rate for a country in a year.
AINT = $\log(\text{fixed assets}/\text{sales revenue})$, a measure of fixed asset intensity.
EINT = $\log(\text{employees}/\text{sales revenue})$, a measure of employee intensity.
LAW = a dummy variable equal to 1 for common-law countries, and 0 for civil-law countries
TUD = trade union density.
BCC = bargaining centralization/coordination index.

BNFT = overall unemployment benefit rate.
 EPL = strictness of employment protection legislation.

Country-specific measures of labor market characteristics TUD, BCC, BNFT and EPL are defined in Table 1.

Substituting equation (2) into model (1a) and rearranging terms, we have:

Model (1b)

$$\begin{aligned} \log\left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}}\right] = & \alpha_0 + \alpha_1 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] + \alpha_2 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t + \alpha_3 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{DEC}_{t-1} \\ & + \alpha_4 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{GDP} + \alpha_5 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{AINT} \\ & + \alpha_6 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{EINT} + \alpha_7 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{LAW} \\ & + \alpha_8 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{TUD} + \alpha_9 * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{BCC} \\ & + \alpha_{10} * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{BNFT} + \alpha_{11} * \log\left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}}\right] * \text{DEC}_t * \text{EPL} + \varepsilon \end{aligned}$$

Model (1b) forms the basis for the testing of our hypotheses. Specifically, H1- H4 predict $\alpha_8 < 0$, $\alpha_9 > 0$, $\alpha_{10} > 0$, and $\alpha_{11} < 0$, respectively. Based on findings of Anderson et al. (2003) and Calleja et al. (2006), we also expect the following signs on coefficients of terms containing control variables: $\alpha_3 > 0$, $\alpha_4 < 0$, $\alpha_5 < 0$, $\alpha_6 < 0$, and $\alpha_7 > 0$

4. Results

4.1 Comparison of Cost Stickiness across OECD Countries

Before estimating model (1b) to test our hypotheses, we first provide estimates of the degree of cost stickiness of operating expense for the 19 OECD countries using the following model. This model is a modified version of model (1a) augmented with country dummy variables. This specification allows the stickiness coefficient to be country specific.

$$\log \left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}} \right] = \alpha_0 + \alpha_1 * \log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] + \sum_{i=1}^{19} \alpha_{i+1} * \log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC} * \text{Country}_i + \varepsilon$$

where Country_i is a dummy variable for country i ($i=1, \dots, 19$). The coefficient α_{i+1} thus measures the average degree of cost stickiness for firms in country i .

The OLS estimates of α_{i+1} ($i=1, \dots, 19$) are shown in the last column labeled “Estimated Cost Stickiness” in Table 3. Of the 19 countries, 16 have negative stickiness coefficients. Of the 16 negative coefficients, 12 are significant at the 10% level. Thus, the sticky behavior of operating expense is widely prevalent and robust. The estimation results in positive stickiness coefficients for three countries (Belgium, Japan, Finland), but none is significant at the 10% level. Countries with the largest (in magnitude) stickiness coefficients are Australia (-0.326), Sweden (-0.198), Canada (-0.176) and U.S. (-0.156). Although these country-specific estimates provide some preliminary evidence on the prevalence of and the variations in cost stickiness in OECD countries, we do not directly use them as the basis for testing our hypotheses because our basic unit of analysis is individual firms. Therefore, it is important to also incorporate firm-level control variables when testing the effect of country-specific labor market characteristics.

4.2 Labor Market Characteristics and Cost Stickiness

In Table 4, we present the results of estimating models (1a) and (1b) using the pooled sample of 12,666 unique firms from 19 OECD countries during 1996-2005.

In model (1a), the estimated value of $\hat{\alpha}_1 = 0.883$ (t-statistic = 323.98) indicates that operating expense increases 0.88% per 1% increase in sales revenues. The estimated value of $\hat{\alpha}_2 = -0.083$ (t-statistic = -17.09) implies that operating expense decreases by 0.80% (= [0.883-

0.083]/100) for a 1% decrease in sales revenue, consistent the sticky behavior of SG&A costs documented in prior studies.

Model (1b) includes measures of four labor market characteristics we consider as well as five control variables identified by previous studies and is used to test H1-H4. The results show that the coefficients on all four labor market variables are of the predicted sign and highly significant. Specially, the coefficient estimate on trade union density (TUD) is -0.003 (t-statistic = -9.08), indicating that operating expense is more sticky in countries with larger shares of union members and thus presumably greater union bargaining power, consistent with the prediction of H1. Thus, a 10% increase in labor union density rate results in an average increase of cost stickiness of 0.3% for operating expense. Consistent with H2, the coefficient on the bargaining centralization and coordination (BCC) variable is positive and significant ($\hat{\alpha}_9 = 0.054$, t-statistic = 6.25), indicating that more centralized and coordinated collective bargaining systems reduce cost stickiness, offsetting the effect of trade union bargaining power on the flexibility of firms' resource adjustment. With regard to the effect of unemployment benefit levels, our find a significant positive coefficient on BNF ($\hat{\alpha}_{10} = 0.001$, t-statistic = 3.79), indicating that firms in countries with comparatively higher levels of unemployment benefits exhibit less operating cost stickiness. This finding supports the prediction of H3. Finally, we find evidence consistent with the hypothesis that that countries with stricter employment protection legislation tend to have higher degree of cost stickiness: the estimated coefficient on the strickvariable EPL is negative and significant ($\hat{\alpha}_{11} = -0.065$, t-statistic = -7.07).

In addition to the above results, coefficients on the four control variables DEC_{t-1} , GDP, AINT, and EINT are all significant and have signs consistent with findings based on

SG&A costs of U.S. firms documented in prior research (Anderson et al. 2003). Contrary to the findings of Calleja et al. (2006), however, we find that operating costs are less sticky for firms in civil-law countries than in common-law countries, evidenced by the negative and significant coefficient on the common-law dummy variable (LAW) ($\hat{\alpha}_7 = -0.135$, t-statistic = 5.37). Several factors may help explain this difference. First, our different results could potentially be attributed to the fact that we collect data from a different source (Compustat Global & Emerging Markets vs. Thomson Banker One) which yields a much larger sample (34,487 vs. Calleja et al.'s 26,983 firm-year observations for France, Germany, U.K., and U.S.). Second, our analysis estimates the *marginal effect* of common-law systems versus civil-law systems after controlling for firm-level and labor market related determinants of cost stickiness, whereas Calleja et al. (2006) ignore the potentially confounding effect of these variables.⁶ Our findings thus underscore the importance of controlling for correlated omitted variables (e.g., labor market characteristics) in analyzing the effect of other country-specific variables on cost stickiness.

4.3 Robustness Check

Our test results reported in Table 4 have shown that, based on a broad sample of firms, the degree of cost stickiness across 19 OECD countries are significantly associated with labor market characteristics as we hypothesized. To evaluate the robustness of our findings, we divide our original data into two sets of mutually exclusive sub-samples and estimate model (1b) on these sub-samples separately. The first set is based on industry groupings: one sub-sample consisting of firms in broadly defined service sectors (4-digit SIC above 4000,

⁶ For our sample of 19 countries, we find that the common-law dummy variable (LAW) is significantly correlated with three labor market characteristics (BCC, BNFT, and EPL), with correlation coefficients ranging from -0.59 to -0.64.

excluding financial firms) and the other consisting of non-service firms (4-digit SIC below 4000); the second set is based on the level of national wealth defined as per capita GDP (on a purchasing power parity basis), dividing the 19 OECD countries into a group with relatively high per capita GDP (9 countries) and another with relatively low per capita GDP (10 countries).⁷ The rationale behind these robustness tests stems from the conjecture that our hypotheses about the impact of labor market characteristics on cost behavior pertain to (1) both service and non-service firms, and (2) both countries with relatively wealthy economies and those without (among OECD countries). Therefore, we expect our findings to be largely robust to estimations using these sub-samples.

The results are reported in Table 5. Of the total 65,691 firm years in the original sample, about 39% (25,786 observations) belong to the service sector. For both service and non-service firms, the coefficients on all four labor market variables are of the predicted sign and significant, confirming the robustness of our findings with respect to industry groupings. Qualitatively similar results are also obtained when we estimate model (1b) using sample firms from the top nine countries and those from the remaining ten countries (ranked in per capita GDP), respectively. Coefficients on all four labor market variables are of the predicted sign and all but one are significant at the 10%.

5. Conclusions

In this study we investigate the relationship between institutional arrangements of labor markets in different countries and asymmetric cost behavior for firms operating in these

⁷ The countries comprising the “high GDP” group include U.S., Norway, Ireland, Switzerland, Denmark, Austria, Canada, the Netherlands, and Australia (National Accounts of OECD Countries, 2003).

countries. Specifically, we focus on cost stickiness; when costs are sticky, they increase more with an increase in sales than they decrease with a decrease in sales of the same magnitude. We posit that labor market characteristics, such as the form of collective bargaining of labor contracts, the level of unemployment benefits, and the strictness of employment protection legislation, systematically shape firms' decisions in adjusting labor resources when they face adverse external demand shocks. We hypothesize that the differences in the speed of downward labor adjustment as a result of constraints imposed by economy-wide structural forces would lead to observable differences in the degree of cost stickiness across countries.

Evidence from our examination of a large sample of firms in OECD countries in the past decade provides strong empirical support for our hypothesis that labor market characteristics are important determinants of across-country variations in the degree of cost stickiness. Our estimation results are consistent with the notion that greater union power causes less complete downward labor adjustment, leading to more pronounced cost stickiness. This effect, however, tends to be alleviated if collective bargaining is carried out in a more centralized fashion and is better coordinated among bargaining parties. In addition, we find that a higher level of unemployment benefits leads to less stickiness in operating expense, while stricter employment protection legislation has the opposite effect on stickiness. Taken together, our analysis confirms that labor market characteristics have a significant effect on the degree of cost stickiness.

Our study is perhaps the first to explicitly consider and test the link between cost behavior and economy-wide structural variables. More broadly, our study advances the understanding of cost behavior. It supports the theoretical framework underlying the recent research on cost stickiness that asserts that costs do not change automatically with changes in

volume. This theoretical framework is built on the basic premise that cost behavior is determined by firms' deliberate decisions about resource adjustment trading off adjustment costs against slack resource costs. If this premise is correct then the degree of cost stickiness should be influenced by not only firm-specific variables, but also economy-wide forces that shape managers' perceptions about the cost of adjustments in labor resources. A deeper understanding of cost behavior in general and of cost stickiness in particular, therefore, requires a comparative analysis of samples of firms from multiple countries to estimate the impact of economy-wide structural variables on cost behavior. We contribute to the rigorous development of this literature by providing comparative statistics on cost stickiness for 19 industrialized countries and then demonstrating that cross-country variations are significantly and systematically associated with labor market characteristics as hypothesized based on prior research in labor economics.

References

Aidt, T. and Z. Tzannatos. 2002. Unions and Collective Bargaining, Economic Effects in a Global Environment. The World Bank, Washington DC, United States.

Anderson, M., R. Banker, and S. Janakiraman. 2003. Are selling, general, and administrative costs “sticky”? *Journal of Accounting Research* 41 (1): 47-63.

Anderson, M., R. Banker, R. Huang, and S. Janakiraman. 2006. Cost Behavior and Fundamental Analysis of SG&A Costs. *Journal of Accounting, Auditing, and Finance*. Forthcoming.

Balakrishnan, R., M. J. Peterson, and N. S. Soderstrom. 2004. Does capacity utilization affect the “stickiness” of cost? *Journal of Accounting, Auditing and Finance* 19 (3): 283-299

Booth, A., M. Burda, L. Calmfors, D. Checchi, R. Naylor, and J. Visser. 2000. What Do Unions Do in Europe? A Report for the Fondazione Rodolfo DeBenedetti, Milan.

Borjas, G. J. 2005. *Labor Economics*. 3rd Edition. McGraw-Hill Irwin.

Bover, O, M. Arellano, and S. Bentolila. 2002. Unemployment duration, benefit duration and the business cycle. *Economic Journal* (112): 223-265.

Calleja, K., M. Steliaros, and D. C. Thomas. 2006. A note on cost stickiness: Some international comparisons. *Management Accounting Research*, forthcoming.

Calmfors, L. 1993. Centralization of wage bargaining and macroeconomic performance: A survey. OECD Economics Department Working Papers, No. 131, OECD, Paris.

Calmfors, L. and J. Driffill. 1988. Bargaining structure, corporatism and macroeconomic performance. *Economic Policy* 3 (1):14-61.

Carling, K., P-A. Edin, A. Harkman, and B. Holmlund. 1996. Unemployment duration, unemployment benefits and labor market programs in Sweden. *Journal of Public Economics* 59: 313-34.

Carling, K, B. Holmlund, and A. Vejsiu. 1999. Do Benefit Cuts Boost Job Findings? Swedish Evidence from the 1990s'. Swedish Office of Labor Market Policy Evaluation, Working Paper 1999:8, Uppsala.

Cooper, R., and R. S. Kaplan. 1992. Activity based cost systems: Measuring the cost of resource usage. *Accounting Horizons* 6: 1-13.

Ebbinghaus, B. and J. Visser. 2000. The Development of Trade Unions in Western Europe Since 1945. Palgrave Macmillan.

Elmeskov, J., J. P. Martin, and S. Scarpetta. 1998. Key lessons for labor market reforms: Evidence from OECD countries' experiences. *Swedish Economic Policy Review* 5 (2): 205-52.

Feldstein, M. 1976. Temporary layoffs in the theory of unemployment. *Journal of Political Economy* 84: 937-958.

Flanagan, R. J. 1999. Macroeconomic performance and collective bargaining: An international perspective. *Journal of Economic Literature* 37 (September): 1150-1175.

Ham, J. and S. Rea. 1987. Unemployment insurance and male unemployment duration in Canada. *Journal of Labor Economics* 5: 325-53.

Holmlund, B. 1998. Unemployment insurance in theory and practice. *Scandinavian Journal of Economics* 100 (1): 113-41.

Hunt, J. 1995. The Effect of Unemployment Compensation on Unemployment Duration in Germany. *Journal of Labor Economics* (13): 88-120.

Katz, L. and B. Meyer. 1990. The impact of potential duration of unemployment benefits on the duration of unemployment. *Journal of Public Economics* 41: 45-72.

La Porta, R, F. Lopez-de-Silanes, A. Shleifer, and R. Vishny. 1998. Law and Finance. *Journal of Political Economy* 106 (6): 1113-1155.

Layard, R., S. Nickell, and R. Jackman. 1991. *Unemployment: Macroeconomics performance and the labor market*. Oxford: Oxford University Press.

Long, V. N. and H. Siebert. 1983. Layoff restraints and the demand for labor. *Zeitschrift fur die gesamte Staatswissenschaft* 139 (4): 612-624.

Medeiros, O. R., and P. S. Costa. 2005. Cost stickiness in Brazilian firms. Working paper.

Meyer, B. 1990. Unemployment insurance and unemployment spells. *Econometrica* (58): 757-782.

Meyer, B. 1995. Lessons from the US unemployment insurance experiments. *Journal of Economic Literature* 33: 91-131.

Millard, S. P. and D. T. Mortensen. 1997. The unemployment and welfare effects of labor market policy: A comparison of the U.S. and U.K. In D. Snower and G. de la Dehesa (eds.), *Unemployment Policy: Government Options for the Labor Market*. Center for Economic Policy Research, Cambridge: University Press.

Nickell, S. 1982. The determinants of equilibrium unemployment in Britain. *Economic Journal* 92: 555-575.

Nickell, S. 1997. Unemployment and labor market rigidities: Europe versus North America. *Journal of Economic Perspectives* 11 (3): 55-74.

Nickell, S., and R. Layard. 1999. Labor market institutions and economic performance. *Handbook of Labor Economics* 3, Amsterdam: North Holland.

Nickell, S., L. Nunziata, and W. Ochel. 2005. Unemployment in the OECD since the 1960s: What do we know? *The Economic Journal* 115 (January): 1-27.

Noreen, E., and N. S. Soderstrom. 1994. Are overhead costs strictly proportional to activity? Evidence from hospital service departments. *Journal of Accounting and Economics* 17: 255-78.

Noreen, E., and N. S. Soderstrom. 1997. The accuracy of proportional cost models: Evidence from hospital service departments. *Review of Accounting Studies* 2: 89-114.

OECD, Employment Outlook. Paris: OECD, 1997.

OECD, Employment Outlook. Paris: OECD, 2004.

OECD. The *OECD Jobs Study — Facts, Analysis, Strategies*. Paris: OECD, 1994.

Oswald, A. J. 1987. Efficient contracts are on the labor demand curve: Theory and facts. London School of Economics Center for Labor Economics, Discussion Paper no. 284.

Pissarides, C. A. 1999. Policy influences on unemployment: The European experience. *Scottish Journal of Political Economy* 46 (4): 389-418.

Scarpetta, S. 1996. Assessing the role of labor market policies and institutional settings on unemployment: A cross country study. *OECD Economic Studies*, vol. 26: 43-98.

Siebert, H. 1997. Labor market rigidities: At the root of unemployment in Europe. *Journal of Economic Perspectives* 11 (3): 37-54.

Soskice, D. 1990. Wage Determination: The Changing Role of Institutions in Advanced Industrialized Countries. *Oxford Review of Economic Policy* 6 (4).

Standard & Poor. 2003. Standard & Poor's Compustat[®] User's Guide.

Tople, R. 1983. On layoffs and unemployment insurance. *American Economic Review* 73: 541-559.

Weidenmeir, M. L., and C. Subramaniam. 2003. Additional evidence on the sticky behavior of costs. Working paper. Texas Christian University.

Table 1
Labor Market Characteristics of 19 OECD Countries

	Trade Union Density (TUD) ^a		Centralization (CEN) ^b	Coordination (COO) ^c	Unemploy. Replace. Ratio (RATIO) ^d	Benefits Duration Index (DUR) ^e	Employment Protection Legislation (EPL) ^f
	1990	2000					
Australia	0.40	0.25	2	2	0.25	1.00	1.2
Austria	0.47	0.37	3	4	0.42	0.68	2.2
Belgium	0.54	0.56	3	4.5	0.46	0.78	2.2
Canada	0.33	0.28	1	1	0.49	0.42	0.8
Denmark	0.75	0.74	2	4	0.66	1.00	1.4
Finland	0.72	0.76	5	5	0.54	0.63	2.1
France	0.10	0.10	2	2	0.59	0.47	3.0
Germany	0.31	0.25	1	1	0.37	0.75	2.5
Ireland	0.51	0.38	4	4	0.35	0.77	0.9
Italy	0.39	0.35	2	4	0.60	0.00	2.7
Japan	0.25	0.22	1	4	0.37	0.00	2.0
Netherlands	0.25	0.23	3	4	0.70	0.64	2.1
Norway	0.59	0.54	4.5	4.5	0.62	0.60	2.7
Portugal	0.32	0.24	4	4	0.65	0.58	3.7
Spain	0.11	0.15	3	3	0.63	0.29	2.9
Sweden	0.80	0.79	3	3	0.74	0.02	2.2
Switzerland	0.24	0.18	2	4	0.74	0.31	1.1
U.K.	0.39	0.31	1	1	0.17	0.96	0.6
U.S.	0.15	0.13	1	1	0.29	0.22	0.2

^a Trade union density TUD is the proportion of wage and salary workers that are union members. Data are from OECD (2004, Table 3.3). Figures reported are for 1999 and 2000.

^b The centralization index CEN measures the degree of collective bargaining centralization for a country. CEN ranges from 1 to 5, with higher score representing higher degree of centralization in collective bargaining (See the Appendix for details of its measurement). Data are from OECD (2004, Table 3.5). Figures reported are for the period 1995-2000.

^c The coordination index COO measures the degree of collective bargaining coordination for a country. COO ranges from 1 to 5, with a higher score representing higher degree of bargaining coordination (See the Appendix for details of its measurement). Data are from OECD (2004, Table 3.5). Figures reported are for the period 1995-2000.

^d Data are from Nickell, Nunziata, and Ochel (2005, Table 2). RATIO is calculated based on the replacement ratio in the first year of an unemployment spell averaged over three family types, with original data reported by OECD for 1999.

^e Data are from Nickell, Nunziata, and Ochel (2005, Table 2). DUR is calculated as equal to $0.6 * (\text{replacement rate in 2}^{\text{nd}} \text{ and 3}^{\text{rd}} \text{ year of a spell}) + 0.4 * (\text{replacement rate in 4}^{\text{th}} \text{ and 5}^{\text{th}} \text{ year of a spell}) \div (\text{replacement rate in 1}^{\text{st}} \text{ year of a spell})$, with original data reported by OECD for 1999.

^f EPL is based on scores on the overall strictness of protection against dismissals for regular employment. EPL ranges from 0 to 6, with a higher score representing greater strictness (See the Appendix for details of its measurement). Data are from OECD (2004, Table 2.A2.4). Figures reported are for late 1990s.

Table 2
Correlations ^a of Four Labor Market Characteristics
for 19 OECD Countries
(p-value in the parentheses)

<i>Variable</i>	<i>TUD</i> ^b	<i>BCC</i> ^c	<i>BNFT</i> ^d	<i>EPL</i> ^e
<i>TUD</i>		0.483 (0.036)	0.351 (0.141)	0.040 (0.871)
<i>BCC</i>	0.480 (0.038)		0.542 (0.017)	0.568 (0.011)
<i>BNFT</i>	0.166 (0.497)	0.555 (0.014)		0.421 (0.073)
<i>EPL</i>	-0.029 (0.906)	0.458 (0.049)	0.442 (0.058)	

^a Pearson (Spearman) correlations are above (below) the diagonal.

^b TUD is the trade union density, as reported in Table 1

^c Bargaining centralization and coordination index (BCC) is the average of the centralization score (CEN) and the coordination score (COO) reported in Table 1.

^d Overall unemployment benefits ratio. BNFT is constructed based the replacement ratio (RATIO) and the duration index (DUR) reported in Table 1 in the following way:

$$\text{BNFT} = \text{RATIO} + \text{RATIO} * \text{DUR}$$

$$= \text{replacement rate in 1}^{\text{st}} \text{ year} + 0.6 * (\text{replacement rate in 2}^{\text{nd}} \text{ and 3}^{\text{rd}} \text{ year})$$

$$+ 0.4 * (\text{replacement rate in 4}^{\text{th}} \text{ and 5}^{\text{th}} \text{ year})$$

BNFT is the weighted sum of unemployment benefits as a percentage of regular income in the first five years of an unemployment spell

^e EPL is strictness index of employment protection legislation, as reported in Table 1

Table 3
Sample Distribution and Descriptive Statistics

	Number of unique firms	Number of firm-years	Median Δ Sales	Median Δ Op. Exp.	Estimated Cost Stickiness ^{a b}
Australia	276	837	0.068	0.070	-0.326***
Austria	104	473	0.050	0.055	-0.088***
Belgium	113	490	0.061	0.064	0.008
Canada	394	1,481	0.085	0.082	-0.176***
Denmark	161	904	0.058	0.060	-0.029
Finland	128	642	0.074	0.075	0.015
France	746	3,414	0.062	0.061	-0.032***
Germany	724	3,243	0.037	0.036	-0.073***
Ireland	57	286	0.129	0.133	-0.090**
Italy	239	1,058	0.060	0.056	-0.004
Japan	3,501	19,789	0.018	0.013	0.010
Netherlands	216	1,029	0.054	0.054	-0.014**
Norway	160	665	0.076	0.081	-0.064**
Portugal	58	237	0.069	0.071	-0.086*
Spain	147	695	0.072	0.076	-0.029
Sweden	304	1,419	0.068	0.068	-0.198***
Switzerland	201	1,199	0.043	0.046	-0.009
U.K.	1,387	6,757	0.056	0.059	-0.071***
U.S.	3,750	21,073	0.078	0.077	-0.156***
Full sample	12,666	65,691	0.049	0.047	-0.083***

^a Country-specific cost stickiness is the estimated coefficient on each country dummy variables in the following augmented version of model (1a)

$$\log\left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}}\right] = \alpha_0 + \alpha_1 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] + \sum_{i=1}^{19} \alpha_{i+1} * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC} * \text{Country}_i + \varepsilon$$

where Country_i is a dummy variable for country i (i = 1, ..., 19).

^b ***, **, * indicate significance at the 1%, 5% and 10% levels (based on one-tailed tests)

Table 4
Results of Estimating Regression Models
Based on Sample Firms from 19 OECD Countries (1996-2005)
(p-value in the parentheses) ^a

$$\begin{aligned}
 \text{Model} \quad \log \left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}} \right] = & \alpha_0 + \alpha_1 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] + \alpha_2 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t + \alpha_3 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{DEC}_{t-1} \\
 & + \alpha_4 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{GDP} + \alpha_5 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{AINT} + \alpha_6 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{EINT} \\
 & + \alpha_7 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{LAW} + \alpha_8 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{TUD} + \alpha_9 * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{BCC} \\
 & + \alpha_{10} * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{BNFT} + \alpha_{11} * \log \left[\frac{\text{SALE}_t}{\text{SALE}_{t-1}} \right] * \text{DEC}_t * \text{EPL} + \varepsilon
 \end{aligned}$$

Model (1a) sets $\alpha_j = 0$ for $j \geq 3$.

Model (1b) includes all terms.

	Coeff.	Exp. Sign	Model (1a)	Model (1b)
Intercept	α_0		0.004 (0.000)	0.005 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right]$	α_1		0.883 (0.000)	0.878 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t$	α_2		-0.083 (0.000)	-0.286 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{DEC}_{t-1}$	α_3	+		0.058 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{GDP}$	α_4	-		-0.009 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{AINT}$	α_5	-		-0.033 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{EINT}$	α_6	-		-0.027 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{LAW}$	α_7	+		-0.135 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{TUD}$	α_8	-		-0.003 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{BCC}$	α_9	+		0.054 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{BNFT}$	α_{10}	+		0.001 (0.000)
$\log \left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}} \right] * \text{DEC}_t * \text{EPL}$	α_{11}	-		-0.065 (0.000)
Adj. R ²			0.7603	0.7639
N			65,691	65,691

Table 4 (Continued)

^a Reported *p*-values are based on one-sided tests when the expected sign is indicated.

Variable Definitions:

OPEX	=	Operating expense (Compustat Global #3).
SALES	=	Net sales revenue (Compustat Global #1).
DEC	=	Sales decline dummy variable, which takes 1 if sales revenue is lower than the previous year, and 0 otherwise.
GDP	=	Annual real growth rate of Gross Domestic Product
AINT	=	Fixed asset intensity, measured as logarithm of the ratio of total fixed assets (Compustat Global #76) to net sales revenue.
EINT	=	Employee intensity, measured as logarithm of the ratio of number of employees (Compustat Global #162) to net sales revenue.
LAW	=	A dummy variable equal to 1 for common-law countries (Australia, Canada, Ireland, U.K., and U.S.), and 0 for civil-law countries.
TUD	=	Trade union density, defined in Table 1.
BCC	=	Index of collective bargaining centralization and coordination, defined in Table 1.
BNFT	=	Overall unemployment benefit rate, defined in Table 1.
EPL	=	Strictness of employment protection legislation, defined in Table 1.

Table 5
Results of Estimating Model (1b) for Sub-Samples Based on
Industry Groupings and Levels of Per Capita GDP (1996-2005)
(p-value in the parentheses) ^a

$$\begin{aligned}
 \text{Model} \quad \log\left[\frac{\text{OPEX}_t}{\text{OPEX}_{t-1}}\right] &= \alpha_0 + \alpha_1 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] + \alpha_2 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t + \alpha_3 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{DEC}_{t-1} \\
 &+ \alpha_4 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{GDP} + \alpha_5 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{AINT} \\
 &+ \alpha_6 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{EINT} + \alpha_7 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{LAW} \\
 &+ \alpha_8 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{TUD} + \alpha_9 * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{BCC} \\
 &+ \alpha_{10} * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{BNFT} + \alpha_{11} * \log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{EPL} + \varepsilon
 \end{aligned}$$

		Sub-Samples Based on Industry Groupings		Sub-Samples Based on Levels of Per Capita GDP	
		Service	Non-Service	High GDP	Low GDP
Intercept	α_0	0.004 (0.000)	0.005 (0.000)	0.010 (0.000)	0.001 (0.085)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right]$	α_1	0.908 (0.000)	0.856 (0.000)	0.848 (0.000)	0.917 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t$	α_2	-0.329 (0.000)	-0.283 (0.000)	-0.376 (0.000)	-0.249 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{DEC}_{t-1}$	α_3	0.038 (0.001)	0.068 (0.000)	0.052 (0.000)	0.057 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{GDP}$	α_4	-0.025 (0.000)	-0.000 (0.0)	-0.016 (0.000)	-0.000 (0.927)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{AINT}$	α_5	-0.003 (0.236)	-0.065 (0.000)	-0.053 (0.000)	-0.016 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{EINT}$	α_6	-0.038 (0.000)	-0.019 (0.000)	-0.047 (0.000)	-0.027 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{LAW}$	α_7	-0.093 (0.019)	-0.147 (0.000)	-0.127 (0.041)	0.043 (0.269)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{TUD}$	α_8	-0.004 (0.000)	-0.002 (0.000)	-0.003 (0.000)	-0.003 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{BCC}$	α_9	0.043 (0.001)	0.048 (0.000)	0.014 (0.260)	0.083 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{BNFT}$	α_{10}	0.002 (0.000)	0.001 (0.052)	0.002 (0.002)	0.002 (0.000)
$\log\left[\frac{\text{SALES}_t}{\text{SALES}_{t-1}}\right] * \text{DEC}_t * \text{EPL}$	α_{11}	-0.083 (0.000)	-0.035 (0.001)	-0.030 (0.036)	-0.140 (0.000)
Adj. R ²		0.7535	0.7718	0.7103	0.8026
N		25,786	39,905	27,947	37,744

Appendix

(a) OECD measures **collective bargaining centralization** using the following 5-point ordinal score system:

- 1 = Company and plant level predominant
- 2 = Combination of industry and company/plant level, with an important share of employees covered by company bargains.
- 3 = Industry-level predominant.
- 4 = Predominantly industrial bargaining, but also recurrent central-level agreements.
- 5 = Central-level agreements of overriding importance.

(b) OECD measures **collective bargaining coordination** using the following 5-point ordinal score system:

- 1 = Fragmented company/plant bargaining, little or no coordination by upper-level associations.
- 2 = Fragmented industry and company-level bargaining, with little or no pattern-setting.
- 3 = Industry-level bargaining with irregular pattern-setting and moderate coordination among major bargaining actors.
- 4 = a) informal coordination of industry and firm-level bargaining by (multiple) peak associations;
b) coordinated bargaining by peak confederations, including government-sponsored negotiations (tripartite agreements, social pacts), or government imposition of wage schedules;
c) regular pattern-setting coupled with high union concentration and/or bargaining coordination by large firms;
d) government wage arbitration.
- 5 = a) informal coordination of industry-level bargaining by an encompassing union confederation;
b) coordinated bargaining by peak confederations or government imposition of a wage schedule/freeze, with a peace obligation.

(c) OECD measures the overall **strictness of protection legislation** against dismissals for workers with regular employment using a scale of 0-6, with higher score representing greater strictness. The indicator is constructed as the average of the following three indices with equal weight:

1. Procedural inconveniences;
2. Notice and severance pay for no-fault individual dismissals;
3. Difficulty of dismissal, which is further based on four criteria: (a) definition of unfair dismissal; (b) trial period; (c) compensation; and (d) reinstatement.