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Reform redux: Measurement, determinants and growth implications

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ABSTRACT

Measurement issues are one of the most important reasons for the highly contrasting findings in the literature on the effects of structural reforms on growth. This paper puts forward improved measures of economic liberalization across countries and over time, focusing on the unique experience of the transition economies. The paper shows that structural reforms, according to these new measures, follow a much richer dynamics than the one suggested by existing indexes. It also finds that such improved measures also generate stronger links with current theoretical work: in standard growth specifications, it finds that these new measures of reform have larger and more precisely estimated effects than the existing ones.

1. Introduction

Since the early 1990s, structural reforms have been implemented throughout the world with varying degrees of success. A large literature has developed although, according to two authoritative surveys (Drazen, 2000, and Persson and Tabellini, 2000), commensurate empirical evidence has yet to materialize: "the gap between theory and evidence is a final weakness of the existing literature" (Persson and Tabellini, 2000, p. 481). One would expect that evidence from developing and transition countries (i.e., from those that implemented large-scale economic reforms) would provide such empirical evidence at once, but that has not happened either.

Two central questions in the theoretical literature on structural reforms are why socially beneficial reforms are not implemented (Fernandez and Rodrik, 1991, Alesina and Drazen, 1991), and how can reforms be designed so that they overcome political resistance and are not reversed. On the latter, Dewatripont and Roland (1992, 1995) offer influential models of reform dynamics, motivated by the transition from communism. They stress the role of uncertainty about the outcome of reforms and the government choice of implementation sequence. Contrasting big-bang to gradualist strategies, they argue the latter are easier to implement as they involve learning. The main arguments in the case for a big bang approach include the costs of partial reforms, time-consistency issues, and the advantages of a political honeymoon in which credibility provide an opportunity to implement painful measures (see Martinelli and Tommasi, 1998). There are also important models arguing that crises trigger economic reforms (see Drazen and Grilli, 1993, Drazen and Easterly, 2001).

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Structural reforms are difficult to measure consistently across countries and over time. Some reforms (e.g., privatization) have elements of both "stroke of the pen national policies" (Easterly, 2006) and harder-to-change "institutions" (Acemoglu et al., 2006). Another important reason is the paucity of comprehensive reform measures. There are a number of studies that focus on one reform and/or on one country but few which study multiple reforms in more than one country over time.[1] A third reason is that results using the existing measures of reform are inconclusive. Babecky and Campos (2011) collect data from 43 econometric studies and show that the *t*-values of the more than 300 coefficients (on the impact of reforms on growth) follow a normal distribution with mean zero: about a third of them is positive and significant, another third is negative and significant and the remaining third is not statistically significant. They try explaining this variation in terms of differences in method, specification and measurement and find that measurement plays a key role.

The period after the collapse of communism generated what is arguably the largest natural experiment on economic reform in recent history and it is paradoxical that satisfactory indicators of reform are still unavailable. This paper tries to close this gap. The objective here is two-fold. One is to construct improved measures of privatization, external and internal liberalization reform efforts for 25 Eastern European and former Soviet Union economies since 1989. The second is to use these new measures to revisit various hypotheses raised in the theoretical literature.

The main findings are as follows. Compared to existing measures, ours generate a less optimistic assessment of the reform process, depicting it as much less smooth than previously thought (in other words, we find a much larger number of instances of reform reversals). We find that political reform (democratization) is the main determinant of reform (in the sense that it matters irrespective of the type of reform). We find a few important reform-specific determinants: economic growth for external liberalization and privatization, and concentration of political power for internal liberalization. Finally, we replicate various econometric studies on the effects of reform on growth and find that those effects, using our new measures of reform, are larger and more precisely estimated.

The paper is organized as follows. In the next section we briefly review the existing measures of reform and articulate a rationale for "reforming" reform measures. Section 3 presents the new reform indexes and benchmarks them against the indicators used in most of the literature. Section 4 assesses how the new measures further our understanding of reform determinants and implications for growth. Section 5 concludes and presents some suggestions for future research.

2. Rationale for improved reform measures

For the transition economies, international organizations are the main source of indicators of reform. The World Bank started this work in the early 1990s by putting forward three reform indicators, covering privatization and internal and external liberalization efforts. Later on, the European Bank for Reconstruction and Development (EBRD) took over this task and improved upon it by offering more (nine) detailed indicators of reform. The two sets are constructed in a similar manner, namely in three steps: (1) a comprehensive set of underlying objective variables is collected, (2) a common scale and weighting scheme is agreed upon, and (3) country and sector specialists study these data, judge them and agree on individual scores on each reform item for each country in each year (the top score is set to reflect the standards and performance typical of those in advanced industrial countries.)[2]

One main advantage of this approach is the ability to "quality-weight" the data. Consider, for instance, a government that chooses to manipulate the data because it believes that if more favorable figures are presented this would increase the likelihood of receiving a loan from an international organization or to improve the terms of that loan. Subjective or judgment-based indexes can to some extent discount, or give a lower weight to, such information. Another main advantage is that these indexes are available in a balanced panel format for all years since 1991.

The data effort carried out at the World Bank is presented in the *World Development Report 1996* (also in De Melo et al., 1996). The overall liberalization index is a weighted average of three areas: (1) internal markets (liberalization of domestic prices and the abolition of state trading monopolies), (2) external markets (liberalization of the foreign trade regime, including elimination of export controls and taxes, and substitution of low-to-moderate import duties for import quotas and current account convertibility), and (3) private sector entry (privatization of small-scale and large-scale enterprises and banking reform.) The weights for this overall liberalization index are determined a priori and set as follows: 0.3 for internal, 0.3 for external liberalization and 0.4 for privatization.

The EBRD (2004) reform indicators cover: large-scale privatization, small-scale privatization, governance and enterprise restructuring, price liberalization, trade and foreign exchange system, competition policy, banking reform and interest rate liberalization, securities markets and non-bank financial institutions, and infrastructure reform. The EBRD indexes on price and external liberalization and privatization are of particular interest. The price liberalization is based on a survey of national authorities and IMF country reports to determine the share of administered (regulated) prices in the Consumer Price Index as well as the share of goods with administered prices in a basket of "15 basic goods." It also takes into account whether wages are regulated. Concerning external liberalization, the EBRD reports on the share of trade in GDP, share of trade with non-transition economies and tariff revenues. With respect to privatization, the EBRD surveys national authorities for data on, inter alia, the share of privatized enterprises and the estimated share of private sector output and employment to GDP and total employment, respectively. The final, aggregate indexes take values from "1" to "4+." For instance, regarding price liberalization, higher values of the

[1] Lora (1997, 2001) focuses on five reforms in a sample of Latin American countries, including tax, trade and labor markets. Two other reforms that have received a great deal of attention are financial liberalization (Kaminsky and Schmukler, 2008, and Abiad and Mody, 2005) and privatization (Megginson and Netter 2001).

[2] "The transition indicators scores in Chapter 1 reflect the *judgment* of the EBRD's Office of the Chief Economist about country-specific progress in transition" (EBRD, 2004, p. 119, italics added).

index are associated with a smaller extent of regulated prices. Thus a score of 1 is obtained when most prices are controlled by the government. A score of 2 stands for some lifting of price administration, yet the state still sets the majority of prices. A score of 3 is reserved for significant progress in price liberalization, but still some involvement of the state in price regulation. A score of 4 stands for comprehensive price liberalization when only a small number of administered prices remain. A score of 4+ means that standards and performance are typical to those of advanced industrial countries with no price control outside housing, transport and natural monopolies.

What are the main issues with these efforts? We identify five potential issues: (1) lack of information regarding which are the variables that make up each index; (2) lack of information regarding how the underlying variables are combined into the aggregate indexes; (3) the fact that in the lists of potential underlying variables presented in the above mentioned reports one finds policy inputs as well as policy outcomes; (4) that the indexes change without attendant changes in the underlying data; and (5) that these indexes maximum score reflect an ill-defined reference point such as a "well-functioning market economy" or an "advance industrial economy."[3]

Let us now expand on each one of these. One first issue we identify is the difficulty of knowing the exact variables underlying each reform indicator. More precisely, accompanying each index one finds a (sometimes large) number of related variables. Yet, there are no statements indicating exactly which one of these variables is used in computing each reform index.

A second potential problem is that it is difficult to know exactly how the reform scores are generated. In other words, we were not able to find a description of how the set of underlying variables are translated into the overall scores. Notice that in the World Bank case, we know how each individual reform indicator is weighted in an overall reform index. But this is not what we have in mind here. We know how an aggregate reform index is constructed (that is, we do not know which variables are taken into account and what are the weights attached to each one of them) but we do not know how each of the three individual components are constructed (that is, an exact list of underlying variables and set of weights are not provided). The same concerns the EBRD indexes.

Third, in the list of underlying variables provided, one finds policy inputs as well as outcomes. For example, in the list of potential underlying variables often presented for external liberalization, one can find tariff levels as well as trade openness. Rodrik (2005) argues that we learn little from cross-country regressions of growth on reform because, inter alia, the literature does not separate effort from outcomes when measuring reform.[4]

Fourth, there are many instances in which the overall reform score have been revised despite the fact that the "underlying data" remained unchanged. This suggests the algorithm may well have changed but if this is the case, there is little documentation that can be drawn upon. The implications for empirical analysis are severe and under-appreciated: this issue translates in practice into what one may call a "perverse vintage effect." The existing reform indicators change depending on which year they were published. A study that uses say the privatization indexes for the second half of the 1990s published in 2002 will employ different values for such indexes than studies that use the privatization indexes for the second half of the 1990s published in 2006. Needless to say, econometric results using these data will differ. Take the case of the Baltic and Asian countries for example. Despite the fact that all the underlying data that is reflected in these indexes has not changed over the years, the reform indicators for the Baltics do improve over time while those for Asian countries tend to go the other way.

Last but not least, existing reform indicators are not continuous and are also benchmarked against an imprecisely defined reference point. They are ordinal variables taking values from 1 to 4+, the latter reflecting the level of liberalization achieved in an "advance industrial economy." Nicoletti and Scarpetta (2003) show that "advance industrial economies" are heterogeneous in how they implement economic reforms thus diminishing the usefulness of such comparator.

3. An attempt to improve the measurement of structural reforms

The objective of this section is to present the CH (for Campos–Horvath) indexes of structural reform we construct for 25 former communist economies between 1989 and 2001. We focus on three areas of reform. The first is internal liberalization reform efforts by which we mean the extent of price and wage liberalization. The second is external liberalization reform efforts, in particular the severity of trade barriers and capital controls. The third captures privatization reform efforts. How are these new reform measures constructed? Firstly, we compile an extensive set of underlying variables. Secondly, we evaluate various ways to normalize and aggregate these data, inter alia, simple averages, principal components and the one proposed by Lora (1997) and decide for the latter on the basis of it being the simplest, most transparent and the one approach that has been often used in the reform literature (Loayza et al., 2005). Thirdly, we classify these underlying objective indicators into "input" and "outcome" indicators of reform in order to generate input-only measures. Fourthly, and finally, we subject the CH indexes to various checks by (a) excluding outcome indicators (or conversely, by examining our preferred input-only measures of reform), (b) assessing reform dynamics across countries for various sub-periods and (c) comparing the CH indexes with those from the EBRD and World Bank.

In constructing these new indexes, we try to address each of the drawbacks we identify in the existing measures. More specifically (and referring to each potential problem discussed in the previous section), our goal is to be as transparent and explicit as possible regarding (1) what are the underlying variables that make up each of the three reform indexes, (2) how the underlying variables are combined into each of the reform indexes, (3) how we separate out reform efforts inputs from reform outcomes, (4) how the CH indexes change over time and how to relate these to changes in the underlying variables, and (5) how we use the in-sample maximum value of each index as a reference point (as opposed to an ideal "well-functioning market economy").

[3] In short, "There are a number of theoretical models that stress the role of reform strategies. Yet the data for discriminating among these models is lacking. The few indicators available are unnecessarily subjective" (Campos and Coricelli, 2002, p. 831).

[4] Loayza and Soto (2004) and Glaeser et al. (2004) make a similar point.

We set out to construct indexes of structural reform for 25 countries for all years between 1989 and 2001.[5] This time window covers the period following the collapse of communism as well as the late transition period. The underlying variables that make up each of the three CH reform indexes are available in Table A.1 in the Appendix A. [6]

How are these variables combined into each of the reform indexes? There are various aggregation methods available. Two obvious candidates are simple arithmetic averages and principal components. One major drawback of simple averages is that when we have so many underlying variables in different units and scales, the ensuing values of the indexes would be difficult to interpret. One major drawback of principal components is that maximum and minimum values of the resulting indexes are entirely determined by the data and have no clear economic meaning.[7] For these reasons, we choose to apply the methodology developed by Lora (1997). One important advantage of Lora's method is that it has been developed and used previously for similar purposes (that is, to capture various reform efforts across countries and over time). Further, in the Lora transformation, the reference point is within sample. In other words, it does not require to benchmark reform efforts against an ideal "well-functioning market economy." Our reference point is the maximum reform effort observed across our sample of countries over time. A drawback of this choice is that enlarging the time window and/or the sample of countries can affect the values of the indexes and minor improvement in one policy area might look like a very ambitious reform, as long as the other countries do not move (which, we believe, is less likely to influence the reform indicators, as most countries' reform efforts co-move, to a large extent). This drawback seems preferable to those of benchmarking against something that cannot be defined with sufficient precision, neither across countries nor over time.

We follow the procedure suggested by Lora (2001) to combine these variables into a single indicator. We normalize the underlying variables by equating the maximum for all countries and all years (or the minimum depending on whether higher values of the variable indicate more or indicate less reform) of each component to one. We calculate the distance from each country–year data point to the global maximum (which is normalized to one) by (a) subtracting each country–year data point from the overall minimum, (b) calculating the range for each series (that is, maximum minus minimum), and (c) dividing the results from (a) by those from (b). Therefore, our overall index I for i-th country is constructed as follows:

$$I_i = \frac{1}{m_i}\frac{1}{n_i}\sum_{j=1}^{m_i}\sum_{t=1}^{n_i}\left[\frac{V_{j\max} - V_{jit}}{V_{j\max} - V_{j\min}}\right] \tag{1}$$

where V is the value of the j-th variable in the i-th country at time t. n stands for the number of years (typically 13) and m for the number of variables. Also note that $V \in \langle 0,1 \rangle$ for all i, t, which is because we normalize the "raw" V value of the j-th variable by the maximum value observed in all countries at time t. Notice that, firstly, in the case of year-by-year indexes, we do not average over time and thus all terms containing n drop out. Secondly, the equation holds when higher values of the underlying variable indicate less reform (for the opposite case, the numerator becomes the difference between the actual value and the observed minimum).

How to separate reform inputs from reform outcomes? The distinction between input and output variables is not always clear cut. When measuring reform, it is advisable to focus on the indicators that are directly under the control of the government (Rodrik, 1996; Loayza and Soto 2004). Including outcome indicators in the construction of aggregate reform indexes may introduce bias in estimating the degree of liberalization. This is so because outcome indicators can be the result of many things other than reform inputs. In addition, it may well be the case that there is a time lag between reform inputs and reform outputs. Therefore, we try to construct input-only measures for three reforms yearly for 25 former communist economies, but also compute indicators combining inputs and outcomes as a robustness check. Our prior is that the correlations between the existing reform indexes will be lower with input-only CH indexes than with indexes that combine reform inputs and outcomes. If that is indeed the case, it may be evidence that existing indicators do mix inputs and outcomes (although we cannot be sure as they often lack a list of underlying variables).

Notice also that in selecting reform outcomes variables we need to minimize the probability that a "true reform input" is mistakenly classified as a "reform outcome." Hence, the resulting list of reform outcomes should only contain variables that are clearly reform outcomes and, conversely, the list of reform inputs will contain variables for which a certain level of reform outcomes is present. The reason for doing this is to try to "stack the cards" against our indexes as this will surely minimize the differences (over time and across countries) between the CH and other reforms measures.

How do input-only CH indexes of reform change across countries and over time? We make two general observations. The first is that the correlation coefficients among our three measures are all significantly positive, but surprisingly low (between 0.4 and 0.7). The second observation refers to reform reversals. While reform measured by the World Bank and EBRD indexes is better portrayed as a smooth, uninterrupted process of continuous improvement, it is a much more turbulent process according to our measures. Ours show a fair amount of trial and error and experimentation which translates in the occurrence of numerous reform policy reversals. This matters because reform reversals are at the heart of the theoretical literature (e.g., Dewatripont and Roland, 1995). According to Merlevede (2003) reversals are observed in 8.9% of the cases for EBRD indicators. Considering our three indexes, the reversals occur in 14–20% of the cases depending on the reform indicators.

[5] These are: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldavia, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

[6] See the working paper version, Campos and Horvath (2009), for detailed definition, coding and source for each one of these variables.

[7] Simple averages and principal components versions of our indexes are available upon request.

How do the CH measures compare to the existing indicators? Note that the EBRD liberalization indexes cover the years 1991–2001 and the World Bank index developed by de Melo et al. (1996) is available only for 1989–1997. Thus, correlation coefficients are based on these years. The results are given in Table A.2. Clearly, the correlations are always lower, when we exclude the reform outcomes suggesting that the previous indexes were likely to mix inputs with outcomes.

4. Empirical results

The objective of this section is two-fold: firstly, to assess the factors that help explain structural reform dynamics across countries; and secondly, to re-estimate various econometric models from the literature using the CH indexes so as to have a sense on how much difference they make.

4.1. Reform determinants

What are the main determinants of economic reform? Here we consider some of the key insights from the theoretical literature on the political economy of reform to throw light on the determinants of each of our three indicators. The literature discussed above has generated a number of hypotheses (Roland, 2000). One set of potential determinants is related to economic conditions: favorable changes in economic conditions (e.g., less unemployment) allow greater margins to the reforming government to compensate losers and thus implement "more reform" (Aghion and Blanchard, 1994). A closely related notion is that of the consequences of a sharp deterioration in economic conditions: an economic crisis increases the number of supporters (that is, potential winners) of reform. Another well understood set of reasons relate to politics, e.g., more democratic countries would be able to implement more reform (because, for instance, democratic elections allow the monitoring of compensation promises). Further, less concentrated political power (an example would be communists loosing seats in Parliament) would be associated with the implementation of "more reform" (Hellman, 1998).

Let us now turn to the econometric methodology. There are two main questions: (a) what are the factors that determine the dynamics of reform across countries and over time? And (b) are the set of determinants the same for each of the three reform areas (namely, privatization, and external and internal liberalization)? Based on the large case study evidence on reform dynamics cited above, on what we learned about this process in collecting the underlying data for our objective indexes and the attendant discussion with public officials, our prior is that these three reforms are driven by different factors. This is partly because we observe a distinct sequence of reforms. Internal liberalization happened immediately after the fall of communism (often with the exception of wage regulation). This was followed by external liberalization and then by privatization efforts. This sequence makes it unlikely that the same set of determinants would hold for each of our three different reforms measures. Moreover, if there were an identical set of determinants there will be little reason to focus on individual reforms. Such strategy would not do justice to the complex dynamics we observe with respect to reform efforts across these countries over time (our results below corroborate this insight).

In what follows, we will examine the determinants of each of the three reform areas separately. [8] We first estimate the following equation:

$$R_{itc} = \beta_0 + \beta_1 GDPgrowth_{tc} + \beta_2 Unempl_{tc} + \beta_3 Democracy_{tc} + \beta_4 IC_{tc} + \beta_5 V_{tc} + \varepsilon_{itc} \quad (2)$$

where R_{itc} stands for the CH indexes of reform, with i denoting reform area (privatization, external or internal liberalization), t denoting year and c denoting country. $GDPgrowth_{tc}$ is the rate of real per capita GDP growth (in country c and year t), $Unempl_{tc}$ is the unemployment rate, $Democracy_{tc}$ is the Freedom House index of democracy (the continuous version from their *Nations in Transit* project defined in the way that the higher values of the index mean less democracy), IC_{tc} is a principal components index of initial conditions[9] and V_{tc} is a vector of auxiliary control variables. We expect the coefficient on GDP growth, unemployment and initial conditions to be positive (the hypotheses are that faster growth, higher unemployment and more favorable initial conditions are more conducive to the implementation of reform) and expect the coefficient on democracy to be negative (the hypothesis being that democracy is more conducive to the implementation of reform).

Table 1 has our econometric results on the determinants of each of our three indexes of reform. The first three columns show these results for the CH internal liberalization index. In this case, the Hausman test indicates that the random-effects estimator is appropriate. The results in column 1 broadly confirm our hypotheses: GDP growth, unemployment and democracy all exert a positive and statistically significant impact on internal liberalization efforts. Initial conditions (reported in the next column) seem to have little impact on those coefficients. Yet, the results suggest that countries with more favorable initial conditions are more likely to implement internal liberalization reforms. In the third column we add a Herfindahl index of concentration of political power

[8] An instrumental variable estimator is employed. The list of instrumental variables is as follows: the initial conditions (first and second factor from principal component analysis of 11 variables capturing the social and economic characteristics of transition countries before 1989), distance from Brussels in km, the share of industry to GDP in 1989, the dummy for the CIS, time of the start of transition, the value of democracy in 1989, the number of assassinations and the share of women in parliament. We also estimated the equations with lagged regressors and obtained largely the same results, which are available upon request. We also introduced squared unemployment and squared GDP, but failed to find them significant. One reason for introducing the squared variables is to disentangle the theories of Fernandez and Rodrik (1991) and Aghion and Blanchard (1994), who put forward that better (or worse in the case of the latter theory) economic conditions foster more reform.

[9] Initial conditions are a measure of the macroeconomic distortions as of 1989 and are constructed in line with, among others, EBRD (2002) and Merlevede (2003).

Table 1
What drives reform? Panel estimates.

	Campos–Horvath Index								
	Internal liberalization			External liberalization			Privatization		
GDP growth	0.003**	0.003*	0.003	0.001***	0.01***	0.007***	0.007***	0.007***	0.004***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Unemployment	0.011***	0.014***	0.006	0.019***	0.016***	0.017***	0.015***	0.011***	0.009***
	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Democracy	−0.04***	−0.04***	−0.04***	−0.06***	−0.07***	−0.05***	−0.05***	−0.04***	−0.04***
	[0.011]	[0.011]	[0.012]	[0.010]	[0.010]	[0.010]	[0.010]	[0.009]	[0.001]
Initial conditions		0.126***	0.112**		0.096***			0.062**	0.043*
		[0.042]	[0.046]		[0.034]			[0.026]	[0.026]
Herfindahl Index			−0.123*						
			[0.064]						
OECD growth						0.055***			0.088***
						[0.013]			[0.015]
Observations	262	262	189	264	264	244	247	247	227
No. of countries	25	25	24	25	25	25	25	25	25
Hansen J-overident. test	9.54	6.35	4.32	6.50*	4.68	3.43	2.24	1.56	1.23
Kleiberger Paap F stat	5.98	2.98	2.87	9.09	2.79	2.65	10.25	2.95	2.14

Robust standard errors are in brackets. * Statistically significant at 10% level, ** Statistically significant at 5% level, *** Statistically significant at 1% level. Fixed effects estimates reported if the consistency of random effects is rejected by Hausman test at 5% level.

(referring to the number of seats in the lower house). Although this addition proves to be of interest (we find that in parliaments in which political power is less concentrated, reforms move farther), the coefficients on growth and unemployment are now less precisely estimated.

The next set of columns has the results for external liberalization. In this case we have a more robust set of determinants in that now GDP growth, unemployment and democracy all have the expected effects. It is interesting to note that while the effect of democracy is smaller for internal liberalization than for external liberalization and privatization, this is inverted with regard to initial conditions. We believe this is in part because of the timing of these reforms: internal liberalization takes root much faster than external and privatization, thus leaving little time to the process of democratization to play a fuller role (notice however that low concentration of political power is an important determinant in this respect) with a similar reasoning applying for the role of initial conditions on privatization (the latter generally takes place too late for the effect of those initial conditions to be fully felt). Also notice that we report that the growth of OECD countries, as a measure of global economic conditions, is an important reform determinant in this case: external liberalization is more likely to be implemented under favorable global economic conditions.

As it also can be seen from Table 1, the results for privatization are in line with those for external liberalization. GDP growth, unemployment rates and initial conditions show a positive and significant impact, while the coefficient on democracy also accords to our priors. For example, the consistent result we obtain showing that higher unemployment rates are associated with more reform efforts can be understood in conflicting manners: it can well be that rising unemployment enlarges the ranks of potential winners and thus increase the support for reform leading to the intensification of reform efforts (which is, as noted above, consistent with the Fernandez and Rodrik model) or it can be that reform directly causes a (temporary) increase in the rate of unemployment (consider the case of privatization). A common concern in literature on instrumental variable estimation is about the validity of instruments. For this reason, we use Hansen J-test for overidentifying restrictions and Kleiberger and Paap test for weak instruments. The results – available in Table 1 – do not show support for weak instruments. Similarly, examining simple correlations shows that many instruments are well correlated with endogenous explanatory variables. The correlations are available upon request. Similarly, the overidentifying restriction tests suggest that our instruments can be considered exogenous.

We subjected the results above to various sensitivity checks (see working paper version, Campos and Horvath (2009), for the further regression details). We find that greater inflation rates decrease external liberalization and privatization efforts (but not internal liberalization.) We also investigate the role of financial crisis (measured as the weighted average of exchange rate pressure and interest rate differentials) and do not find that it affects the CH reform indicators with the somewhat surprising exception of privatization (similarly, fiscal deficit is never statistically significant). We have also examined a number of political issues. EU negotiations (a dummy variable taking the value of 1 from the year when EU accession negotiations started) are found to affect positively external liberalization as well as privatization efforts, but not internal liberalization. This is maybe a consequence of price and wage liberalization occurring well before negotiations started. The occurrence of violent conflict was found to have a surprisingly limited impact: controlling for initial conditions in our baseline specifications, the coefficient on wars is statistically significant at conventional levels only for the case of privatization. Following Frye and Mansfeld (2004), we create a variable capturing the electoral calendar (the number of years until elections). Surprisingly, we find little evidence for the timing of elections in driving any of our reform indicators except for external liberalization. Further, we employ various measures of changes in government's ideological orientation to address the potential effects of political alternation on reform. For this purpose we use the number of ideological alternations (e.g., from center-left to center-right) and the number of leadership changes (data are from Hoff et al., 2011). We find that cumulative leadership and political changes are positively associated with our three indexes of

reform. Not surprisingly, for two of them (internal and privatization) we find that these measures of political alternation substitute for democracy as the latter becomes insignificant after the inclusion of any of the two alternation variables. Finally, we assess the possibility of reform contagion: whether countries are more likely to implement reform say because of learning from the experience of close neighbors or because reform in close neighbors directly induces domestic reform (consider the case of competition among countries for FDI inflows). However using various such measures (distance from Brussels, distance between capital cities, whether or not previously part of the Soviet Union), we fail to find that reforms are driven by how much other "close" countries reform. In a nutshell, with the exception of the political and ideological alternation variables, we find no robust additional determinant of reform efforts, while our principal results remained unchanged.

4.2. Growth implications and endogeneity issues

The results above suggest that the CH indexes are useful and reliable in furthering our understanding of reform. Yet, the literature on the economic effects of reform has long recognized that growth and reform may be jointly determined. The reform is carried out in the expectation that it will translate into faster growth rates, while at the same time a growing economy enables a reformist government to compensate losers from reform and thus continue, or even intensify, reforms. There is also the notion that the impact of reform on growth occurs with a lag: the contemporaneous effect of reforms on growth may be negative, while at the same time the lagged effect may be positive. It is thus important to investigate what are the ultimate consequences, in terms of existing econometric results, of using the CH indexes. One way to address such issues is to directly re-estimate some of the "reform equations" from the literature using our reform indicators instead and compare the ensuing coefficients. Also, there is now a somewhat sizable literature on the effects of reform on growth which has, generally speaking, found a positive impact of reform on growth when reform is proxied by the subjective indicators we discussed above. It is also important to investigate whether our objective indexes change these results.

We select four well-known papers that report a first-stage reform equation. Table 2 contains the "reform equations," while Table 3 has the corresponding "growth equations." The reform equations we re-estimate are originally from Heybey and Murrel (1999), Merlevede (2003), Falcetti et al. (2002) and Kim and Pirttila (2006). It is worth noting that we use the same variables in the replication, except the reform measures.[10]

Heybey and Murrel (1999) specify reform (as measured by the World Bank indexes) as a function of economic growth, democracy as measure by the Freedom House index, the extent of initial economic liberalization and the share of manufacturing on GDP. Their results are reproduced in the second column of Table 2: although economic growth facilitates the implementation of economic reforms, an extensive history of reforms attempts seems to be a hindrance. Using our reform indexes, we are able to reproduce their results with respect to the initial level of liberalization and indeed strengthen them in the sense that the coefficient is larger and estimated more precisely. Yet, we could not reproduce the result for economic growth.[11]

Merlevede (2003) analyzes the impact of reform reversals. The paper reports the coefficients from a reform equation. Merlevede's data show that reform (measure by the EBRD indexes) is driven by contemporaneous economic growth and democracy as measured by the inverted Freedom House (in the inverted index, higher figures indicate more democracy). He reports that initial conditions matter in explaining reform dynamics. Using the CH reform indexes, we are able to replicate the finding that democracy is an important factor in driving reform. However, we do find that although contemporaneous growth is positively associated with reform progress, lagged economic growth turns out to be inversely related to reform. The latter result can be interpreted as supporting the notion that economic crises are important determinants of reform. Finally, we find little support for the role of initial conditions.

As it can also be seen from Table 2, one main feature of the reform equation from Falcetti et al. (2002) is the attention to initial conditions. The CH indexes not only reproduce the growth effects reported by Falcetti et al., but they are also in this case estimated more precisely and the size of the coefficients is larger. The situation with respect to democracy is similar, though the size of the coefficient is smaller. One main difference is that we find little evidence supporting the notion that initial conditions play a significant role in explaining reform dynamics.[12]

The last reform equation in Table 2 is from Kim and Pirttila (2006). It explains reform dynamics using various macroeconomic variables. More specifically, growth and budget surpluses are expected to foster reform efforts (because, for instance, both increase the government credibility in terms of compensating potential losers) and unemployment and inflation are expected to hinder reform efforts (because, for instance, both increase individual and aggregate uncertainty, as in Dewatripont and Roland, 1995). Our reform indexes not only reproduces the growth effect reported by Kim and Pirttila, but have it estimated more precisely and, once again, the value of the coefficient is larger than in the original. Interestingly, however, we find opposite results with respect to unemployment: in ours, changes in the rate of unemployment (note that the Arellano–Bond estimates refers to

[10] In order to replicate these results we generate an aggregate index of reform effort (using the Lora normalization described above and averaging the three reform indexes).

[11] The replication results for Heybey and Murrel's growth equation is available upon request.

[12] These are capture by two principal components: the first denoted by IC1 is interpreted as macroeconomic distortions inherited from socialism (largest loadings are for the pre-1990 black market premium, repressed inflation, and share of CMEA trade over GDP). IC2 is interpreted as the level of socialist development as the largest loadings are for real GDP per capita in 1989 and share of population in urban areas in 1990.

Table 2
Joint estimation of reform and growth: reform stage panel results.

	Heybey Murrell		Merlevede		Falcetti et al.		Kim Pirttila	
	Original	With CH reform indexes	Original	With CH reform indexes	Original	With CH reform indexes	Original	With CH reform indexes
Growth	0.006***	0.006	0.056***	0.035***	0.08***	0.36***	0.002	0.003**
	[0.002]	[0.03]	[0.004]	[0.001]	[0.01]	[0.05]	[0.002]	[0.001]
Growth-lagged			−0.003	−0.011***	−0.01***	−0.12***		
			[0.002]	[0.004]	[0.004]	[0.04]		
Time IC1			−0.34***	0.004	−0.02***	0.004		
			[0.091]	[0.005]	[0.007]	[0.04]		
Time IC2			−0.12	0.0001				
			[0.12]	[0.005]				
Freedom House	0.008	−0.014	0.81***	−0.049***	−0.15***	−0.05***		
	[0.005]	[0.1]	[0.32]	[0.014]	[0.06]	[0.01]		
Industry	0.13*	0.35						
	[0.07]	[0.62]						
Lib. Index 1989	−0.2***	−0.63***						
	[0.05]	[0.23]						
Inflation							0.007	−0.007
							[0.01]	[0.02]
Unemployment							−0.03***	0.02***
							[0.01]	[0.007]
Gov. balance							0.002	0.002
							[0.002]	[0.003]
R^2/Chi-squared	0.48	0.35	770***	123***	434***	123***	0.59	0.23
Estimation	3SLS	3SLS	3SLS	3SLS	3SLS	3SLS	2SLS	2SLS

Robust standard errors are in brackets. * Statistically significant at 10% level, ** Statistically significant at 5% level, *** Statistically significant at 1% level. CH stands for Campos–Horvath.

Table 3
Joint estimation of reform and growth: growth stage panel results.

	Fidrmuc		Falcetti et al.		Merlevede		Kim Pirttila	
	Original	With CH reform indexes	Original	With CH reform indexes	Original	With CH reform indexes	Original	With CH reform indexes
Liberalization	23.3***	26.3***	−13.3	−48.6***	−8.35	−73.2***	−0.86	2.16
	[6.65]	[4.1]	[8.26]	[13.5]	[10.84]	[19.1]	[0.81]	[1.74]
Lib. index (lag)			10.84***	52.7***	10.79**	75.1***		
			[3.99]	[11.6]	[4.82]	[16.7]		
Time IC1			0.27***	0.06	0.78***	0.12		
			[0.09]	[0.09]	[0.16]	[0.1]		
Time IC2					0.11	−0.09		
					[0.23]	[0.12]		
Fiscal	0.073	0.16	0.34***	0.09	0.22**	0.08	0.38***	−0.09
	[0.11]	[0.11]	[0.12]	[0.08]	[0.1]	[0.1]	[0.13]	[0.1]
School	0.019	−0.02						
	[0.137]	[0.04]						
Investment	0.104	0.001**					0.24***	−0.0001
	[0.244]	[0.0003]					[0.05]	[0.0002]
War	−5.97***	−12.7***						
	[1.729]	[2.99]						
Reform reversal					25.47*	111.7***		
					[13.55]	[28.1]		
Growth-lagged							0.37**	0.29***
							[0.11]	[0.1]
Cum Lib. index							9.04***	3.07*
							[3.4]	[1.46]
Fiscal-lagged							−0.92	0.55***
							[0.89]	[0.21]
Inflation-lagged							0.52	0.01
							[1.13]	[0.16]
R^2/Chi-squared	0.76	0.28	241***	196***	411***	170***	3263***	1238***
Estimation	FE	FE	3SLS	3SLS	3SLS	3SLS	AB	AB

Robust standard errors are in brackets. * Statistically significant at 10% level, ** Statistically significant at 5% level, *** Statistically significant at 1% level. AB stands for Arellano–Bond estimator and CH for Campos–Horvath.

variables in first-differences) are associated with an increase in reform efforts. Interestingly, the coefficients on inflation and unemployment both have the same sizes as in Kim and Pirttila, but opposite signs.

We now turn to the replication of the attendant growth equations to investigate whether using our reform indexes change existing results on the economic impact of reform. The growth equations we re-estimate are originally from Fidrmuc (2003), Merlevede (2003), Falcetti et al. (2002) and Kim and Pirttila (2006). The specification from Fidrmuc (2003) has as main arguments contemporaneous reform, fiscal balance, school enrolment and investment rates, and involvement in armed conflict. The first column in Table 3 shows Fidrmuc's original coefficients while the second column shows ours. As it can be seen, our reform indicators are able to replicate all the original results, but with our measure these coefficients turn out to be larger and more precisely estimated (notice that originally the coefficient on investment was not statistically different from zero).

The specifications from Falcetti et al. (2002) and from Merlevede (2003) are similar. The main difference is the latter having an additional dimension for initial conditions and a dummy variable capturing the occurrence of reform reversals. From the Falcetti et al. equation, we are able to replicate and improve upon the reform results (again more precisely estimated and larger). Note however that using the CH indicators, we find little support for the role of initial conditions as well as for the role of fiscal balances. The outcome is similar with respect to Merlevede's specification: the coefficients on the CH reform indexes are more precisely estimated and larger than in the original paper. Finally, the results from Kim and Pirttila (2006) are shown in the last two columns. They argue that growth is mainly driven by reform, cumulative reform, fiscal balance, investment, and inflation. Using the CH reform indexes, we are again able to replicate these results although this was the only case in which our coefficients are slightly smaller and not in every case more precisely estimated.

In sum, our new measures of reform seem able to replicate key results from the literature. These new measures show a much stronger effect on growth (contemporaneous and lagged), but a smaller (yet still significant) effect of cumulative reform. Crucially, re-estimating some of the main growth equations from the literature using these new measures provide less support for economic initial conditions.

5. Conclusions

This paper tries to contribute to the growing literature on the political economy of reform. There have been very few efforts trying to take the many theoretical insights to the data. This is in part because reform is a political economy topic *par excellence*: reform is multidimensional and it is driven by the complex interplay of political and economic forces. The transition from communism to capitalism in Central Europe and the former Soviet Union is arguably the largest natural experiment on economic reform in recent history and it is paradoxical to say the least that efforts to systematically measure such reforms efforts have not emerged. In particular, the paucity of objective indicators of reform is, in our view, a reason for serious concern. This paper tries to address this gap by constructing measures for three main reform areas in the transition economies since 1989. Compared to the existing (subjective) indexes, the CH measures generate not only a less optimistic assessment of the reform process, but also depict it as a much less smooth process than previously thought. We also believe this is one of the first papers to try to implement empirically the distinction between reform efforts inputs and outcomes. Among the main determinants of reform, we find domestic growth for external liberalization and privatization, concentration of political power for internal liberalization, and democracy for all three of them. We replicate the results from the main econometric studies of the effects of reform on growth and find that those effects, using the new measures of reform, are larger and more precisely estimated.

In terms of future work, the main suggestions we offer are as follows. First, it is important to provide improved indicators for more reforms, while simultaneously offering more detailed dis-aggregation. For instance, future work should separate out wage from prices liberalization in order to throw light on what seems to be their very different dynamics. In terms of additional reforms that we believe should be examined, those of a more institutional nature that fall under the heading “2nd generation reforms” should be given top priority (see Efendic et al., 2011, or de Jong and Bogmans, 2011, for recent evidence). These encompass important areas such as competition policy, financial sector anti-corruption initiatives and judiciary reform. The second main suggestion we offer builds upon the first: to study interdependencies between the reform areas (that is, to focus on the issues of complementarity, sequencing and speed of reforms). Even though some work on complementarities in now available (Braga De Macedo and Oliveira Martins, 2008, Braga De Macedo et al., 2010 and Coricelli and Maurel, 2011), it should be subjected to different measures of reform. Future research would do well in examining the relationship between objective indicators of reform in more areas and attempt to identify differences in their sequencing and speed so as to allow a well-informed discussion of the possible relationship between the different reform speeds and sequences, on the one hand, and political development, reform outcomes and aggregate economic performance, on the other.

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Appendix A

Table A.1
Variables underlying each of the Campos–Horvath reform indexes.

Reform inputs	Reform outcomes
Internal liberalization index	
1. Number of goods subject to price regulation (basket of 15 goods)	3. Share of administered prices in CPI
2. Wage regulation	
External liberalization index	
1. Compatibility with Article VIII	25. Share of trade with non-transition countries
2. Controls on commercial credit	26. Openness
3. Controls on foreign direct investment	27. Import duties as % of tax revenue
4. Controls on liquidation of FDI	28. Tariff revenues as % of imports and taxes on international trade
5. Documentation requirements for release of foreign exchange for imports	29. Tax revenues from international trade
6. Exchange rate taxes	
7. Export duties as % of tax revenue	
8. Export licenses	
9. Export taxes	
10. Import licenses and quotas	
11. Import tariff rate	
12. Interest rate liberalization	
13. Investment transactions	
14. Multiple exchange rates	
15. OECD membership	
16. Permission for foreign exchange accounts held abroad by residents	
17. Permission for foreign exchange accounts held domestically by residents	
18. Permission of foreign exchange accounts for non-residents	
19. Repatriation requirements	
20. Repatriation requirements for invisible transactions	
21. Surrender requirements	
22. Surrender requirements for invisible transactions	
23. Tariff code lines	
24. WTO membership	
Privatization index	
1. Share of small firms privatized	7. Private sector share in GDP
2. Total number of enterprises privatized	8. Credit to private sector
3. Total number of small and medium-sized enterprises privatized	9. Private sector investment as % of GDP
4. Total number of large enterprises privatized	10. Privatization revenues
5. Share of foreign-owned banks in total number of banks	11. Asset share of private-owned banks (in %)
6. Total number of private enterprises	

Table A.2
The correlations between the Campos–Horvath indicators and other reform indicators.

	Reform inputs only		Reform inputs and outcomes	
	EBRD	WB	EBRD	WB
Internal liberalization	0.52	0.38	0.56	0.42
External liberalization	0.79	0.65	0.81	0.73
Privatization	0.62	0.41	0.80	0.52

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