Episodes of Unemployment Reduction in Rich, Middle-Income, and Transition Economies

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Abstract

This paper studies the incidence and determinants of episodes of drastic unemployment reduction, defined as swift, substantial, and sustained declines in unemployment. Forty-three episodes are identified over a period of nearly three decades in 94 rich, middle-income, and transition countries. Unemployment reductions often coincide with an acceleration of growth and an improvement in macroeconomic conditions. Episodes are much more prevalent in countries with higher levels

of unemployment and, given unemployment, are more likely in countries with better regulation. An efficient legal system that enforces contracts expeditiously is particularly important for reducing unemployment. The results imply that while employment is largely related to the business cycle, better regulation reduces the likelihood of high unemployment and facilitates a more rapid recovery in the event unemployment builds up.

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1 Introduction

Job creation is one of the most pressing priorities around the world. Despite a rich literature on the determinants of unemployment,¹ defining a set of policies to achieve enduring unemployment reductions remains elusive. This paper adopts an empirical approach to address this question by examining the incidence and the determinants of episodes of drastic unemployment reductions, defined as swift, substantial and sustained drops in unemployment. More specifically, an episode is defined as a reduction in the unemployment rate over a four-year period of at least three percentage points and at least a quarter of its initial level that persists for a minimum of three years. In addition, we insist that episodes start with a strict decline in unemployment and rule out overlap between declines to avoid counting the same unemployment reduction spell as two separate episodes.

Episodes of unemployment reduction are quite common, and significantly more likely to occur in countries with better regulation. This result obtains using various alternative indicators of regulatory quality, and is robust to using alternative definitions of the filter used to identify reductions, alternative parameterizations of the filter, alternative estimation methods, and excluding episodes that are potentially driven by recovery from war or crisis. The results are also confirmed by Bayesian Model Averaging methods, which furthermore suggest that the efficacy of the legal system, enforcement of property rights, the control of corruption and business regulations are particularly important for reducing unemployment.

Unemployment reductions tend to coincide with an acceleration of GDP growth, as well as a surge in trade, higher investment, and lower government spending as a share of GDP. The regulatory environment also tends to improve as unemployment declines. Although causation is difficult to establish, the coincidence of large reductions in unemployment with improving macroeconomic conditions is consistent with prudent macroeconomic management being conducive to employment creation.

Sound regulation is associated with a double-dividend; countries with better regulation not only tend to have lower unemployment on average, but are also more likely to experience an unemployment drop when confronted with stints of high unemployment. The importance of an

¹ See, for example, Blanchard and Wolfers, 2000, Nickell et al. 2005, and Djankov and Ramalho 2009.

impartial legal system, secure property rights, and efficient contract enforcement alongside lean regulation underscores the importance of implementation.

The importance of economic reform is perhaps most evident in the transition countries, which experienced two waves of unemployment reductions. The first wave, in the mid-1990s, involved Hungary and Latvia, two of the early reformers. The second wave, around the millennium, involved Russia, Ukraine, Bulgaria, Croatia, Estonia and Lithuania. Focusing on the Baltics, Estonia, the lead reformer, maintained relatively low unemployment in the 1990s, averaging 7 percent, with little limited scope for a sharp reduction at that time. In contrast, Latvia and Lithuania built up high unemployment early on, topping 15 percent in the mid-1990s. In Latvia, unemployment began declining in the mid-1990s after business reforms were made. In Lithuania, despite similar external economic conditions and trade patterns, slower reform appears to have contributed to postponing a more sustained adjustment until 2001.²

This paper contributes to several strands of literature. A large body of research examines the (cross-country) determinants of unemployment, focusing on the role of institutions, shocks, and crucially, the interaction between them as explanations for differences in the evolution of unemployment across countries (see, for example, Blanchard and Gali, 2010, Blanchard and Wolfers, 2000, Feyrer and Sacerdote, 2013, Nickell et al 2005, Helpman and Itshkoki, 2010). This paper aims to contribute to that literature by analyzing large and sustained declines in unemployment, focusing on their potential determinants and how they start. In doing so, we help differentiate between the drivers of secular changes in employment and those of cyclical labor adjustment (see also Davis et al, 2012, Elsby et al. 2009). In the process, we also provide evidence on the relationship between growth and employment creation. Moreover, by highlighting the association between business regulation and the reduction in unemployment, our results also contribute to the growing literature on their importance for development outcomes.³

² Privatization was relatively rapid and successful in Estonia and Latvia as compared with Lithuania (Havrylyshyn and McGettigan 1999), Latvia instituted the trade reforms required to accede to the WTO in 1998, as compared with 2000 for Lithuania. In 2004 (the earliest year for which data are available), the Doing Business indicators record Latvia ranked 14 as compared with 39 for Lithuania in days to start a business.

³ More cumbersome regulation can be damaging either because it is captured by incumbents or because it creates rent-seeking opportunities for government officials that are tasked with enforcing it. In either case, it hampers competition and impedes development. For example, De Soto (1990) shows that the economy of Peru, in the absence of property rights and well functioning legal systems, veered toward informality, creating many small producers that were not able to expand because they did not have legal rights to their property. As another example, Djankov et al (2002) show that more arduous entry regulation is associated with more corruption and informality across countries, as opposed to better

The remainder of this paper is organized as follows. The next section explains how drastic unemployment reduction episodes are identified. Section 3 examines the incidence, and correlates of, episodes of unemployment reductions. Section 4 assesses to what extent episodes can be predicted, and provides evidence of a robust association between the quality of the overall regulatory framework and the incidence of reductions. Section 5 examines which aspects of the regulatory framework matter most. Section 6 concludes.

2 Identification and Incidence of Episodes of Unemployment Reduction

2.1 Identification

Following Hausmann et al. (2005) on growth accelerations and Freund (2005) on current account reversals, we use an event study approach. We define an episode of unemployment reduction to be a substantial reduction of unemployment that is sustained for a protracted period of time and rule out overlap between episodes. Specifically, a decline in the unemployment rate starting at period t qualifies as an episode if the following conditions are satisfied:⁴

- (i) Unemployment declines at least 3 percentage points over a 4 year period
- (ii) The decline in unemployment over this 4 year period is at least 25% of total initial unemployment.
- (iii) The drop in unemployment must remain below the critical unemployment reduction thresholds for at least another 3 years.
- (iv) Unemployment strictly declines in the first year of the episode.
- (v) An unemployment reduction episode did not commence in the previous 7 years (e.g. in the previous 7 years there was no year in which conditions i, ii, iii and iv were simultaneously met that was not itself preceded by the onset of an unemployment reduction in the previous 7 years); unemployment reduction episodes are not contiguous.

quality products and improved competition as its proponents advocate. In follow-up work, Djankov et al (2008) also highlight the important of enforcement, by demonstrating that transparent contract enforcement is instrumental in preventing self-dealing—where agents exploit power to maintain excess share of profits, thus retarding investment and growth.

⁴ We also implemented two additional conditions, notably that unemployment declines were not driven by a single outlier alone, and that unemployment during the episode was always strictly lower than unemployment at the onset of the episode, but these conditions were not binding, in the sense that they were always satisfied when the other conditions were satisfied.

Conditions i and ii ensure that the decline in unemployment is substantial. A decline of 3 percentage points over a four year period is crudely equivalent to a standard deviation away from the mean 4 year change in unemployment. Condition ii ensures that the threshold for an unemployment reduction episode is higher for countries with higher levels of unemployment; for example, in a country with 40% initial unemployment, it needs to reduce by at least 10 percentage points for that reduction to qualify as an episode, whereas a country with an initial unemployment of 20% requires a reduction in unemployment of 5 percentage points or more. By construction, countries with lower than 3% initial unemployment cannot experience an episode. Condition iii requires that the decline in unemployment is sustained for at least three years, and does not merely reflect cyclical fluctuations. Condition iv ensures that unemployment reduction episodes commence with a decline in unemployment, and condition v rules out counting the same unemployment reduction spell as two separate events.

One potential concern is that unemployment could decline due to falling labor market participation. We choose to focus on declines in unemployment, as opposed to increases in employment as a share of working age population since participation can fall as countries become richer, as more people of working age attend high school and university, or retire early.⁵ Still, to control for this possibility, we also report results including only episodes where labor force participation remains constant or increases and results remain robust.

Our primary data source is the World Bank's *World Development Indicators* 1980-2008. The earliest year for which the onset of an unemployment event can be identified is 1980, whereas the last year is 2001. In case information on unemployment is missing for one year, it is imputed using the average of the unemployment rates in the preceding and the subsequent years for the purpose of identifying reduction episodes, but not in the subsequent analysis. Countries for which we do not have at least 8 consecutive annual observations on unemployment after imputing it are excluded. These restrictions reduce the sample to 94 countries. Arguably as a result of lower labor market monitoring capacity in poor countries, there are no low-income countries in our sample, only five countries from Sub-Saharan Africa and two from South Asia. Thus, our results are most relevant for middle income, transition, and OECD countries. See Table 1 for a description of all variables and their source.

⁵ In addition, employment to population ratios, typically measured as the population over the age of 15 (or 25) that is employed, are potentially (more) impacted by changing demographics, such as those due to increases in life expectancy.

2.2 Incidence

Unemployment reduction episodes are common, as is demonstrated by Table 2 which lists all 43 events that we identify by region, country and year. Almost half of all the countries in our sample (40 out of 94) have experienced at least one episode. To arrive at the (unconditional) probability of experiencing an unemployment episode, we follow Hausmann et al. (2005) and divide the total number of events by the total number of country-years for which an unemployment episode could have been identified. The latter is calculated by the total number of country-observations eliminating the 7-year window after the onset of an event, since in this period unemployment reduction episodes are not allowed to initiate by construction. On average, approximately one in 20 countries which are not in an episode reduction event embark on one each year.

Aside from the sheer number of unemployment events, the magnitude of the associated decline in unemployment is striking; unemployment declines from an initial average of 14.5% to 8.8% and then to 7.1% 4 and 7 years after the onset of the event respectively. Thus, at the end of the episode average unemployment was less than half of its initial value.

Table 2 demonstrates that the incidence of unemployment reduction events does not vary dramatically across regions. Their incidence also does not vary strongly across income groups, yet appears to be increasing with the initial level of unemployment as is indicated by Table 3, which lists the incidence of episodes by initial unemployment quartile and income group. Only one country, Thailand, in the lowest unemployment quartile experienced an event. This is perhaps not a surprise once one considers that even supposedly well-functioning labor markets suffer some friction unemployment (Blanchard and Katz, 1997). For example, the natural rate of unemployment in the U.S., which arguably has one of world's most flexible labor markets, has recently been estimated to be in the range of 5.6 to 6.9% (Daly et al., 2012). In what follows, we exclude observations with unemployment lower than 6% unemployment from the analysis for this reason. In section 4 we will show that our main results are robust to including them.

The choice of parameters for the filter used to identify unemployment reduction episodes is inevitably arbitrary. For example, increasing the thresholds for unemployment declines by 10% and 20% reduces the number of events to 36 and 26, respectively.⁶ Conversely, relaxing the thresholds

⁶ A 10% (20%) higher threshold implies that unemployment should decrease by at least 3.3% (3.6%) and 27.5% (30%) of its initial value over the initial four year period. Conversely, a 10% (20%) lower thresholds implies that unemployment

by 10% and 20% increases the number of events to 49 and 54, respectively. As another example, adopting a more stringent definition of sustainability by requiring that unemployment 7 years after the onset of the episode cannot be higher than its level 4 years after onset (that is, not allowing for rebounding of unemployment in this period) reduces the number of events to 34. Ruling out the possibility that unemployment reduction episodes are driven by declines in labor force participation, by insisting that the labor force participation rate four years after the onset of the event is at least as high as at the beginning of the event, leaves 33 episodes. In section 4.2 it is shown that adopting these and other alternative parameterizations of the filter does not alter the qualitative pattern of results.

It is important to recognize that our identification comes from the timing of episodes within countries and also across countries, between those that have and those that fail to have episodes of unemployment reduction. An example is provided in Figure 1, showing unemployment in Bulgaria and Macedonia, two neighboring countries, with similar populations and trade patterns. While Bulgaria was undertaking reforms starting in the mid-1990s in order to join the European Union, reform in Macedonia did not take hold until a decade later. Their respective patterns of unemployment are quite different. While Bulgaria had an episode of unemployment reduction starting in 2001, Macedonia did not, despite much higher unemployment, which typically makes sustained reduction easier.

3 Correlates and Antecedents of Unemployment Reduction Episodes

Now that we have defined and identified episodes of unemployment reduction, we next characterize them by the evolution of macro- and institutional variables.

3.1 Initial Conditions

Table 4 presents descriptive statistics on initial conditions at the time of onset of an episode (columns 1) and compares those with the conditions prevailing in countries that are not currently in

should decrease by at least 2.7% (2.4%) and 22.5% (20%) of its initial level during the four years after the onset of the episode.

an episode and in which no event occurs (column 2). Coefficients in the table with an asterisk indicate that differences in initial conditions are statistically significant at the 5% level.

Consistent with the results demonstrated in Table 3, countries that experience unemployment reduction episodes have significantly higher initial unemployment, notably 14.7% on average, than countries in which episodes do not occur, with average unemployment at 11.6%. These numbers may seem high, but recall that we have confined the sample to country-year observations experiencing unemployment levels of at least 6%.

In spite of this differential in average initial unemployment, countries embarking on episodes of unemployment reduction are remarkably similar in other macroeconomic domains to those that do not.⁷ They neither have significantly different initial GDP levels, nor record significantly different growth rates at the time of onset. They also do not have a significantly higher propensity to export, import and to receive FDI inflows. Moreover, they do not differ from those that do not embark on episodes in terms of average inflation and government spending as a share of GDP. In addition, they are not significantly more or less democratic on average.

Countries that have unemployment reductions also do not score higher on indicators of the overall regulatory framework. Our preferred proxy for overall regulatory quality is the economic freedom index of the Fraser Institute, as it is time-varying. Since this indicator and its subcomponents are only available every 5 years from 1980 until 2010, we linearly interpolate scores for the intervening years. No statistically significant differences between countries that embark on episodes and ones that do not are detected in any of the sub-components or the aggregate index itself.

We complement these broad indicators with specific indicators of labor regulation and financial openness from the IMF, as well as with data on governance and regulation from the *Worldwide Governance Indicators* (Kaufmann et al., 2010) and the *Doing Business Indicators*. Since these last two data sets are only available from 1996 and 2004 onwards, respectively, we follow Collier and Goderis (2008) and extrapolate them backwards for years in which they were not available. Note that this procedure implicitly assumes that these policies do not vary over time, whereas in reality they may well have changed in response to (the absence of) unemployment reduction events. In other words, they are potentially endogenous. Collier and Goderis (2008), however, argue that because these indicators tend to capture structural policies that change only slowly over time, the

⁷ We also examined differences in average debt, savings, real interest rates, and the terms of trade and did not find any statistically significant differences in these either.

magnitude of potential endogeneity bias is likely limited. Bearing in mind this caveat, table 4 suggests that countries embarking on episodes are not characterized by more flexible labor laws, greater financial openness, a policy environment especially conducive to trade, or superior governance. However, they are characterized by expedited enforcement of contracts, which, on average, takes roughly 23% longer in countries that do not embark on episodes.

Overall, the descriptive statistics suggest that countries embarking on episodes are not different in terms of initial conditions, except for their business regulations and their initial level of unemployment.

3.2 The Evolution of Key Explanatory Variables

Examining the evolution of key explanatory variables sheds light on the likely determinants of unemployment reduction episodes, which is important in view of the stark similarity in initial conditions reported in the previous section. Table 5 presents regressions in which key explanatory variables are regressed on dummies that indicate whether the country is currently in the first four years of an event (labeled “Beginning”), or the subsequent three-year period (labeled “End”) to determine if there are significant changes in these variables.⁸ The sample is confined to events for which information on unemployment was available three years prior to the onset of the episode. All regressions are estimated using a standard Fixed-Effects estimator to remove time-invariant country characteristics.

Although this procedure controls for country-differences that are constant over time, it does not control for global shocks, or the possibility that some variables, such as trade flows, might share a common trend. To negate the possible impact of these, we also present regression estimates where we use as dependent variable explanatory variables demeaned by the sample average of observations available in the relevant year. This demeaning removes the impact of both covariate shocks, such as global growth booms and crises, as well as time trends; the resulting coefficient estimates thus provide information on how countries in episodes fare relative to other countries in the sample.

Turning to the results, the reduction in unemployment that characterizes episodes coincides with an acceleration of growth. This is illustrated by Figures 2 and 3, which plot the evolution of unemployment and GDP growth, respectively, demeaned by the sample average. Unemployment

⁸ Note that we confine the sample to country-year observations that are either experiencing an episode or about to embark on one within at most three years.

tends to increase in the build-up to the event (Figure 2), reflecting the fact that episodes often involve a reversal of fortune, which is typically accompanied by a distinct jump in GDP growth (Figure 3) at the onset of the unemployment episode.

The increase in GDP growth is accompanied by a significant increase in investment as a share of GDP, whereas government spending as a share of GDP declines, suggesting that overall macroeconomic conditions improve. In addition, countries experiencing an unemployment reduction episode are significantly less likely to be experiencing a crisis than they were before the onset of the episode; some events concur with recovery from crisis. Moreover, episodes are accompanied by a significant surge in trade (see also Freund and Pierola, 2008), exports and imports both increase significantly and roughly by the same magnitude.

The regulatory environment appears to improve during unemployment reduction episodes, as is indicated by the positive and significant improvement in the Economic Freedom Index. This improvement persists in the last three years of the episode and is predominantly driven by significantly improved regulation, improvements in the legal system and property rights and access to sound money (reflecting inflation, its volatility, money growth, and the ability to own foreign currency bank accounts – see Table 1). These beneficial changes appear to persist throughout the second phase of episodes. By contrast, no significant changes in financial openness and labor regulations as proxied by advance notice and severance pay requirements as well as the generosity of unemployment benefits are detected during either the first or the second phase of episodes.

4 Predicting Unemployment Reduction Episodes

We now turn to potential predictors of successful episodes of reduction in unemployment. We estimate a probit model, where the dependent variable URE_{it} takes the value 0 if there is potential for an unemployment reduction episode to start in country i at time t but none has, and 1 if it starts in year t . Years in which an episode cannot begin (e.g. the seven years after onset) are excluded. The estimating equation is:

$$\Pr(URE_{it}|X_{it}) = \Phi(X_{it}'\beta)$$

where X_{it} is the vector of explanatory variables.

Table 6 presents various specifications of this model for countries with unemployment rates of at least six percent that are not currently experiencing an episode. All specifications control for initial unemployment and include year dummies. Column 1 additionally controls for GDP per capita and its growth, whereas column 2 instead controls for a host of macroeconomic indicators, notably investment, openness, FDI, government consumption, inflation, as well as democracy, proxied by the polity indicator (from Marshall et al., 2011). Column 3 simultaneously controls for both. Column 4 instead controls for GDP per capita, its growth, initial unemployment and whether or not a country is in crisis or at war. Column 5 examines the impact of regulation using the EFW indicator of economic freedom as a proxy for the overall quality of regulation, controlling for GDP and its growth as well as initial unemployment. Column 6 includes all additional explanatory variables.

Overall, while unemployment episodes are difficult to predict, there are some important regularities. The models we present explain between 10-18% of the observed variance, which is not low in these type of event studies.⁹ Of greater interest, the difficulty in predicting episodes is reflected in the fact that few explanatory variables are statistically significant. Macro-conditions other than unemployment do not predict the onset of episodes; the other macro variables, including GDP per capita and its growth, are never statistically significant, neither individually nor jointly. Simultaneously controlling for both, as is done in column 3, does not overturn this conclusion. Column 4 demonstrates that countries at war are more likely to embark on an episode. However, this effect is only significant at the 10% level, and, moreover, not robust to including additional control variables (see column 6).

In contrast, initial unemployment is a strong and significant predictor of the onset of unemployment reduction episodes. On average, a 1% point increase in initial unemployment increases the likelihood of the incidence of an episode by 0.7%-0.9%. Although this effect may not seem large in absolute terms, one has to bear in mind that the unconditional probability of an episode taking off is 5.8% for countries with unemployment in excess of 6%. To put this into perspective, *ceteris paribus*, the odds of an episode happening in a country with 20% unemployment are approximately twice as high than it happening in the average country in our sample, even though, to qualify as an episode, its unemployment must decrease by almost a full percentage point more due to the criterion that unemployment must decrease by at least a quarter of its pre-event level (condition ii).

⁹ For example, the models Hausmann et al. (2005) use to predict growth accelerations explain between 5 and 8% of the observed variance. The low pseudo R² also could be driven by rare-events bias (King and Zeng, 2001), which is addressed in the next section.

The most important finding is that regulatory quality is positively correlated with the incidence of episodes as is evidenced by the strongly statistically significant coefficient on the index of economic freedom in columns 5. This finding is robust to controlling for macro-variables, democracy, and whether or not a country is in crisis or at war (column 6). Moreover, the magnitude of this association is remarkable; a one-standard deviation improvement in regulatory quality (i.e. an increase of 1.08 in the Economic Freedom Index) is associated with an increased probability of incidence of 3.6%-5.0%. Note that this is a conditional association; recall that we did not find a significant positive bivariate correlation between the incidence of employment episodes and indicators of overall regulatory quality because countries with better regulation tend to have lower initial unemployment to start with.

Tables 7 and 8 present robustness checks using specifications that replicate those in columns 5 and 6 in Table 6; that is, one that controls for initial unemployment, GDP per capita and GDP per capita squared (referred to as the initial conditions, “IC”, specification), and one that includes all explanatory variables (referred to as the “Full” specification), which we can only estimate on a smaller sample for which all of these variables are available. To conserve space we only present the coefficient estimates associated with our key variable of interest, notably economic freedom.

To start with, as alternative proxies for overall regulatory quality, the ease of doing business rank from the *Doing Business Indicators* and the regulatory quality index from the *World Governance Indicators* are used. The results presented in Row A of Table 7 are robust to using these alternative proxies; the ease of doing business rank is consistently negatively correlated with the incidence of episodes, indicating that worse regulation renders unemployment reduction less likely. The indicator of regulatory quality from the *Worldwide Governance Indicators* assigns higher scores to countries with better regulatory frameworks and is significantly positively correlated with the incidence of unemployment reduction episodes.

Second, we examine the robustness of our results to using more stringent definitions of an unemployment episode by imposing additional criteria for the identification of an episode. We begin by ruling out the possibility that reductions in unemployment are driven by declines in labor force participation. In particular, we impose as an additional criterion for the identification of an episode that labor force participation after the first four years of the unemployment episode is at least as high as it was at the start. While this reduces the number of episodes to 33, the Economic Freedom Index remains a strongly significant predictor of the onset of episodes (see columns 1 and 2 in Row B). Next, we impose a stricter definition of sustainability and require that unemployment does not

increase between four and seven years after onset of the episode. This leaves 34 events. If anything, adopting this more stringent definition of sustainability leads to a stronger correlation between regulation and the incidence of episodes (see columns 3 and 4 in Row B).

Third, we assess the robustness of the results to using higher thresholds for unemployment declines, which we increase and decrease by 10% and 20% respectively; the results, which are presented in row C, are qualitatively robust to using these alternative thresholds, although changing the thresholds by a wide margin diminishes the statistical significance of the conditional correlation between regulation and the incidence of employment episodes.

Fourth, we examine the robustness of our results to alternative sample restrictions. To start with, the requirement that initial unemployment must be in excess of six percent is dropped. The qualitative pattern of results does not change (see columns 1 and 2 in row D). Finally, we rule out episodes being driven by recovery from war or crises by excluding countries which were at war or in a crisis at any point during the past four years. Discarding these observations substantially strengthens the association between regulation and the incidence of episodes.

Fifth, Table 8 examines the robustness of the results to using alternative estimations methods that are better equipped to deal with unobserved heterogeneity and rare-occurrence bias. The latter bias may arise because we are focusing on the onset of episodes; even though, at any given time a substantial number of countries are experiencing an unemployment episode, onset is of course more rare. This may result in bias, which is typically downwards, due to both small sample selection bias (which tends to bias coefficient estimates downwards) and not explicitly accounting for estimation uncertainty (which tends to reduce the estimated variance, which in turn result in underestimation of the likelihood of the occurrence of rare events). To address these issues, we re-estimate our models using the modified logistic regression models proposed by King and Zeng (2001) that correct for these potential problems. The results are presented in the top row of Table 8. Rare-events bias does not appear to affect the coefficient estimate associated with regulation which, if anything, is lower than in standard logistic regressions, which are presented in columns 5 and 6 for purposes of comparability. Nonetheless, accounting for estimation uncertainty strengthens our results somewhat; the attributable risk¹⁰ associated with a 1 point increase in the Economic Freedom Index is estimated to be 3.9% in the specification that controls for initial conditions only and 6.0% in the specification that includes all control variables. These increases in probability are a

¹⁰ Attributable risk (or the first difference risk) is defined as the change in the probability as a function of a change in a covariate; see King and Zeng (2001).

bit higher than the corresponding marginal effects obtained using a standard probit model (recall the results presented in columns 5 and 6 of table 5 which yielded marginal effects of 3.6% and 5.0% respectively).

Finally, we attempt to address potential bias due to unobserved heterogeneity, starting with random effects probit models. The specifications presented in columns 1 and 2 of the bottom row of Table 8 show that the results are robust to controlling for such random effects, and that the null hypothesis that they should not be included is not rejected. A well-documented drawback of the random effects estimator is that it imposes that unobserved country-specific effects are not correlated with the explanatory variables. To allow for the possibility that they are, we re-estimate these models using Chamberlains fixed-effects logit, at the cost of having to exclude countries that never experienced episodes from our sample. This in turn leads to convergence problems in the model that includes all explanatory variables (the full specification). We also present standard linear fixed effects estimates, which obviously do not appropriately account for the binary nature of the data yet help shed light on the likely impact of unobserved time-invariant heterogeneity by using information from countries that did not witness an episode. Overall, our results suggest that such heterogeneity is important, as is evidenced by F-tests that reject the null that country-fixed effects do not matter in the linear fixed effects specifications. Nonetheless, such heterogeneity is unlikely the key driver of the results we observe; the positive association between regulation and the incidence of episodes remains significant both in the conditional logit and linear fixed effects models, albeit at the 10% level in the latter specifications. This is a strong result, since regulation evolves only slowly over time, and because a one year horizon over which to identify the beneficial impacts of reforms is fairly short.

To summarize, the relationship between regulation and unemployment reduction episodes appears robust.

5 Which Policies Matter Most? Bayesian Model Averaging

The regulatory proxies used thus far are quite broad, and the positive association between regulation and the incidence of episodes prompts the question: which aspects of regulation matter most? To help answer this question and to assess the robustness of our previous results, we employ Bayesian Model Averaging methods using subcomponents of the Economic Freedom Index as well as

alternative, more detailed, proxies for labor, trade, financial and business regulation, and indicators of governance as potential predictors of the onset of episodes. Bayesian Model Averaging offers a systematic method to deal with the uncertainty inherent in model selection by allowing one to assess the posterior likelihood of models and coefficients, thereby helping us assess which variables are most relevant (see Hoeting et al., 1999, for an introduction to Bayesian Model Averaging).

To formalize the notion of model uncertainty, let X denote a $n \times p$ matrix of potential predictors of outcome variable Y that is assumed to be a binary indicator of a latent variable Y^* that follows a logistic density with mean $\mu = X\beta$. Given the number of potential explanatory variables p , there are $q=2^p$ possible different models which, following Raftery (1995), we shall assume to be a priori equally likely. The marginal distribution of the data for a given model M_k is given by:

$$p(Y|M_k) = \int p(Y|M_k, \beta_k) * \pi(\beta_k|M_k) * d\beta_k$$

where $\pi(\beta_k|M_k)$ is the prior distribution¹¹ of the parameters β_k of model M_k . The posterior model probability for any given model M_k can in turn be computed as:

$$p(M_k|Y) = \frac{p(Y|M_k) * \pi(M_k)}{\sum_{k=0}^q p(Y|M_k) * \pi(M_k)}.$$

where $\pi(M_k)$ is the prior probability that model M_k is true.

The posterior distribution of a quantity of interest can now be computed as the weighted average of each of the models considered, where weights are given by the posterior model probabilities. For example, the posterior expected value for the coefficient vector β after averaging across models is:

$$E(\beta|Y) = \sum_{k=0}^q p(M_k|Y) * E(\beta_k|M_k, Y).$$

We implement the Bayesian Model Averaging technique three times.¹² The results are presented in Table 9. To start with, as a robustness check, we use the Bayesian Model Averaging procedure using all variables included in our most general model, notably specification 6 in Table 6, as potential explanatory variables. The Bayesian analysis, which is presented in the first column

¹¹ In our application, these prior distributions are computed using the BIC approximation, which is akin to the Unit Information Prior (UIP) (see Raftery, 1996).

¹² To implement the BMA method, we use the “BMA” package in R (version 3.15.1 by Raftery et al. (2012)) which uses approximate Bayes factors and Occam’s window algorithm to reduce the model space to a set of parsimonious models that have decent explanatory power. One general caveat to bear in mind when interpreting the results of BMA procedures is that their results can be very sensitive to measurement error (see Ciccone and Jarocinski, 2010).

(labeled model set 1), corroborates our results; the most potent predictor of the incidence of episodes is initial unemployment. This is evidenced by its extremely high posterior inclusion probability (PIP) (99.9).¹³ The next best predictor, albeit with a substantially lower posterior inclusion probability (35.3), is the Economic Freedom Index. The other explanatory variables considered do not appear to be useful predictors.¹⁴

Second, to assess which aspects of policy matter most we replicate this analysis, but now replace the Economic Freedom Index by its component indicators, notably indices of the regulation of business, credit and labor, the freedom to trade internationally, the size of the government, legal system and the security of property rights, and access to sound money. The results, which are presented in the second column (labeled model set 2), suggest that the legal system and property rights and rules governing credit, business and labor, are the most important aspects of the business environment. Note that while the posterior inclusion probability of the indicator of the legal system is higher than that of regulation, the coefficient associated with regulation is much higher.

Third, to validate these results, and to further probe which aspects of regulation matter most, we run a Bayesian Model Averaging analysis where we use as explanatory variables initial unemployment and a host of alternative indicators of regulation. To proxy labor regulation we use indicators of the severance pay and advance notice requirements as well as the generosity of unemployment benefits from the IMF (Aleksynska et al., 2011) and the rigidity of employment index from the World Bank Doing Business Indicators. The time it takes to export as recorded in the Doing Business Indicators is used as a proxy for trade regulation, whereas the time it takes to open and close a business and the time it takes to enforce a contract are used as proxies for business regulation. We also include an indicator of financial regulation from Abiad et. al. (2008), as well as indicators of political stability, the control of corruption and the rule of law from the *Worldwide Governance Indicators*. The Bayesian Model Averaging analysis suggests that amongst them the time it takes to enforce a contract and the control of corruption are the most important predictors of the incidence of episodes, albeit at much lower posterior inclusion probabilities than initial unemployment. In particular, protracted contract enforcement is associated with a reduced

¹³ The PIP is a measure of how important a predictor a variable is and is defined as the sum of the posterior probabilities of all models that include the variable in question; if models that include this variable are more likely, one can infer that the variable in question has predictive power.

¹⁴ In robustness checks not presented to conserve space but available upon request we also experimented with including additional explanatory variables, notably, literacy, mortality, demographic indicators, the exchange rate and domestic credit as a share of GDP, but none of these had substantial explanatory power.

likelihood of unemployment reduction events commencing. These findings are consistent with the results we obtained when we used the subcomponents of the Economic Freedom Index, which also pointed towards the importance of an efficacious legal system and secure property rights as important enabler of employment growth. They also resonate with the descriptive statistics recorded in Table 4, which demonstrated that countries that embark on episodes are characterized by both higher initial unemployment and expedited contract enforcement relative to countries that do not. Interestingly, the stringency of labor regulations and the generosity of unemployment benefits do not appear to help predict the onset of unemployment reduction episodes. Financial openness does not appear an important determinant of drastic unemployment reductions either.

6 Conclusions

We examine how countries across the world have generated sustained reductions in unemployment by using an event study analysis. The frequency with which such unemployment reduction episodes occur is encouraging. Each year approximately 1 in every 20 countries not already in an episode embarks on such an unemployment reduction episode. Moreover, the associated decline in unemployment is typically large, since, average unemployment seven years after onset stood at less than half its initial level.

In spite of their prevalence, unemployment reduction episodes are difficult to predict *ex ante*, reflected in the low predictive power of models of their onset and the fact that countries embarking on episodes are characterized by initial conditions very similar to those which do not in terms of growth, GDP, FDI inflows, exports, imports, investment, government spending, inflation, democracy, and various proxies for regulatory quality. Nonetheless, countries that embark on episodes tend to suffer higher unemployment and have *de jure* policies dictating more prompt enforcement of contracts.

Episodes tend to coincide with an acceleration of growth, an overall improvement in macroeconomic conditions manifested, *inter alia*, in higher trade flows, high investment and lower government spending, as well as improvements in the regulatory framework. In addition, the incidence of crises reduces significantly, suggesting that episodes sometimes concur with recovery. Although we are not able to attribute causation, these findings point towards the importance of prudent macroeconomic management in fostering sustainable employment growth.

Our most important finding is that unemployment reduction episodes are much more likely in countries with better regulation. This relationship is robust to using alternative proxies for regulatory quality, the imposition of additional criteria to identify employment episodes, alternative parameterizations of the filter used to identify episodes, alternative estimation methods and various different sample restrictions, and is crucially conditional on initial unemployment. On average, countries embarking on episodes do not outperform countries that do not in terms of overall regulatory performance. The reason is that countries with good regulation are less likely to have high unemployment in the first place and consequently less likely to experience an episode. However, if they do end up with high unemployment, they are much more likely to escape from it.

The results are validated by Bayesian Model Averaging procedures which point towards contract enforcement and the security of property rights as critical components of the business environment and important enablers of employment growth. The relatively strong role for contract enforcement relative to other indicators of governance, labor regulation and access to finance is perhaps not too surprising if we consider that net job creation is typically accounted for by (young) small firms (Haltiwanger et al, 2010), which are disproportionately reliant on lean regulation and consistent implementation thereof in order to expand (Beck et al., 2005). The importance of averting corruption is not entirely unexpected either, since excessive regulation goes hand in hand with graft (Djankov et al 2002), taxing employers and making expansion more difficult, especially for firms lacking connections to government officials.

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Table 1: Variable Description and Sources

Variable Name	Source	Description
Unemployment	WDI	
Log GDP per capita	WDI	Natural logarithm of real GDP per capita based on purchasing power parity (PPP). Data are in constant 2005 international dollars.
GDP per capita growth	WDI	GDP per capita growth (% terms)
Exports	WDI	Exports of goods and services (% of GDP)
Imports	WDI	Imports of goods and services (% of GDP)
Openness	WDI	(Exports+Imports)
FDI	WDI	Foreign direct investment, net inflows (% of GDP)
Investment	WDI	Gross fixed capital formation (% of GDP)
Government Spending	WDI	General government final consumption expenditure (% of GDP)
Inflation (log)	WDI	$\log((100+\text{annual inflation}(\%))/100)$
Democracy	Marshall et al. (2011)	Polity2: the combined polity score which is the difference between the democracy and autocracy indicators
War	Lacina and Gleditsch (2005)	Indicator variable taking value 1 if the country was engaged in a war (i.e. a conflict with at least 1,000 battle related death in a given year), and 0 otherwise
Crisis	Laeven and Valencia (2010)	Indicator of banking crises taking the value 1 if the country was experiencing a banking crisis and 0 otherwise.
<i>Broad Indicators of Regulatory Quality</i>		
Economic Freedom	EFW	Composite index of economic freedom
Ease of Doing Business Rank	DB	Country's rank score in the ease of doing business indicators in 2008 (extrapolated backwards over time) (1=most business friendly regulations)
Regulatory Quality	WGI	Measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (with higher values corresponding to better outcomes). For years in which information on this indicator was missing, we use the average of the preceding and the subsequent years if those are available (1997,1999 and 2001) and the earliest available year otherwise (i.e. for years preceding 1996 we take the 1996 value).
<i>Dimensions of Economic Freedom</i>		
Government Size	EFW	Indicator of central government involvement in the economy (comprising general government consumption spending, transfers and subsidies, government enterprises and investment and the top marginal tax rate)
Regulation	EFW	Indicator of credit (ownership of banks, foreign bank competition, private sector credit), labor (minimum wages, hiring and firing regulations, centralized collective bargaining, mandated cost of hiring and worker dismissal and conscription) and business regulation (price controls, administrative requirements, bureaucracy costs, starting a business, bribes, licensing restrictions, costs of tax compliance).
Legal System	EFW	Indicator of legal structure and the security of property rights, taking into account judicial independence, whether courts are impartial, property rights, military interference in the political process, integrity of the legal system, legal enforcement of contracts, and regulatory restrictions on sale of real property
Money	EFW	Indicator of the efficacy of money as a medium of exchange (comprising measures of money growth, inflation and its volatility, as well as the freedom to access foreign bank accounts).
Free Trade	EFW	Indicator of the ease with which goods can be traded across borders (comprising taxes on trade, regulatory trade barriers, size of the trade sector relative to expected, black-market exchange rates, capital market controls)
<i>Labor Regulation</i>		
Rigidity of Employment	DB	Measures flexibility in the regulation of employment in 2008, specifically as it

		affects the hiring and redundancy of workers and the rigidity of working hours
Unemployment Benefits	Aleksynska et al. (2011)	Generosity of unemployment benefits measures by gross replacement rate (GRR), that is, the ratio of unemployment insurance benefits a worker receives relative to the worker's last gross earnings after being unemployed for one year
Severance Pay	Aleksynska et al. (2011)	Index of legally mandated severance payments for workers with 9 months of service
Advance Notice	Aleksynska et al. (2011)	Index of legally mandated advance notice requirements for workers with 9 months of service
Finance		
Financial Openness	Abiad et al. (2008)	Financial liberalization index (rescaled) (comprised of 8 sub-components)
Business		
Time to Enforce a Contract	DB	Log time to enforce a contract in 2004
Starting a Business	DB	Log time required to start a business in days in 2004
Closing a Business	DB	Log time to resolve a bankruptcy in 2004 (in years)
Trade		
Time to Export	DB	Log time to export in days in 2004
Governance		
Political Stability	WGI	Measures the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism. For years in which information on this indicator was missing, we use the average of the preceding and the subsequent years if those are available (1997,1999 and 2001) and the earliest available year otherwise (i.e. for years preceding 1996 we take the 1996 value).
Rule of Law	WGI	Measure of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. For years in which information on this indicator was missing, we use the average of the preceding and the subsequent years if those are available (1997,1999 and 2001) and the earliest available year otherwise (i.e. for years preceding 1996 we take the 1996 value).
Control of Corruption	WGI	Measure of the extent to which public power is exercised for private gain, including petty and grand forms of corruption, as well as capture of the state by elites and private interests. For years in which information on this indicator was missing, we use the average of the preceding and the subsequent years if those are available (1997,1999 and 2001) and the earliest available year otherwise (i.e. for years preceding 1996 we take the 1996 value).

Note: WDI=World Development Indicators, WGI=Worldwide Governance Indicators, DB=Doing Business Indicators, EFW=Economic Freedom of the World

Table 2: List of Unemployment Reduction Episodes by Region, Year, and Country

Region	Episode	Year	Country	Unemployment			ΔUnemployment	
				At onset	After 4 years	After 7 years	First 4 years	All 7 years
<i>(countries)</i>	<i>% (No./Obs)</i>							
East Asia and the Pacific (8)	6.3% (5/80)	1986	Malaysia	8.3	5.1	3.0	-3.2	-5.3
		1986	Singapore	6.5*	2.1*	2.7*	-4.5*	-3.8*
		1987	Thailand	5.8	2.7	1.3	-3.1	-4.5
		1988	Fiji	9.4	5.4	5.4	-4.0	-4.0
		1998	Korea, Rep.	7.0	3.3	3.7	-3.7	-3.3
Europe and Central Asia	6.3% (8/127)	1993	Hungary	12.1	9.0	6.6	-3.1	-5.5
		1996	Latvia	20.2	13.9	10.5	-6.3	-9.7
		1999	Russia	13.5	8.2	7.2	-5.3	-6.3
		2000	Ukraine	11.6	8.6	6.4	-3.0	-5.2
		2001	Bulgaria	19.4	10.1	5.7	-9.3	-13.7
		2001	Croatia	20.5	12.6	8.4	-7.9	-12.1
		2001	Estonia	12.6	7.9	5.5	-4.7	-7.1
		2001	Lithuania	16.8	8.3	5.8	-8.5	-11.0
Industrial (26)	3.6% (12/332)	1983	Canada	12.0	8.8	8.1	-3.2	-3.9
		1983	United States	9.6	6.2	5.6	-3.4	-4.0
		1984	Netherlands	14.2	9.1	6.9	-5.1	-7.3
		1986	Portugal	8.6	4.7	5.5	-3.9	-3.1
		1993	Denmark	10.7	5.4	4.5	-5.3	-6.2
		1993	Ireland	15.6	10.2	4.3	-5.4	-11.3
		1993	Britain	10.3	7.1	5.6	-3.2	-4.7
		1994	Finland	16.4	11.4	9.1	-5.0	-7.3
		1995	Netherlands	7.0	3.5	3.1	-3.5	-3.9
		1995	Spain	22.7	15.6	11.4	-7.1	-11.3
		1997	France	12.6	8.6	9.2	-4.0	-3.4
		1997	Sweden	10.0	5.0	6.5	-5.0	-3.5
Latin America and the Caribbean (26)	4.6% (15/329)	1982	Chile	19.6	8.7	5.3	-10.9	-14.3
		1982	Costa Rica	9.4	6.3	3.7	-3.1	-5.7
		1983	Uruguay	15.4	9.1	8.5	-6.3	-6.9
		1984	Jamaica	25.6	18.9	15.7	-6.7	-9.9
		1985	Colombia	14.0	8.9	9.5	-5.1	-4.5
		1985	El Salvador	16.9	8.4	7.9	-8.5	-9.0
		1987	Bolivia	20.5	5.9	3.1	-14.6	-17.4
		1993	Barbados	25.6	14.6	9.3	-11.0	-16.3
		1994	Bahamas, The	13.4	7.6	6.9	-5.8	-6.5
		1995	Mexico	6.9	2.5	2.9	-4.4	-4.0
		1995	Nicaragua	16.9	10.9	12.2	-6.0	-4.7
		1996	Trinidad and	16.3	12.1	10.5	-4.2	-5.8
		1997	Cuba	7.1	4.1	1.9	-3.0	-5.2
		1999	Jamaica	15.7	11.7	9.6	-4.0	-6.1
		2000	Colombia	20.5	13.7	10.9	-6.8	-9.6
Middle East and Northern Africa	3.0% (2/66)	1995	Morocco	22.9	13.9	11.6	-9.0	-11.3
		2000	Algeria	29.8	17.7	13.8	-12.1	-16.0
South Asia (2)	4% (1/24)	1994	Sri Lanka	13.0	9.1	7.9	-3.9	-5.1
Sub Saharan Africa	0% (0/25)							

Notes: the number of observations refers to the number of country-year observations characterized by unemployment in excess of 3% that have not experienced the start of an episode within the last 7 years. ΔUnemployment refers to the 4 year change in unemployment from the onset of the event onwards. * indicates unemployment rates were imputed.

Table 3: List of Unemployment Reduction Episodes by Income Group and Initial Unemployment

<i>Unemployment Quartile</i>		<i>Income Group</i>				<i>Total</i>
		<i>Lower Middle</i>	<i>Upper Middle</i>	<i>High: Non-OECD</i>	<i>High: OECD</i>	
Q1	No.	1	0	0	0	1
(3.0<U<6.0%)	%	0.79	0.00	0.00	0.00	0.41
Q2	No.	0	3	1	3	7
(5.9≤U<8.7%)	%	0	4.41	4.55	3.37	3.13
Q3	No.	1	2	1	7	11
(8.7%≤U<12.6%)	%	2.86	3.64	3.33	6.86	4.95
Q4	No.	5	11	4	4	24
(12.6%≤U)	%	13.89	9.73	8.00	11.43	10.17
Total episodes	No.	7	16	6	14	43
Episodes average	%	4.07	5.54	4.88	4.12	4.64

Notes: No. refers to the number of episodes, % to the number of episodes as a share of those country-year observations that are characterized by unemployment in excess of 3% that have not experienced the start of an episode within the last 7 years

Table 4: Initial Conditions and Descriptive Statistics

Initial Conditions						
<i>Bolded, Italicized and Underlined</i>						
coefficients indicate that mean differences are significant at the 5% level						
	<i>Onset of an Episode</i>			<i>No Takeoff</i>		
	Mean	SD	N	Mean	SD	N
<i>Initial Unemployment</i>						
Unemployment	14.69*	5.75	42	11.67*	4.99	672
<i>GDP</i>						
GDP per capital (log)	8.25	1.19	41	8.38	1.10	668
GDP per capita growth	0.78	4.81	42	1.27	4.01	670
<i>Trade</i>						
Exports	38.66	17.09	40	35.33	19.22	665
Imports	37.75	16.35	40	38.27	20.15	665
FDI	2.67	2.42	41	2.14	5.60	644
<i>Core Macro</i>						
Investment	19.14	5.30	40	20.45	4.42	654
Government spending	17.21	4.60	42	16.85	5.77	658
Inflation	0.12	0.15	39	0.20	0.47	636
<i>Crisis</i>						
Crisis	0.14	0.36	35	0.12	0.33	478
<i>Democracy and Conflict</i>						
Polity Score	6.08	5.63	40	6.95	5.01	600
War	0.13	0.33	40	0.07	0.25	600
<i>Overall Regulatory Quality</i>						
Economic freedom (EFW)	6.35	1.08	41	6.21	1.08	605
Ease of Doing Business –Rank (DB)	56.90	44.51	40	68.75	47.17	654
Regulation (WGI)	0.62	0.63	42	0.57	0.57	662
<i>Dimensions of Economic Freedom (EFW)</i>						
Government Size	5.55	1.40	41	5.55	1.63	602
Legal System	6.15	2.26	40	6.20	2.00	592
Money	7.07	2.16	41	6.75	2.44	611
Free Trade	6.89	1.36	41	6.68	1.27	605
Regulation	6.17	1.01	40	5.90	1.12	598
<i>Labor Regulation</i>						
Rigidity of Employment (DB)	27.80	19.09	40	29.47	19.52	654
Unemployment Benefits	0.30	0.28	36	0.25	0.22	482
Severance Pay	1.14	1.69	36	0.96	1.33	489
Advance Notice	2.67	1.87	36	2.35	1.71	489
<i>Financial Openness</i>						
Financial Openness	0.64	0.29	36	0.63	0.25	495
<i>Trade Regulation</i>						
Time to Export - log(Days)	2.85	0.64	40	2.98	0.57	640
<i>Business Regulations (DB)</i>						
Starting a Business - log(Days)	3.43	0.80	38	3.57	0.92	596
Closing a Business - log(Days)	1.11	0.35	39	1.24	0.43	633
Time to Enforce a Contact -log(Days)	6.20*	0.52	40	6.41*	0.45	640
<i>Governance (WGI)</i>						
Rule of Law	0.49	0.98	42	0.47	0.87	664
Voice	0.53	0.81	42	0.54	0.73	664
Political Stability	0.29	0.91	42	0.18	0.86	664
Government Effectiveness	0.64	1.04	42	0.53	0.97	664
Control of Corruption	0.62	1.07	42	0.48	0.98	662

Note: Table includes country-year observations that are characterized by unemployment in excess of 6% that have not experienced the start of an episode within the last 7 years. * indicates that mean differences in the explanatory variable between countries that experience an episode and those that do not are significant at the 5% level.

Table 5: Evolution of Key Explanatory Variables

Evolution of Key Explanatory Variables: FE Regressions						
$Y_{it} = \beta_D * Beginning + \beta_E * End + u_i + \varepsilon_{it}$						
Dependent variable	Level		N	Demeaned		
Variable	β_B Beginning (t=1,2,3,4)/se	β_E End (t=5,6,7)/se		β_B Beginning	β_E End (t=5,6,7)/se	N
Unemployment	-1.902*** (0.309)	-5.350*** (0.333)	381	-2.113*** (0.306)	-5.188*** (0.330)	381
GDP per capita (log)	0.189*** (0.031)	0.506*** (0.034)	385	0.052** (0.021)	0.194*** (0.023)	385
GDP growth	3.759*** (0.351)	2.629*** (0.380)	385	2.577*** (0.347)	1.436*** (0.375)	385
Exports	4.658*** (0.564)	5.528*** (0.610)	365	2.769*** (0.560)	0.457 (0.605)	365
Imports	4.156*** (0.556)	5.717*** (0.601)	365	2.879*** (0.514)	1.680*** (0.556)	365
FDI	1.363*** (0.369)	2.985*** (0.398)	385	0.016 (0.379)	-0.299 (0.410)	385
Govt spending	-1.072*** (0.233)	-1.380*** (0.252)	385	-0.841*** (0.240)	-0.761*** (0.259)	385
Investment	0.553 (0.373)	2.232*** (0.404)	368	0.726** (0.354)	2.309*** (0.383)	368
Inflation (log)	-0.077** (0.032)	-0.074** (0.034)	377	-0.028 (0.033)	-0.016 (0.036)	377
Crisis	-0.147*** (0.029)	-0.144*** (0.031)	319	-0.111*** (0.029)	-0.111*** (0.031)	319
War	0.000 (0.021)	0.005 (0.023)	363	0.014 (0.021)	0.025 (0.023)	363
Polity	0.939*** (0.246)	1.631*** (0.266)	363	0.337 (0.262)	0.436 (0.283)	363
Financial Openness	0.084*** (0.015)	0.140*** (0.018)	313	-0.002 (0.010)	-0.009 (0.011)	313
Unemployment Benefits	0.004 (0.005)	-0.009 (0.006)	313	-0.006 (0.006)	-0.035*** (0.006)	313
Severance Pay	0.033 (0.027)	0.057* (0.031)	313	-0.019 (0.027)	-0.022 (0.032)	313
Advance Notice	-0.075 (0.086)	0.100 (0.100)	313	-0.156* (0.086)	-0.073 (0.100)	313
Economic Freedom	0.354*** (0.045)	0.584*** (0.049)	385	0.167*** (0.037)	0.198*** (0.040)	385
Regulation	0.323*** (0.046)	0.560*** (0.049)	379	0.114*** (0.037)	0.149*** (0.040)	379
Free trade	0.195*** (0.047)	0.218*** (0.051)	385	-0.010 (0.032)	-0.099*** (0.034)	385
Government Size	0.214*** (0.066)	0.519*** (0.071)	382	0.024 (0.065)	0.099 (0.070)	382
Legal System	0.056 (0.058)	0.314*** (0.063)	375	0.089* (0.053)	0.300*** (0.057)	375
Sound Money	0.944*** (0.117)	1.283*** (0.127)	385	0.488*** (0.107)	0.466*** (0.115)	385

Note: Table presents FE regression estimates of the form : $Y_{it} = \beta_D * Beginning + \beta_E * End + u_i + \varepsilon_{it}$, where the sample spans the four year period prior to the onset of an episode up until 7 years after it's onset. **Demeaned** denotes that the dependent variables are demeaned by the overall sample average in year t. This is done to remove spurious fluctuations due to common time effects. Episodes for whom unemployment rates three years prior to the onset of the episode were not available are excluded from the analysis.

Table 6: Predicting Episodes of Unemployment Reduction

Predicting Episodes: Probit Models – Marginal Effects at the sample mean Dependent Variable: Onset of an unemployment episode (Standard Errors in Parentheses)						
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment	0.009*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.012*** (0.003)	0.009*** (0.002)	0.009*** (0.002)
GDP per capita growth	-0.001 (0.003)		-0.001 (0.004)	-0.003 (0.004)	-0.002 (0.003)	-0.004 (0.004)
Log GDP per capita	-0.001 (0.011)		-0.002 (0.015)	0.010 (0.014)	-0.024 (0.015)	-0.038* (0.023)
Openness		0.001 (0.000)	0.001 (0.000)			0.000 (0.000)
Total Investment % of GDP		-0.004 (0.003)	-0.004 (0.003)			-0.004 (0.003)
FDI - net inflows		0.000 (0.001)	0.001 (0.001)			0.000 (0.001)
Government Spending % of		-0.000 (0.002)	0.000 (0.002)			0.005* (0.003)
Inflation (log)		-0.034 (0.034)	-0.039 (0.039)			-0.009 (0.031)
Polity		-0.001 (0.002)	-0.001 (0.003)			0.002 (0.003)
War				0.064 (0.060)		0.104 (0.092)
Crisis				-0.002 (0.042)		0.000 (0.038)
Economic Freedom					0.036** (0.015)	0.050*** (0.019)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	498	459	459	367	498	355
Pseudo R2	0.100	0.113	0.114	0.138	0.121	0.181

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors are heteroscedasticity robust and clustered by country, observations with unemployment lower than 6% were excluded from the sample.

Table 7: Robustness Checks

Table 6: Robustness Checks				
Probit models – Marginal Effects at the sample mean				
Dependent variable: onset of an unemployment episode				
(Standard Errors in parentheses)				
A. Alternative Indicators of Regulatory Quality				
	<i>Doing Business</i>		<i>WGI</i>	
Ease of Doing Business	-0.001*** (0.000)	-0.001** (0.000)		
Regulatory Quality			0.026** (0.012)	0.041*** (0.014)
Controls	IC	Full	IC	Full
Number of observations	488	355	471	333
Pseudo R2	0.118	0.178	0.115	0.174
B Additional Criteria				
	<i>Excluding declines in labor force participation</i>		<i>Stricter Sustainability</i>	
Economic Freedom	0.029** (0.011)	0.040** (0.016)	0.045*** (0.015)	0.054*** (0.019)
Controls	IC	Full	IC	Full
N	498	311	393	291
Pseudo R2	0.128	0.178	0.183	0.310
C. Different Treshholds				
	<i>10% higher</i>		<i>20% higher</i>	
Economic Freedom	0.032** (0.013)	0.042*** (0.016)	0.013 (0.012)	0.006* (0.006)
Controls	IC	Full	IC	Full
N	484	330	439	297
Pseudo R2	0.142	0.284	0.202	0.466
	<i>10% lower</i>		<i>20% lower</i>	
Economic Freedom	0.035** (0.014)	0.041** (0.019)	0.033** (0.015)	0.029 (0.020)
Controls	IC	Full	IC	Full
N	545	396	522	376
Pseudo R2	0.122	0.174	0.147	0.205
D Sample Restrictions				
	<i>No restrictions on initial unemployment</i>		<i>Excluding countries at war, in crisis or recovering from these</i>	
Economic Freedom	0.036** (0.015)	0.050*** (0.019)	0.057*** (0.017)	0.096*** (0.033)
Controls	IC	Full	IC	Full
N	498	355	298	156
Pseudo R2	0.121	0.181	0.141	0.247

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors are heteroscedasticity robust and clustered by country, observations with unemployment lower than 6% were excluded from the sample. “IC” means initial unemployment, GDP per capita (log), GDP per capita growth and year dummies were included as controls. “Full” means that, in addition to these, openness, investment, FDI, government spending as a share of GDP, inflation, polity, war and crisis were included as controls.

Table 8: Additional Robustness Checks: Accounting for Unobserved Heterogeneity and Rare Events Bias

Additional Robustness Checks: Alternative Estimation Methods					
Dependent variable: onset of an unemployment episode (Standard Errors in parentheses)					
<i>A. Correcting for Rare-Events Bias</i>					
	<i>Rare Events Logit</i>				<i>Logit (for comparison)</i>
	Coef/Se	<u>Attributable Risk</u>	Coef/Se	<u>Attributable Risk</u>	Coef/Se
Economic Freedom	0.565** (0.229)	3.93%	0.932** (0.365)	7.01%	0.604** (0.268)
Controls	IC		Full		IC
N	488		355		488
Pseudo R2	0.118		0.178		
<i>B. Accounting for Unobserved Heterogeneity</i>					
	<i>Random Effects Probit</i>		<i>Conditional Logit</i>	<i>Linear FE Model</i>	
	Coef/Se	Coef/Se	Coef/Se	Coef/Se	Coef/Se
Economic Freedom	0.375** (0.186)	0.375** (0.186)	2.600*** (0.994)	0.054* (0.029)	0.069* (0.040)
Controls	IC	IC	IC	IC	Full
N	626	626	285	626	460
Tests for RE and FE	LR χ^2 (1)=0.48	LR χ^2 (1)=0.48		F(72,529) =2.44(p=0.00)	F(53,374) =2.84(p=0.00)

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors are heteroscedasticity robust and clustered by country in the logit and random effect probit models, observations with unemployment lower than 6% were excluded from the sample. “IC” means initial unemployment, GDP per capita (log), GDP per capita growth and year dummies were included as controls. “Full” means that, in addition to these, openness, investment, FDI, government spending as a share of GDP, inflation, polity, war and crisis were included as controls. “Attributable Risk” measures the change in the probability of an unemployment episode commencing associated with a 1 point increase in the Economic Freedom Index from 0.5 points below the sample mean to 0.5 points above the sample mean.

Table 9: Bayesian Model Averaging Estimates

Bayesian Model Averaging Results (Dependent Variable: Onset of an Employment Episode – Logistic Regression Models)									
	Model Set 1 <i>Robustness Check</i> <i>Extended Specification</i>			Model Set 2 <i>Different Dimensions of</i> <i>Economic Freedom</i>			Model Set 3 <i>Alternative Policy</i> <i>Indicators</i>		
<i>Variable</i>	Mean (βY)	SD (βY)	PIP $P(\beta \neq 0 Y)$	Mean (βY)	SD (βY)	PIP $P(\beta \neq 0 Y)$	Mean (βY)	SD (βY)	PIP $P(\beta \neq 0 Y)$
<i>Extended Specification</i>									
Unemployment	0.167	0.040	99.9	0.165	0.041	99.7	0.16	0.04	100
Economic Freedom (EFW)	0.493	0.246	35.3						
Total Investment % of GDP	-0.063	0.055	7.6	-0.052	0.054	4.9			
Log GDP per capita	-0.145	0.343	7.5	-0.446	0.414	13.1			
War	0.765	0.694	7.4	1.146	0.782	11.4			
GovtSpending % of GDP	0.044	0.040	7.0	0.040	0.043	5.9			
Inflation (log)	-0.550	0.801	6.6	-0.041	0.970	3.9			
Openness	0.004	0.005	5.2	0.004	0.005	4.4			
GDP per capita growth	-0.041	0.052	4.8	0.004	0.005	4.4			
Polity	-0.007	0.045	3.9	-0.028	0.049	4.1			
FDI - net inflows	0.001	0.038	3.8	-0.005	0.042	4.0			
Crisis	0.147	0.578	3.6	0.137	0.584	2.9			
<i>Sub-components of the EFW index</i>									
Legal System				0.323	0.180	34.8			
Regulation				0.474	0.238	23.9			
Sound Money				0.164	0.108	12.4			
Free Trade				0.093	0.261	5.1			
Government Size				-0.048	0.162	4.5			
<i>Alternative Policy Indicators</i>									
Time to Enforce a Contract							-0.950	0.434	33.3
Control of Corruption							0.590	0.528	22.9
Rule of Law							-0.404	0.802	12.5
Time to Start a Business							-0.353	0.229	12.4
Severance Pay							0.178	0.156	9.3
Political Stability							0.291	0.304	9.3
Time to Export							-0.312	0.443	6.3
Financial Openness							-0.272	0.874	4.5
Time to Close a Business							-0.241	0.566	4.5
Unemployment Benefits							0.150	0.905	3.9
Advance Notice							0.023	0.114	3.9
Rigidity of Employment - DB							-0.004	0.010	3.9
N									
		355			329			377	

Note: All models include an intercept. Bayesian Model Averaging was implemented by means of the BMA package in R. (version 3.15.1) which uses approximate Bayes factors and Occam's window algorithm to reduce the model space to a set of parsimonious models that have decent explanatory power (following Raftery, 1995). The estimates presented for Model Sets 1, 2 and 3 were averaged over respectively 75,181, and 113 such models. For more information on the BMA package, see Raftery et al. (2012).

Figures:

Figure 1: Bulgaria has an Unemployment Reduction Episode; Macedonia Does Not

Figure 2: The Evolution of Unemployment during Unemployment Reduction Episodes

Figure 3: The Evolution of GDP per capita Growth during Unemployment Reduction Episodes