

STG Resilience Papers

Health System Resilience in the Context of the COVID-19 Pandemic: The Gap Between Eastern and Western Europe

*Tamara Popic and Alexandru D. Moise, both Max Weber Fellows,
European University Institute, Florence, Italy*

May 2021

Summary

- It remains unclear which specific aspects of the health system play the most important role in the handling of the COVID-19 pandemic and whether there are regional differences among healthcare systems that explain different effects of the pandemic on countries across Europe.
- This policy brief builds on the analysis of links between three institutional dimensions of health systems – financial input, infrastructure input and workforce input – and the number of excess deaths in 30 Eastern and Western European countries during the first and the second waves of the pandemic. This analysis provides three main findings.
- Firstly, higher monetary input into the healthcare system, characteristic for the countries in Western Europe coming from public sources is linked to a lower number of excess deaths. Instead, higher monetary input coming from private sources, patients' out-of-pocket payments for healthcare, is linked to a higher number of deaths in Eastern Europe. Secondly, a higher input of healthcare workforce in form of general practitioners and nurses in Western Europe is linked to lower number of excess deaths. Thirdly, these health system characteristics have a stronger impact during periods where infection rates are high.
- This policy brief specifies the following two policy recommendations, which hold particularly for Eastern Europe. One is that in order to strengthen healthcare system resilience to the present and future pandemics, countries should increase public and reduce private spending for healthcare services. Another recommendation is that healthcare systems should strengthen their primary care by increasing the numbers of general practitioners and by increasing the supply of nurses. In the absence of these, governments need to rely more unilaterally on costly restrictive measures in order to prevent the health system from being overrun.

1. Health System Resilience During the Pandemic

Government [lockdown measures](#) have been the focus of efforts to understand the resilience of countries in Europe to the effects of the current COVID-19 pandemic. Countries, or even regions of Europe, were praised for being exceptionally eager to introduce strict lockdowns and hence offset the deadly effects of the SARS-CoV-2 virus for their population. In [Eastern Europe](#), by introducing very strict lockdown measures early on during the first wave of the pandemic, countries in the region had significantly fewer deaths related to COVID-19 than their Western counterparts. However, as the pandemic unfolded, it became clear that imposing strict lockdowns on the population is a difficult policy option, generating high [economic costs](#). This was best showcased by the policy shift in Eastern Europe, where the economically more vulnerable countries of the region during the second wave of the pandemic relaxed their lockdowns and shifted to less restrictive prevention measures. The effect was, however, deadly as countries such as the [Czech Republic](#) quickly became Europe's leader in COVID-19 related deaths.

This shift in policy approach of Eastern European governments should not be seen as too surprising. It reflects the more general [dilemma](#) facing policymakers in the context of the present pandemic, which is the dilemma of how to increase countries' capacities for handling the pandemic without resorting to restrictive prevention measures that risk generating high economic costs.

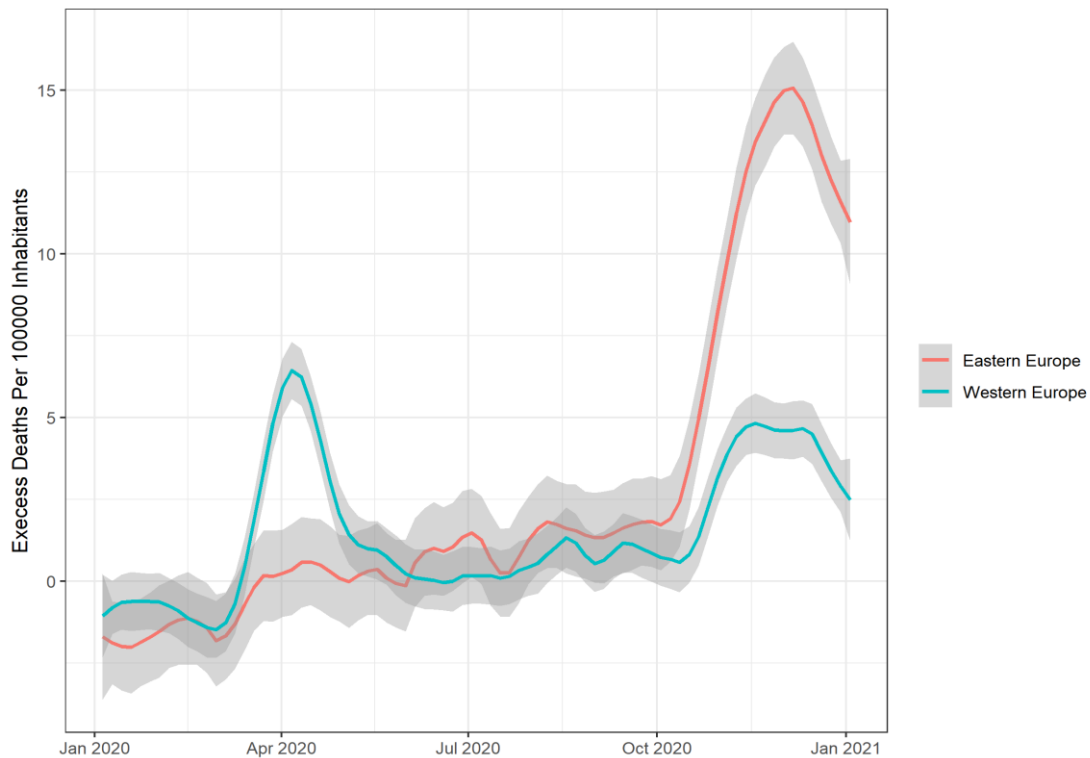
This policy brief inquires into how European countries can improve their preparedness against pandemics by strengthening the resilience of their health systems. The analysis of the role of the health system in battling the effects of the COVID-19 pandemic has received less attention compared to government lockdown measures. However, continuous media reports on the lack of healthcare system resources such as [hospital infrastructure](#) or [healthcare workforce](#) in Eastern Europe suggest that the capacities of health systems has played a key role in how successfully the countries reacted to the surges in infections. In absence of cross-country comparisons there is still little understanding of the relative importance of the different institutional dimensions of healthcare systems for battling the pandemic effects and whether there is a regional aspect of the healthcare system that could explain why some regions of Europe have done better than the other in handling the pandemic.

2. COVID-19 Excess Deaths Differentials: Regional Perspective

Figure 1 shows how Eastern Europe was spared from the first wave but overtook Western Europe in the second wave in terms of deaths. While a large part of this discrepancy can be attributed to the higher number of cases in Eastern Europe during the second wave, the question remains as to

whether the characteristics of the East European health systems contributed to higher mortality rates.

Figure 1. Excess deaths in Europe by region, East and West.



In order to better capture the complexity of the institutional design of healthcare systems and to study its relationship with pandemic outcomes, we use a conceptualization which defines different dimensions of the healthcare service 'production process' (see Wendt et al. 2010). This conceptualization distinguishes between three different dimensions of inputs into the healthcare system: (1) *Monetary input*, which accounts for the financing of healthcare services; (2) *Infrastructure input*, which reflects the supply of healthcare facilities, and (3) *Workforce input*, which reflects the supply of healthcare staff. Importantly, all three dimensions, although causally related, allow us to capture different aspects of the healthcare system design experienced by individuals in 'real time' and test the importance of each dimension for the population health outcomes in the pandemic context.

Various cross-national studies found evidence of strong correlations between specific aspects of the actual institutional arrangement of healthcare systems and the population health outcomes. They show that monetary input, in form of public spending on health correlates with better population health outcomes (Singh 2014; Bradley et al. 2016). A stronger workforce, which implies a high supply

of general practitioners have positive effects on health outcomes (Vogel and Ackerman 1998). While these studies suggest that characteristics of health systems matter for the overall health of the population, it is less clear if they would matter in a pandemic. The COVID-19 pandemic has caused a shift in the [epidemiological transition](#) as the dominant disease pattern of non-communicable diseases has been replaced by a majority of deaths caused by an infectious, communicable disease caused by the SARS-CoV-2 virus.

The purpose of our policy brief is thus to isolate each of these specific aspects of the health system and test their links with the different effects of the COVID-19 pandemic across countries and regions of Europe. In line with the literature but with adjustments for the specificities of the disease pattern, we expect population health outcomes to be affected by the institutional design of the healthcare system. More specifically, we expect higher public healthcare spending and more generous healthcare infrastructure to be associated with lower number of deaths and an overall lower case fatality rate. In respect to the third dimension, workforce, we expect lower deaths in healthcare systems with a higher number of doctors and nurses.

3. Evidence: The East-West Gap

Data

Existing data used for country comparisons of COVID-19 pandemic effects suffer from limitations (see Meyerovitz-Katz and Merone 2020). The comparisons based on commonly used indicators, such as [average fatality rates](#), face the issue of comparability as they use the officially reported cases and deaths by individual countries, which depend on the amount of testing and the definition of a COVID-19-related death, which varies from country to country.

In light of these limitations of official data on country-specific COVID-19 deaths, we use the excess mortality indicator developed by [The Economist](#). The indicator uses past mortality data to predict the number of deaths we would have expected in a certain period in the absence of COVID-19. Any excess deaths are then attributed to the pandemic. This data has two advantages. The first is that it captures deaths that are likely due to the SARS-CoV-2 virus but that otherwise escape national statistics if the person was not tested before or after they passed away. The second is that it creates a common definition for deaths that is comparable across countries. It is therefore much more likely to capture actual differences in how the virus affects different countries, as opposed to merely differences in the way that countries report deaths.

We use three additional data sources. Data on COVID-19 cases, testing and related measures such as the positivity rate of tests is taken from the [Johns Hopkins Center for Systems Science and Engineering \(CSSE\)](#). Data on government restrictive measures is taken from the [Oxford COVID-19 government response tracker \(OxCGRT\)](#). Lastly, data on health system characteristics is taken from the [European Health for All database](#), of the World Health Organization (WHO).

Methods

In order to compare the effects of the pandemic on different countries, we construct a variety of measures to approximate the underlying case fatality rates. The main measure for the case fatality rate (presented in the main analysis and graphs below) was calculated with data on excess deaths adjusted for the number of cases. While this case fatality rate approximates the underlying probability that an infected individual dies in a particular country, it is sensitive to the number of cases that a country reports, which itself depends on the number of tests being carried out. In order to overcome this problem, we build additional measures which account for the number of tests, the test positivity rate and the number of individuals admitted to intensive care units. The conclusions of our analysis remain stable across these different measures.

In order to test the effects of various health system characteristics, we create three snapshots of our data, creating summary measures for the first (March to July 2020) and second (July 2020 to January 2021) wave of the pandemic, as well as an overall snapshot (up until January 2021). We build OLS regression models using excess deaths and case fatality rates as outcomes to test the impact of health system characteristics, while controlling for case numbers, demographics, and government stringency measures.

Results

With respect to financial input, the best predictor is overall health expenditure as proportion of GDP. More public health expenditure as a share of total health expenditure is linked with lower death rates (Figure 2). Conversely, more private expenditure coming from patients' out-of-pocket payments is linked to higher death rates (Figure 3). These patterns reveal that most Eastern European countries feature low public and high private spending on health which is correlated with high number of deaths. This suggests that both expenditure measures capture certain aspects of citizens' ability to access health services in the context of the pandemics, which is then linked to the overall effect of its impact on the population. More concretely, it suggests that countries with easier access to health

services for the general public, i.e. lower out-of-pocket payments for medical care, fare better in handling the SARS-CoV-2 patients.

Figure 2. Public Expenditure on Health and Excess Deaths

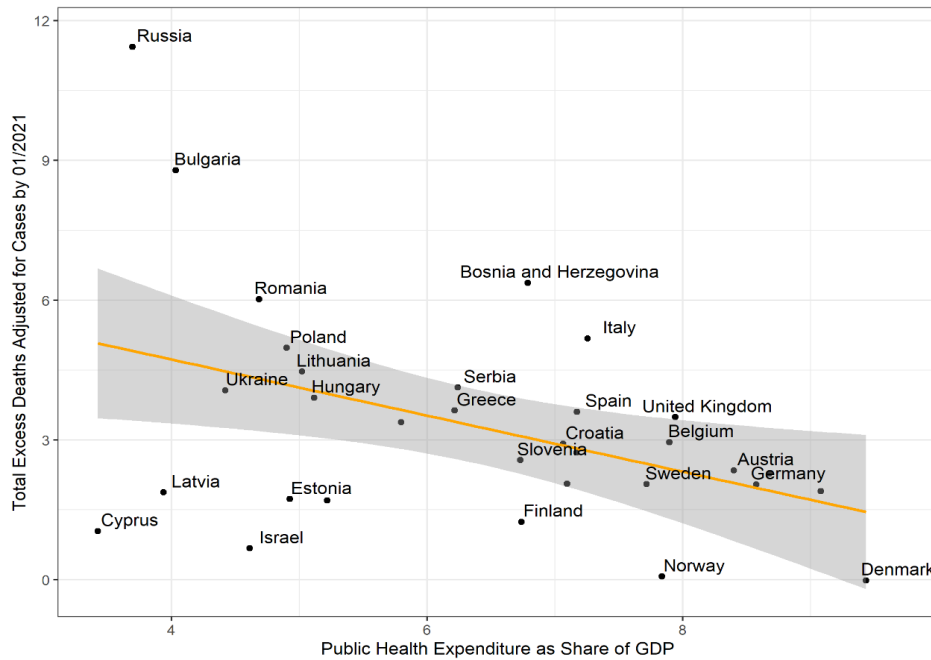
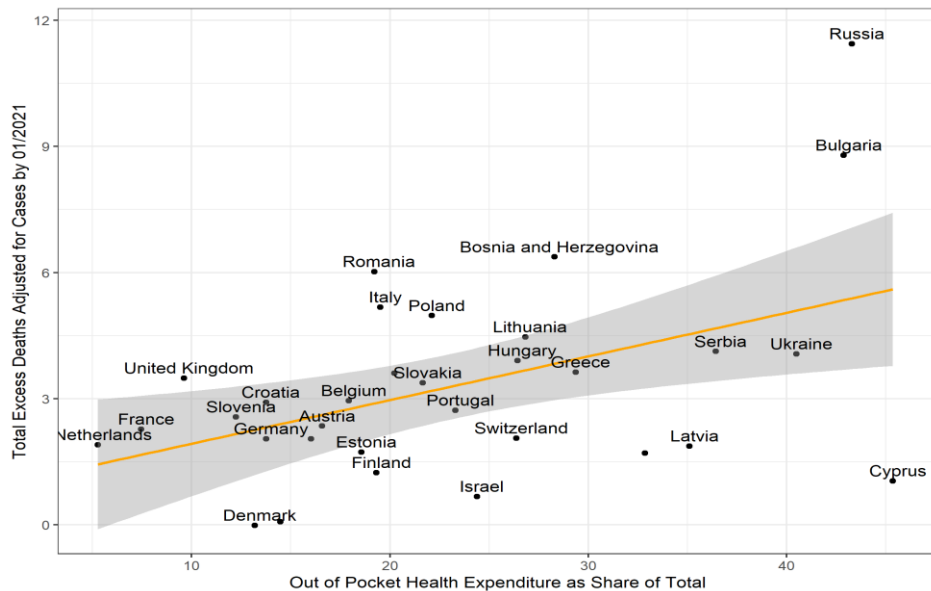


Figure 3. Out-Of-Pocket Expenditure on Health and Excess Deaths



The analysis on the workforce input dimension reveals a similar pattern. Countries with more nurses per capita, and to a lesser extent, more doctors per capita, fare better in overall mortality rates and case fatality rates. These results are intuitive since the nature of the pandemic was to put intense pressure on health personnel, stretching their capacity as more and more patients arrived into hospitals. Many of the countries with lower numbers of health workers continuously see these numbers shrinking, as nurses and doctors emigrate to other countries for higher pay and better working conditions. This had already put pressure on the health systems of these countries, the majority of them in Central and Eastern Europe, before the pandemic (Žuk et al. 2019). Indeed, the relationship between nursing personnel and excess deaths reveals similar difference between the two European regions – with lower number of nurses being linked to higher deaths in most Eastern as compared to Western European countries.

Figure 2. Nursing Personnel and Excess Deaths

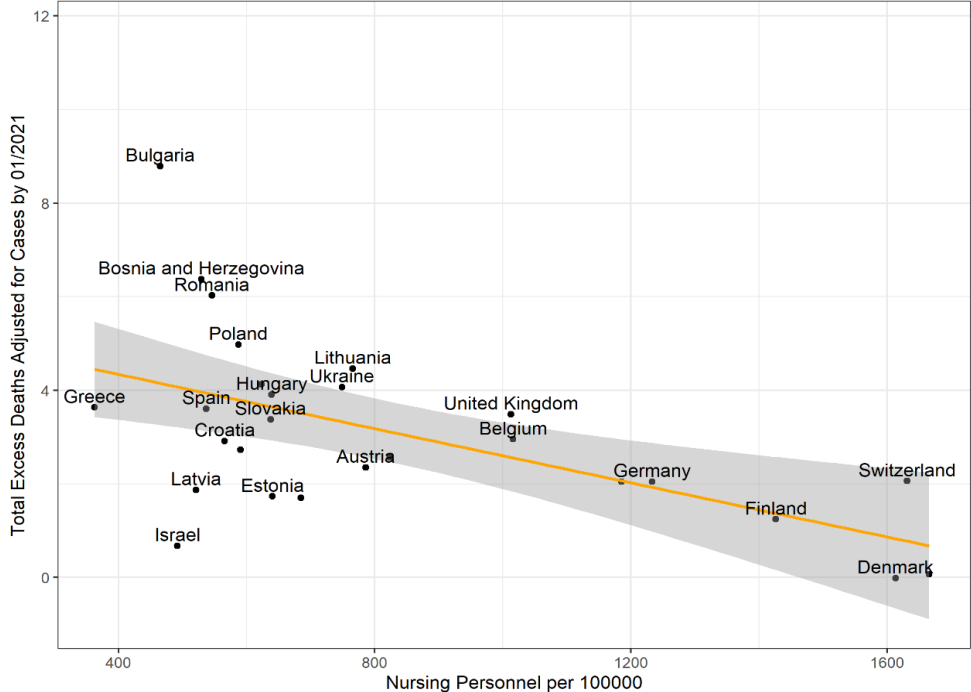
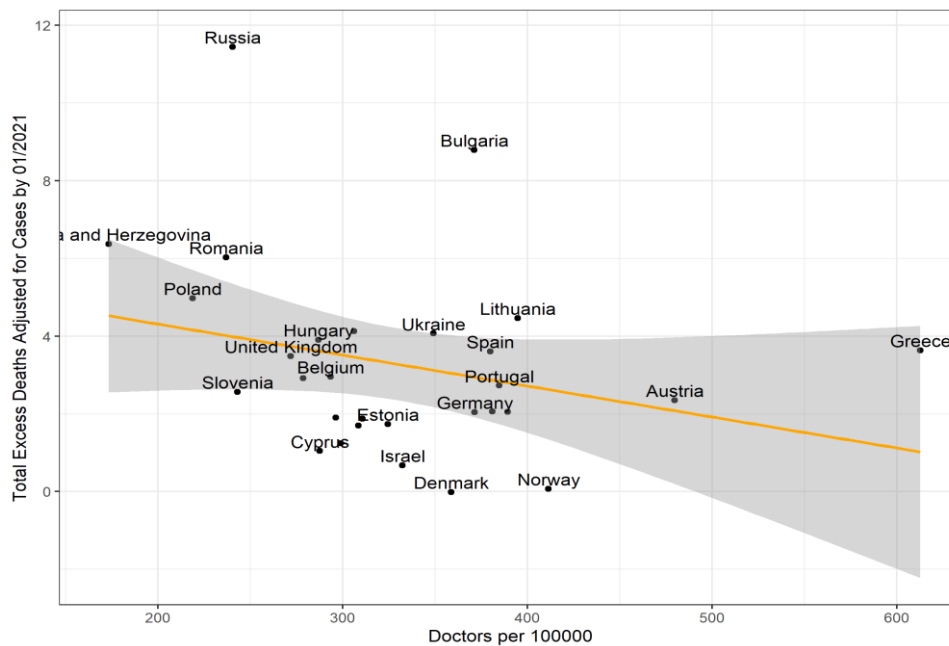


Figure 5. Doctors per 100000 and Excess Deaths



The final dimension that we look at, the infrastructure input, is less conclusive. The number of hospitals and hospital beds per capita do not seem to be related to the number of excess deaths. Nursing home beds, however, do seem to be predictive of fewer deaths. One possible reason for this unexpected finding might be that the quality, rather than the quantity of hospital infrastructure is what matters for handling of the pandemics. Specifically, the availability of ventilators and protective equipment, as well as the technical quality of the infrastructure overall, is likely to be more important than the quantity of available beds. Romania is a telling example. During the pandemic, in separate incidents, COVID-19 patients died during a [fire at a hospital](#), while in another cases patients died following [malfunctions of oxygen supply](#). Better data, which captures these dimensions, will be able to tell us if such incidents are likely to have a big impact in overall death rates.

The First and Second Waves – the Importance of Surges

The second wave of COVID-19 pandemics (approximately from July 2020 to January 2021), proved to be far more deadly than the first, in absolute terms. It seems that the second wave was also more deadly even when accounting for the increased number of cases. That is to say, it seems that the case fatality rate was higher in Europe during the second wave. This is despite the fact that countries had already [accumulated experience](#) in fighting the virus and had many months to prepare better responses.

Central and Eastern European countries again seem to be exemplary of this trend. While, as a group, they [passed the first wave with relatively few cases and deaths](#), they became the dominant hotspot

of the virus in Europe, and at times, in the world during the second. This suggests that severe restrictive measures before and during the first wave, protected the more fragile health systems of these countries. Having largely relaxed these measures during the second wave, their health systems were exposed and put under severe pressure. Our analysis shows that these countries have higher case fatality rates even after controlling for GDP, population age structure, testing, health system characteristics, and other factors. What this means is that there are likely additional factors and mechanisms which could explain why they were less able to care for patients. These might include the [insufficient tracking and tracing programs](#), especially of new virus variants, as well as other inefficiencies in health systems, including drug and equipment shortages, which we could not capture with current data.

This discrepancy between the first and the second waves suggests that the role of the health system becomes prominent once its capacities are pushed to their limits. While no country had to deal with a complete collapse of their system due to too many cases, the cracks in the systems of certain countries became more visible and resulted in foreseeable but avoidable deaths. The earliest example was Italy's Bergamo region at the very beginning of the pandemic. [The uncontrolled outbreak](#) quickly pushed [one of the best health systems](#) in Europe to its limits, and resulted in major losses of life.

4. Conclusions and Recommendation

Our analysis shows that the COVID-19 pandemic has exposed regional differences in the resilience of the European health systems. The pandemic reveals the Achilles heel of Eastern European health systems – lack of public funding for medical services and deficits in healthcare workforce. During the increased pressure posed by the current pandemic, these weaknesses are largely responsible for the higher case fatality rates caused by the SARS-CoV-2 virus in the region.

These findings point out that preventive public health measures, such as mandating mask usage and imposing restrictions on gatherings and mobility, are key to controlling case numbers and therefore the absolute number of deaths. However, beyond these measures, differences in resources and capacities of the healthcare systems are responsible for regional divide in the effects of the pandemic across Europe. This suggests that stronger health systems that allow easier access to the needed care and have more medical personnel, are better able to withstand the shock of a pandemic and care for patients in need.

Based on these findings, the key policy recommendation of this policy brief is that countries, and particularly countries of the Eastern European region should focus on strengthening their health systems through investments in public expenditure, removing financial barriers to access, and in developing and maintaining their health workforce. In the absence of such investments, governments need to protect their fragile health systems through harsher prevention measures, which come at higher economic costs.

References

- Bradley, E. H., Canavan, M., Rogan, E., Talbert-Slagle, K., Ndumele, C., Taylor, L. and Curry, L. A. (2016). Variation in health outcomes: the role of spending on social services, public health, and health care, 2000–09. *Health Affairs*, 35 (5).
- Meyerowitz-Katz, G. and Merone, L. (2020). A systematic review and meta-analysis of published research data on COVID-19 infection-fatality rates. *International Journal of Infectious Diseases* 101.
- Singh, S. R. (2014). Public health spending and population health: a systematic review. *American Journal of Preventive Medicine*, 47(5).
- Vogel, R. L. and Ackermann, R. J. (1998). Is primary care physician supply correlated with health outcomes?. *International journal of health services*, 28(1).
- Wendt, C., Kohl, J., Mischke, M. and Pfeifer, M. (2010). 'How Do Europeans Perceive Their Healthcare System? Patterns of Satisfaction and Preference for State Involvement in the Field of Healthcare', *European Sociological Review* 26.
- Żuk, P., Żuk, P. and Lisiewicz-Jakubaszko, J. (2019). Labour migration of doctors and nurses and the impact on the quality of health care in Eastern European countries: The case of Poland. *The Economic and Labour Relations Review*, 30 (2).