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Does social trust speed up reforms? The case of central-bank independence

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Abstract: Many countries have undertaken central-bank independence reforms, but the years of implementation differ. What explains such differences in timing? This is of interest more broadly, as it sheds light on factors that matter for the speed at which economic reforms come about. We study a rich set of potential determinants, both economic and political, but put special focus on a cultural factor, social trust. We find empirical support for an inverse u-shape: Countries with low and high social trust implemented their reforms earlier than countries with intermediate levels. We make use of two factors to explain this pattern: the need to undertake reform (which is more urgent in countries with low social trust) and the ability to undertake reform (which is greater in countries with high social trust). Overall, our findings imply that culture matters for institutional change.

JEL classification: E52, E58, P48, Z13.

Keywords: Central banks, Independence, Social trust, Inflation, Monetary policy, Reform.

1. Introduction

One of the strongest instances of institutional change since the late 1980s has been the increase in central-bank independence (CBI) in many countries (Crowe and Meade, 2007; Cukierman, 2008; Arnone *et al.*, 2009). The underlying motivation of the reforms leading up to this greater independence is a belief that they contribute to lower inflation rates by limiting

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the discretionary power of politicians, who have an incentive to use monetary policy for electoral gain (Kydland and Prescott, 1977; Rogoff, 1985). There are, indeed, indications that CBI has been successful in this regard (Brumm, 2006; Acemoglu *et al.*, 2008; Klomp and de Haan, 2010). However, the year of implementation of these reforms differs between countries. What explains such differences in timing? Knowing the answer to this question is important, since it helps clarify which factors that facilitate or stall important economic reforms.

Therefore, we analyse potential determinants of how long it takes for CBI reforms to come about. We include political and economic factors – but also cultural variables, with special attention being paid to social trust, measured as the share of a population that thinks that people in general can be trusted. An increasing number of studies find that cultural factors, not least social trust, help explain economic, political and social outcomes (Alesina and Giuliano, 2013; Algan and Cahuc, 2013).

In particular, we present reasons for expecting an inverse u-shaped relationship between social trust and the time it takes for CBI reform to be undertaken. The idea is that low trust entails a strong *need* for reform, which will induce policymakers to try to undertake it more swiftly, while high trust entails a strong *ability* to undertake reform, which will facilitate for policymakers to agree on it and to push it through. These two factors explain why low and high trust can be expected to be associated with relatively quick policy reform. At intermediate trust levels, however, there is neither need nor ability strong enough to speed up the reform process, making it slower.

Our empirical analysis supports such a pattern, for our full sample as well as for democracies and autocracies separately. Interestingly, for democracies, the inverse u shape is skewed, such that it is almost linear. This suggests that the predominant relationship is one of higher social trust being associated with faster CBI reform in this subsample. In addition, we find that some factors, in addition to trust, tend to speed up reforms: inflation, democracy, change to democracy, membership in the European System of Central Banks (ESCB), number of CBI reforms in countries with which there is economic cooperation, uncertainty avoidance and masculinity. Some other variables, on the contrary, seem to prolong the time to reform: unemployment and IMF credits.

To our knowledge, this is the first study to look at cultural, political and economic factors as potential explanations of how fast economic reforms are implemented. Alesina *et al.* (2006) include economic and political variables but not cultural ones; they find that reforms are more rapidly adopted after crises, when new governments take office and when strong presidents or clear legislative majorities are present. Otherwise, previous studies do not

primarily look at the speed of reforms but at factors that might affect reforms coming about or the scope of reforms. For example, Heinemann and Tanz (2008) study how social trust relates to market-oriented institutional reforms, and they find evidence that it promotes such reforms in three areas: government size, the legal system and the regulation of private companies and the labour market. Pitlik and Wirth (2003) report that inflation and growth crises, as well as democracy and a divided system of government, are positively related to liberalization. Similarly, Pitlik (2008) shows that a bad growth performance is conducive to liberalizing reforms in democracies but not in autocracies; and Giuliano *et al.* (2013) find a positive effect of democracy on the adoption of economic reforms. Daunfeldt *et al.* (2013) find that CBI reform was more probable in non-OECD countries if there had been high and variable inflation in the past and if the politicians faced a high probability of being replaced.

With this as the background, we first outline our theoretical idea of the relationship between social trust and reform speed; we then present our data and empirical methodology; after which the results, and our interpretation, are introduced.

2. Social trust and central-bank independence reform

The basic starting point is a situation with ‘too high’ inflation, as perceived by central political decision-makers. They then ponder how to reduce it, and if they (or their advisors) have read their Kydland and Prescott (1977) and Rogoff (1985), they realise that the situation is the result of the institutional setting within which monetary policy has been conducted and the incentives this setting has entailed. The question is how a change in this setting that results in lower inflation can be achieved and, when a solution (CBI reform) has been identified, how it can be brought about in a quick manner. It is here that social trust becomes important, for explaining the speed with which CBI reform comes about. In essence, the question is to what extent a cultural variable has bearing on the nature of institutional change.

Two relevant factors: need and ability

We propose, primarily inspired by Heinemann and Tanz (2008) and Berggren *et al.* (2014), that two factors are relevant: the need and the ability to undertake reform. The main difference between this study and these two is that the former looks at the *general* relationship between social trust and reforms, while we look at CBI reforms with their special characteristics, and that the latter looks at the relationship between social trust and a *de jure*

index of CBI, while we look at the time it takes for CBI reform to come about.

The need for CBI reform is greater the lower the level of social trust. The reason is that with little trust, the underlying problem of the situation, identified by the literature on time inconsistency in monetary policy as a credibility or *lack-of-trust* problem, is worse.¹ Plausibly then, inflation is also higher. A low-inflation monetary policy is not credible if people and financial actors do not trust the politicians to adhere to stated goals of keeping inflation low, and the well-known result with high inflation ensues. This makes it more important to change the institutional setting for monetary policy such that a decision-making instance that will not face incentives to raise inflation gets more power. This implies a more independent central bank (in line with Rogoff, 1985). However, if people trust others, including policymakers, plausibly because of displayed trustworthiness, the lack-of-trust problem is smaller and inflation arguably lower (albeit still possibly perceived to be too high). In that case, the need for CBI is smaller. If the need for reform is perceived to be high, then actors will also make stronger efforts to make it come about, and the more probable it is that it, indeed, also comes about fast.² To this one can add the idea of Funke (1993), that if reform policies are not perceived as credible, one needs to implement them quickly, both to overcome resistance and to allow them to yield beneficial outcomes reasonably soon.

The ability to undertake CBI reform is greater the higher the level of social trust. This is because trust helps remove obstacles to reforms coming about, among other things in the following ways. First, trust makes it easier to dissemble expert information about the long-term benefits of reforms: people will be more willing to accept such information, from policymakers and the media, if the senders are perceived to be trustworthy (Boix and Posner, 1998). In the context of CBI this will enable those who plan to make the central bank more independent to more effectively explain the logic of the time-inconsistency problem and how a politically governed monetary authority tends to generate higher inflation. Second, interest groups can block reform if they think that they can gain by opposing it, but high trust reduces suspicion and enhances cooperation among groups, making the blocking of reforms less probable.³ One can, for example, imagine that groups who benefit from high inflation, such as homeowners with big loans, will try to stop reforms that reduce inflation – and especially if

¹ Low credibility for sustaining policies can also explain the lack of reforms more generally: see Roháč (2014).

² The clearest illustrations of this logic appear after crises: then the need for reform is often abundantly clear, and reform then also tends to come about rather quickly. On the link between crises and reforms, see, e.g., Drazen and Grilli (1993), Drazen and Easterly (2001), Pitlik and Wirth (2003) and Campos *et al.* (2010).

³ On interest-group blocking of reforms, see Alesina and Drazen (1991) and Fernandez and Rodrik (1991).

trust is low. Low trust will, for instance, tend to create an expectation that reformers are not acting with each group's or even overall social benefits in mind. Third, compensation schemes are more credible in a setting with high trust, which makes it easier for those in society who think they will lose out on reforms to accept them, given compensation promises. If those who gain from inflation feel convinced that the reformers will compensate them in other ways over time, their resistance might be given up. Trust is also related to pro-social preferences (Fehr, 2009), and therefore even people who think they will lose from reforms can be expected to be more willing to accept them even without compensation schemes, if they believe that the reforms will result in good social consequences. This can make politicians in high-trust contexts bold in proposing reforms, as they consider the risk of electoral punishment relatively small. Fourth, initiators of CBI reforms in a country with high trust will not expect their political opponents to exploit a reform process for short-term gain to any great extent; and they will also expect bureaucrats, not least in the central bank, to behave well and follow their intentions with the reform, once it is in place.⁴ All of these factors indicate that trust increases the ability to undertake CBI reform, and the higher the ability to undertake such a reform, the sooner it comes about, all else equal.

When putting these two factors, need and ability, together, we get a relationship between social trust and the time it takes for a CBI reform to come about in the form of an *inverse u-shape*. At low levels of social trust, the need for reform is urgent, and as decision-makers therefore work hard to bring about reform, the time it takes is relatively short. At high levels of social trust, the ability for reform is high, and therefore the time for reform to become about is relatively short. At intermediate levels of social trust, neither need nor ability is very high, which implies a longer time before reform happens.

The way in which social trust matters

We see low or high social trust as helping but not solely causing CBI reform to come about. If low or high social trust was sufficient, it could not easily be explained why countries with similar trust levels have had similar CBI reforms at different points in time. Rather, according to our understanding, social trust affects *some but not all* necessary (and jointly sufficient) factors required for CBI reform to occur. This means that low or high social trust (compared

⁴ Leibrecht and Pitlik (2014) show that social trust is positively related to economic liberalization, and the more so the stronger the institutional and political constraints on the executive are. That is, when it should be especially difficult to agree on reforms, due to institutional hindrances and political polarization, trust is especially valuable in making reforms come about.

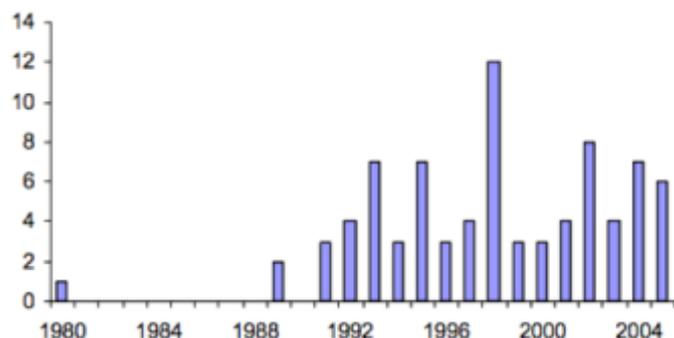
to intermediate levels) makes it more likely that all necessary conditions are met, and that reform comes about, earlier rather than later, but it alone does not suffice.

Following Berggren *et al.* (2014), we suggest these necessary conditions for reform implementation: that certain ideas have emerged and have been accepted (the identification by academic economists of the time inconsistency problem), that there is a perception of a problem that needs to be solved (high inflation rates, the political dependence of central banks) and that some individuals are willing to lead the initiation of a reform process. Social trust arguably affects the latter two of these conditions (by affecting the perceived need for and the ability to undertake reform), but it does not solely cause these necessary conditions to be met and it does not affect the first necessary condition. The time it takes for CBI reform to appear can therefore vary between countries, even though trust levels are quite stable over time and even though they are sometimes similar between countries.

3. Data

Based on data in Daunfeldt *et al.* (2013), collected through a questionnaire to central banks worldwide, we know when CBI reforms occurred. The questionnaire both asked *if* some institutional change had taken place that granted the central bank more independence from elected policymakers (in which case we say that a reform occurred) and, if so, *when* it took place. Note that the measure does not take into consideration how much CBI had increased (and that only increases in CBI were recorded). Our dependent variable is the number of years from 1980 until CBI reform, defined in the way just described, took place (2005 at the latest). This variable thus takes a low (high) value for countries implementing CBI reforms relatively early (late). The start year, 1980, was chosen since the first CBI reform was recorded then in our dataset, and it occurred in the United Arab Emirates (but as reported below, we also check whether our results are robust to starting in 1985). The next two (New Zealand and Chile) took place in 1989. Figure 1 shows the number of CBI reforms in the world over time.

Figure 1. The number of central-bank independence reforms per year (one observation refers to one country). Source: Daunfeldt *et al.* (2013).



Our explanatory variable of main interest is social trust, the share of the population that answers ‘yes’ to the first part of the question: ‘In general, do you think most people can be trusted or can’t you be too careful?’ Like Bjørnskov (2007), we use the average of all available observations in the World Values Survey, LatinoBarómetro, the AfroBarometer, the Asian and East Asia Barometers, and the Danish Social Capital Project; the idea is that averages reduce the risk of letting atypical data of individual years matter.

We also use a set of economic and political control variables, based on previous studies: inflation (IMF, 2011); unemployment (ILO, 2011); GDP per capita and the use of credits from the IMF (World Bank, 2011); political fragmentation in parliament⁵ and whether the country is a federation or not (Lundell and Karvonen, 2003); the number of coups (Marshall and Marshall, 2007); the quality of government (ICRG, 2008); a democracy dummy (Cheibub *et al.*, 2010); change to democracy (in the preceding decade) (Cheibub *et al.*, 2010); CBI reforms in economic cooperation (to capture peer effects), i.e., the number of countries with preceding CBI reforms in the organization of which the country is a member (of the European Union, the African Economic Community, the Asia-Pacific Economic Cooperation or the Latin American Free Trade Association) prior to reform in the own country (Daunfeldt *et al.*, 2013); pre-reform CBI (Cukierman *et al.*, 1992); dummy for members of the ESCB (European System of Central Banks); and three cultural variables: power distance (the extent to which inhabitants in a country accept that power is distributed unequally within a society), uncertainty avoidance (tolerance of uncertainty) and masculinity (the extent to which individuals in a country tend to endorse goals usually more popular among men) (De Jong,

⁵ This variable is based on a Herfindahl index, and it is defined as $10,000 - \sum_p (s^p)^2$, where s^p is the seat share (in whole percentages) of party P and where the summation runs over all parties in the legislature (its lower house if there are more chambers).

2002).⁶ These explanatory variables are measured as the average of the values for the ten-year period preceding CBI reforms (different time periods in different countries), to reduce the risk for reverse causality and for having atypical values from some particular year influence the results. As for reverse causality, we think the risk is small in any case due to the nature of social trust: it is a deep-rooted cultural variable that is surprisingly stable over time (Uslaner, 2008; Bjørnskov and Tinggard Svendsen, 2013), and it is highly unlikely that it would be affected by a reform in the area of monetary policy. On the other hand, if we had studied more specific trust measures, such as trust in the central bank or trust in government, the speed of reform could have influenced trust.

Several of these variables have missing values, and since there is a great risk that this introduces bias and affects the representativeness of the sample (from list-wise deletion of cases with missing observations), we have created a larger sample through multiple imputation (Graham *et al.*, 2003).⁷ The multiple imputation approach produces unbiased parameter estimates that reflect the uncertainty associated with missing observations and is robust to violations of assumptions in the underlying imputation model. We use five imputed datasets. The empirical analysis is performed on each of these datasets, and the estimation results for each are later combined (Rubin, 1987).

The sample includes 149 countries observed annually over the period 1980 to 2005. Descriptive statistics are given in Table 1.

⁶ Following De Jong (2002), we expect the following: that *power distance* is positively related to the time it takes for CBI to be established, since countries with a higher power distance tend to centralize political power, which entails resistance to reforms that increase CBI; that *uncertainty avoidance* implies quicker CBI reform, since the purpose of the latter is to reduce inflation, which is negatively related to a desire to eschew uncertainty, and since countries with uncertainty avoidance are characterized by specialization and formal rules; and that *masculinity* is also helpful for quick CBI reform to come about, since it implies a strong readiness to act (and undertake reform).

⁷ Since data are not likely to be randomly missing – some variables are more likely to be missing for less developed countries – results can be obscured if one only analyzes the countries with fully observed values for all variables. Imputation is then an attractive method to avoid the problem. An iterative Markov chain Monte Carlo method is used to simulate a predictive distribution for the missing observations based on the mean and covariance structure of the observed data. The imputed values are then drawn from this distribution.

Table 1. Descriptive statistics

	Mean	S.d.	Median	Minimum	Maximum	Share
Time to CBI reform since 1980 (No. of years)	21.50	4.23	22	9	23	0
Social trust	0.24	0.12	0.22	0.04	0.68	22%
Pre-reform CBI	0.35	0.12	0.35	0.09	0.82	51%
Inflation	0.28	0.41	0.12	-0.00	2.43	12%
GDP per capita	7994	8118	5198	298	37071	9%
Unemployment	8.68	5.16	9.46	0.35	31.20	55%
Federation	0.44	0.49	0	0	1	46%
IMF credits	0.23	0.49	0.02	0	2.67	1%
Party fragmentation	5934	1444	5935	0	9554	42%
Coups	0.04	0.09	0	0	0.54	17%
Democracy	0.60	0.49	1	0	1	0%
Change in democracy	0.17	0.37	0	0	1	0%
ESCB membership	0.19	0.43	0	0	1	0%
Quality of government	0.60	0.20	0.57	0.17	1	32%
CBI reforms in economic cooperation	3.42	4.63	0	0	18	0%
Power distance	0.59	0.15	0.59	0.11	1.04	55%
Uncertainty avoidance	0.68	0.16	0.68	0.08	1.12	55%
Masculinity	0.49	0.13	0.49	0.05	1.1	55%
Number of countries	149					

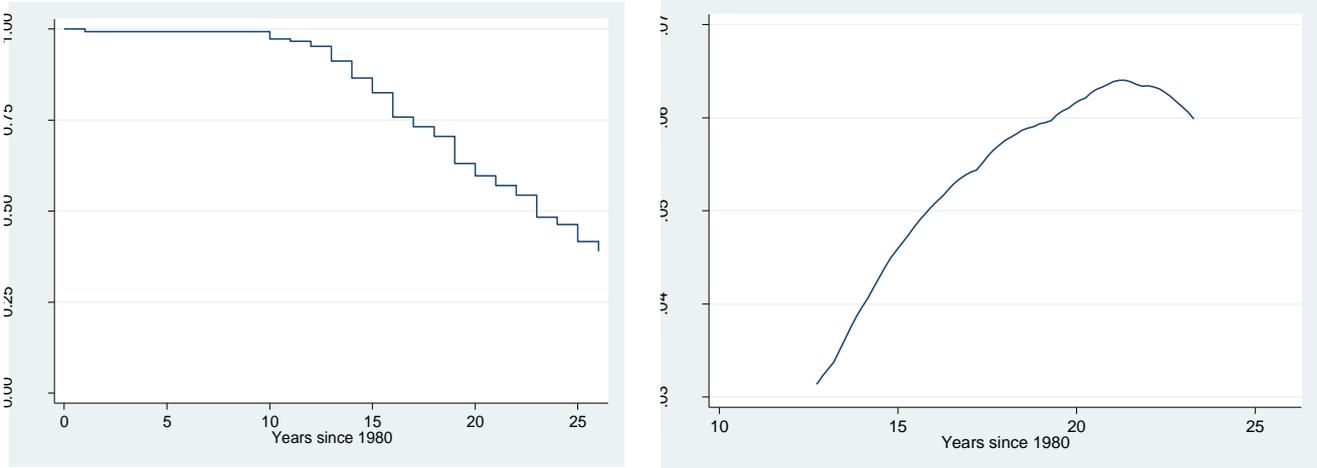
Notes: The values for the explanatory variables correspond to the average value over ten years preceding the implementation of major CBI reforms in each country. ‘Share’ refers to the proportion of observations, in relation to the total, that are missing and have been replaced with multiple imputation.

4. Empirical analysis

To analyze the time it takes for CBI reforms to be implemented, with particular focus on social trust, we perform a duration analysis (see, e.g., Cameron and Trivedi, 2005). As mentioned, our dependent variable is the number of years it takes from 1980 for CBI to be implemented. All countries enter the sample in 1980, the mean time until CBI reform is 21.5 years (median 23 years) and the number of countries implementing CBI reforms is 90. The data are right censored at 26 years (for the 59 countries without a CBI reform).

In Figure 2 we display the unconditional Kaplan-Meier survivor (left) and the smoothed hazard functions (right).⁸ The survival function indicates that implementation of CBI reforms began after ten years (the sample starts in 1980) and that the probability of observing no CBI reforms in the population declined each following year, with the largest drop after 19 years, indicating that CBI reforms were becoming more likely to occur. The probability that an average country implements a CBI reform at t (given no previous implementation) increased until 2002 (22 years from 1980) and then declined, as indicated by the hazard function.

Figure 2. Kaplan-Meier survivor (left) and smoothed hazard function (right).



To model the time it takes until a CBI reform is undertaken we utilise a parametric approach, since it produces more efficient estimates conditional on a correct distributional assumption.⁹ In Table 2 we report the estimated Akaike and Bayesian information criteria for models based on the generalized gamma, Weibull, log-logistic, log-normal, gompertz and the exponential distributions, for both a linear and non-linear specification of our trust variable (including all other control variables in all specifications).

⁸ The Kaplan-Meier estimate is a nonparametric estimate of the true underlying survival function for the population showing the probability that a CBI reform is not implemented before a specific time, i.e. that the state of ‘no CBI’ survives beyond a specified time (note here that failure means the implementation of a CBI reform, while survival correspond to no CBI reform). The hazard function displays the probability of a CBI reform for an average country at t , given that it has not been implemented up until t .

⁹ We have also considered non-parametric Cox proportional hazard models. Results from these models with regard to our trust variable were in general similar to those reported here, although with somewhat lower significance levels.

Table 2. Akaike and Bayesian information criteria for different model and distributional specifications

Distribution	Akaike	Bayesian	Akaike	Bayesian
	Linear trust	Linear trust	Non-linear trust	Non-linear trust
Generalized				
gamma	136.22	139.23	134.49	137.49
Weibull	137.17	140.17	136.32	139.32
Loglogistic	138.38	141.38	136.41	139.41
Lognormal	138.58	141.59	134.72	137.72
Gompertz	151.15	154.16	150.28	153.28
Exponential	278.84	284.85	278.34	284.36

As can be seen, based upon both information criteria, the generalized gamma distribution is preferable for all models (closely followed by the log-normal for the non-linear specification). The generalized gamma model has a density given by

$$f(t) = \frac{\lambda p (\lambda t)^{p\kappa-1} e^{-(\lambda t)^p}}{\Gamma(\kappa)} \quad (1)$$

where $\lambda = \exp(X\beta)$ and (p, κ) are two shape parameters allowing for a flexible hazard rate.¹⁰

In Table 3 estimation results for a number of gamma distributed models are displayed with trust entering in a linear fashion.

¹⁰ A nice feature of the generalized gamma model is that it nests a number of the other parametric models as special cases: Weibull ($\kappa = 1$), exponential ($p = \kappa = 1$), log-normal ($\kappa = 0$) and the standard gamma ($p = 1$). Testing these nested model alternatives, i.e. testing whether parameter restrictions of the alternative models hold, confirms our conclusion that a generalized gamma model is preferable for our considered sample. Henceforth, our analysis is therefore reported for specifications based on the generalized gamma distribution.

Table 3. Duration analysis of determinants of time until implementation of CBI reform – linear trust

	Model 1	Model 2	Model 3	Model 4
Social trust	-0.14** (0.00)	-0.16** (0.03)	-0.34** (0.01)	-0.46** (0.10)
Pre-reform CBI	-0.04 (0.21)	-0.07 (0.17)	-0.10 (0.17)	-0.02 (0.29)
Inflation	-0.27** (0.09)	-0.27** (0.09)	-0.25** (0.11)	-0.26** (0.09)
GDP per capita	0.07 (0.07)	0.06 (0.08)	0.06 (0.09)	0.08 (0.08)
Unemployment	0.09** (0.03)	0.08** (0.01)	0.06* (0.03)	0.04** (0.01)
Federation	0.03 (0.05)	0.03 (0.06)	0.04 (0.05)	0.04 (0.05)
IMF credits	0.14** (0.07)	0.15** (0.07)	0.13* (0.07)	0.14** (0.07)
Party fragmentation	-0.12 (0.37)	-0.13 (0.34)	-0.07 (0.38)	-0.12 (0.35)
Coups	0.02 (0.03)	0.02 (0.03)	0.02 (0.02)	0.01 (0.04)
Democracy	-0.18** (0.01)	-0.18** (0.01)	-0.16** (0.01)	-0.16** (0.00)
Change to democracy	-0.23** (0.04)	-0.23** (0.05)	-0.24** (0.07)	-0.20** (0.02)
ESCB membership	-0.15** (0.04)	-0.15** (0.04)	-0.12** (0.03)	-0.13** (0.03)
Quality of government	0.02 (0.03)	0.02 (0.03)	0.04** (0.01)	0.05* (0.03)
CBI reforms in economic cooperation	-0.02 (0.01)	-0.02 (0.01)	-0.02* (0.01)	-0.02* (0.01)
Power distance	-	-0.08 (0.11)	0.03 (0.15)	0.09 (0.12)
Uncertainty avoidance	-	-	-0.32** (0.01)	-0.33** (0.09)
Masculinity	-	-	-	-0.38** (0.01)
Constant	3.45** (0.32)	3.53** (0.20)	3.70** (0.25)	3.87** (0.35)
Log-likelihood	-63.33	-63.27	-62.27	-60.62
Likelihood ratio – Chi-2 (13)	52.97	53.10	55.08	58.39
AIC	127.07	126.94	124.95	121.65
Observations	149	149	149	149
Imputation method	Multiple	Multiple	Multiple	Multiple
Model	ACF	ACF	ACF	ACF
Distribution	Generalized gamma	Generalized gamma	Generalized gamma	Generalized gamma

Notes: The table report results for regression models with the number of years from 1980 until CBI reform as the dependent variable. The explanatory variables are the average of the values for the ten-year period preceding CBI reforms (different time periods in different countries). *significant at the 10% level, **significant at the 5% level.

All models imply a negative significant effect, at the 5 percent level, from trust on duration until reform, i.e., a higher trust level shortens the time until a CBI reform is implemented.¹¹ To get a feeling for the magnitude of the estimates, we calculate marginal effects in the following way:

$$\text{percentage change in the time it takes for CBI reform to come about} = 100 \times [e^{\hat{\beta}_k \delta} - 1] \quad (2)$$

where δ is the change in the covariate X_k . The estimate for the trust variable indicates that a increase in trust of 20 percentage points (e.g., from the level of France, 0.22, to that of the U.S., 0.42), all else equal, would decrease the time until reform by 8.8 percent. That is, if France had had the trust level of the U.S., all else equal, the CBI reform would have been implemented about one year earlier.

So far, we have modeled trust in a linear fashion, but as proposed in section 2, trust may stand in a non-linear relation to the time until reform. To investigate possible non-linear effects, we first consider adding a quadratic trust term.¹² In Table 4, model 5, the results imply an inverse u shape, but the positive-sloping segment is insignificant.¹³

However, we prefer another way of considering non-linearity: using a restricted cubic spline.¹⁴ With a restricted cubic spline, a continuous smooth function for trust is obtained: linear before the first knot, piecewise cubic polynomial between adjacent knots and linear again after the last knot. Modeling the non-linear effect of trust with a restricted cubic spline

¹¹ To check whether the results are driven by countries that combine low trust and high inflation, we have added an interaction term between trust and inflation to model 4. All three estimated coefficients (trust, inflation and their interaction) have a negative sign and are significant. So while we find that the effect of trust on the duration until reform is partly driven by “low trust–high inflation” countries, the effect for the other (“non-low trust–high inflation”) countries nevertheless remains statistically significant with an unchanged sign. This indicates that the effect from trust on duration is not solely driven by the combination of low trust and high inflation.

¹² Note that the control variables of model 4 in Table 3 are used throughout the ensuing analysis. The results for these are not listed here but are qualitatively similar to the ones reported in Table 3.

¹³ However, in a model based on the log-normal distribution both trust terms, and the full inverse u relationship, are significant – see model 9 in Table 4.

¹⁴ In the modeling of non-linear relationships, the restricted cubic spline offers, *a priori*, potentially larger flexibility than polynomials, like a squared term, in the fitting of the regression line. Another advantage is that parameter estimates are easier to interpret.

with three knots at the 10, 50 and 90 percentiles of the trust variable confirm the inverse u shape as well as its statistical significance – see model 6 in Table 4.¹⁵

Table 4. Duration analysis of determinants of time until implementation of CBI reform – non-linear trust

	Model 5	Model 6	Model 7 (Democracies)	Model 8 (Autocracies)	Model 9	Model 10
Social trust	0.84 (0.58)	-	-	-	1.55** (0.06)	-
Social trust ²	-2.15** (1.02)	-	-	-	-2.44** (0.41)	-
<i>Restricted cubic spline</i>						
Social trust – spline 1	-	0.85** (0.20)	0.50** (0.17)	3.72** (0.13)	-	2.05** (0.11)
Social trust – spline 2	-	-2.29** (0.38)	-1.87** (0.88)	-5.299** (0.52)	-	-2.83** (0.33)
Explanatory variables (as in model 4)	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	-59.65	-58.386	-22.40	-19.25	-60.25	-53.35
Likelihood ratio – Chi-2 (13)	60.328	61.73	43.60	39.42	61.72	75.53
AIC	119.70	118.30	45.20	38.90	122.50	110.70
Observations	149	149	89	60	149	149
Imputation method	Multiple	Multiple	Multiple	Multiple	Mean	Mean
Model	ACF	ACF	ACF	ACF	ACF	ACF
Distribution	Generalized gamma	Generalized gamma	Log-normal	Log-normal	Log-normal	Log-normal

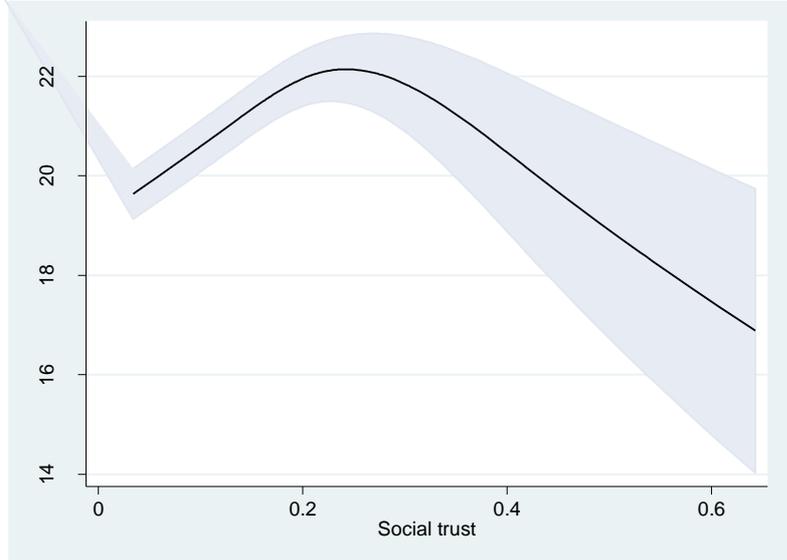
Notes: The table report results for regression models with the number of years from 1980 until CBI reform as the dependent variable. The explanatory variables are the average of the values for the ten-year period preceding CBI reforms (different time periods in different countries). *significant at the 10% level, **significant at the 5% level. The models based on the generalized gamma distribution did not converge when separating between democracies and autocracies due to the smaller samples sizes. The results for these sub-samples are therefore based on models using the log-normal distribution. Results for other explanatory variables are similar to those previously reported for models with linear trust specifications.

In Figure 3 the predicted time until reform (based on model 6, with trust modeled as a restricted cubic spline) is displayed, varying over the social trust variable, with a 95-percent confidence interval indicated by the shaded area and with other explanatory variables at their

¹⁵ To check for sensitivity, we perform the same analysis using the log-normal distribution in model 10, with the same qualitative results.

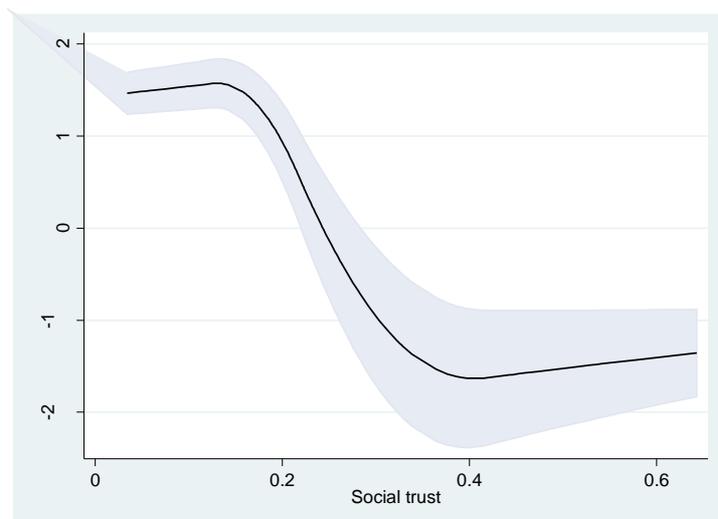
mean. As can be seen, the time until reform varies from about 22 years at an intermediate trust level to a little more than 16 years at the highest trust level.

Figure 3. Predicted time until reform (in years) depending on social trust (model 6, Table 4).



In Figure 4, the corresponding marginal effects varying with social trust are displayed, for an increase in trust of 10 percentage points, all else equal. Thus, it shows the marginal effect, i.e., the predicted change in time until reform of such a change in trust for different values of trust. The 95-percent confidence levels are indicated by the shaded area. For example, the figure implies that if Switzerland (with a trust level of 0.44) experienced an increase of trust with 10 percentage points, it would implement a CBI reform about 1.5 years earlier; and that if Poland (with a trust level of 0.21) experienced the same change in trust, it would implement a CBI reform about 1 year later.

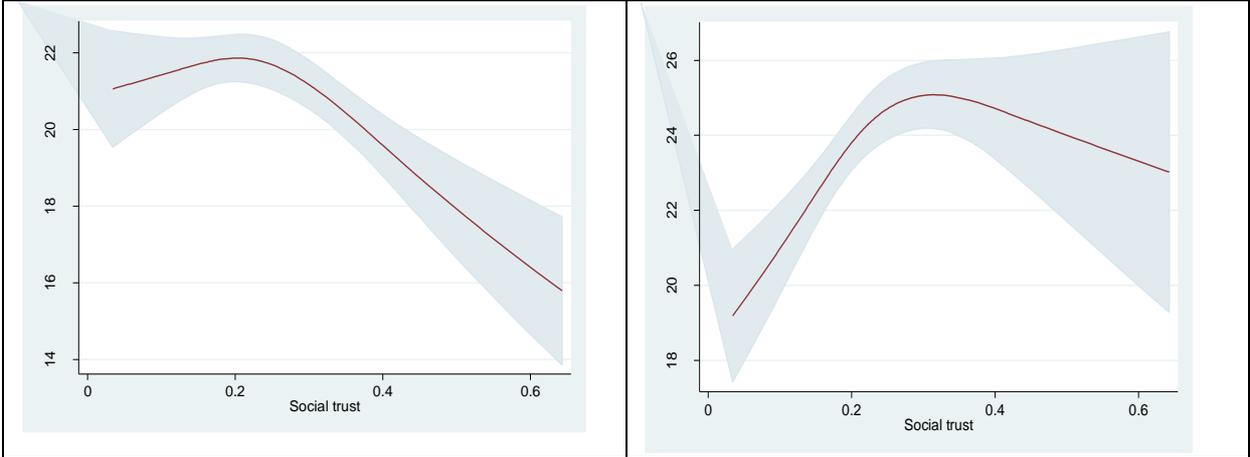
Figure 4. Marginal effects (in years) for different levels of social trust (model 6, Table 4).



In Table 4 we also run separate models for democracies and non-democracies (models 7 and 8). We make this division as the political decision-making process arguably differs between the two country groups, which might affect the way in which trust affects the speed of reform. For example, we would expect the ability part of our theory to play a more important role in democracies, since collective decision-making involves more groups of actors and is more fractionalized (cf. Boix and Posner, 1998). We would also expect the need part of our theory to matter more in autocracies, since trust is lower in such countries, which implies that formal reforms are more important to achieve a certain goal. Since the sample sizes are reduced by making this division, models based on the relatively complex generalized gamma distribution turn out not to converge. However, results from models based on the log-normal distribution (second best for non-linear specifications, according to Table 2) confirm the inverse u shape for both democracies and non-democracies.

In Figure 5, the predicted time until reform (in years) for the separate samples of democracies (left) and non-democracies (right) (based on model 8 and 9 from Table 4, modeling trust as a restricted cubic spline) are displayed over the social trust variable, with the 95-percent confidence indicated by the shaded area and with other explanatory variables at their mean.

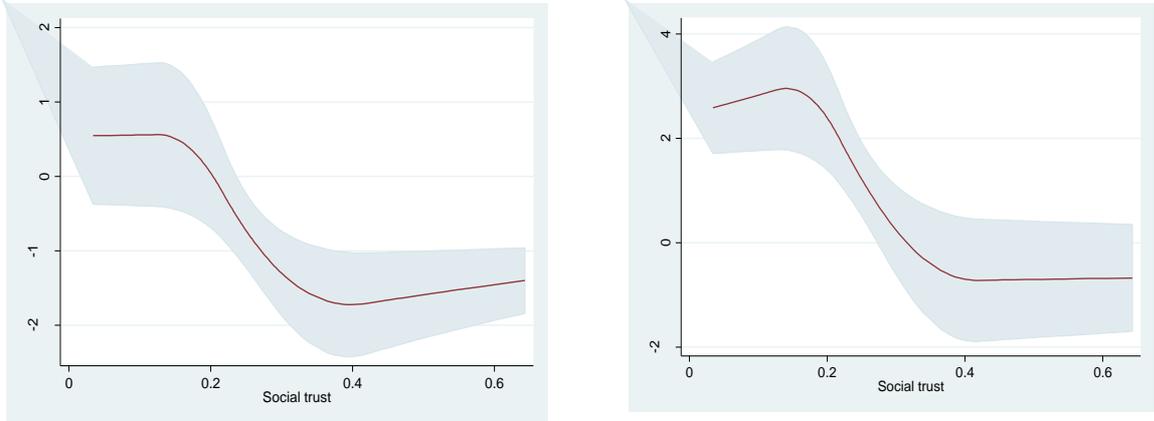
Figure 5. Predicted time until reform (in years) for democracies (left) and non-democracies (right) based on models 7 and 8, Table 4.



While the inverse u shape is obtained for both samples, the negative slope dominates for the sample of democracies (for those with a trust level a bit above 0.20), implying that here, higher trust implies faster CBI reform. Reform comes about quickly in these countries because of a strong ability to agree on the implementation of reform, an ability that increases in trust. For autocracies, with generally low trust levels, the need for reform is what drives the results.

In Figure 6, the corresponding marginal effects (in years) for democracies (left) and non-democracies (right) for an increase in trust of 10 percentage points are displayed, all else equal.

Figure 6. Marginal effects (in years) for democracies (left) and non-democracies (right) based on models 7 and 8, Table 4.



To exemplify, for the sample of democracies these results imply that if the Netherlands (with a trust value of 0.55) increased its trust by 10 percentage points, it would, all else equal,

be likely to implement a CBI reform about 1.5 years earlier. For non-democracies the results imply that Morocco (with a trust level of 0.18) would be likely to implement a CBI reform almost 3 years later if its trust level increased by 10 percentage points. Notable, marginal effects are significantly different from zero for social trust levels above about 0.24 for democracies and for trust levels below about 0.26 for non-democracies.

As for other explanatory variables, it turns out that several are related to the speed of reform. The results for our main model (model 6 in Table 4, unreported here, but available upon request) are similar to those reported for model 4 in Table 3 and indicate that a relatively higher inflation, being or becoming a democracy in the previous 10 year period, being a ESCB member, having a larger number of CBI reforms in countries with which there is economic cooperation, being characterized by uncertainty avoidance (the tolerance of uncertainty found in people) and masculinity (the extent to which individuals in a country tend to endorse goals usually more popular among men), all shorten the duration to CBI-reform for an average country. In contrast, a relatively higher unemployment rate and IMF credits increase the duration.¹⁶

To comment on a few of these, a 10 percentage-point higher past inflation rate shortens the duration to reform with about 7 months. High historical inflation, thus, seems to create stronger preferences for implementing reforms in order to achieve credibility for a low-inflation goal, supporting Hayo's (1998) claim that CBI is related to an historical feedback process. Democracies on average implement CBI reforms 3.6 years earlier than non-democracies and countries that changed their ruling system to a democracy in the previous 10-year period implemented CBI-reforms about 4 years earlier (compared with both other democracies and non-democracies). Countries that are members of the ESCB are on average 4.3 years faster with their CBI-reforms than non-membership countries. These latter results clearly illustrate that the institutional framework matters for the speed of reform. As for unemployment, a higher past rate of 10 percentage points relates to a delay with 1.5 months. We suggest that this follows from politicians believing that CBI reforms will entail lower

¹⁶ While we did not find a statistically significant relationship between pre-reform CBI, as measured by a *de jure* index, and our outcome measure, we nevertheless also tried replacing it with the pre-reform turnover rate of bank governors, which has been proposed as a(n inverse) *de facto* measure of CBI (Sturm and de Haan, 2001; Dreher et al., 2008, 2010). The results indicate that social trust has the same effect as before on the duration until reform; the turnover rate itself is negative and significant, indicating that the lower this rate is, the longer it takes for reform to happen.

inflation and from expecting, due to simple Phillips-curve considerations, that this will worsen the unemployment problem (and their ability to combat it in the future).

In contrast to these results, more IMF credits appear to increase the time it takes for a CBI reform to come about, which is somewhat unexpected. Maxfield (1997) suggests that CBI reforms are more likely to be implemented in high-debt developed countries, since they want to signal creditworthiness to foreign investors and IMF in order to get more funds. This would imply earlier reforms in high-debt countries. This theory is thus not supported by our results.

To test the sensitivity of our results towards using multiple imputation to replace missing observations we also present results, in models 9 and 10 in Table 4, for the two different non-linear trust specifications (quadratic trust and restricted cubic splines) where traditional mean imputation was used instead. Reassuringly, the results confirm the previously found inverse u shape for social trust.

Given that ESCB membership required monetary stability one may view the ESCB membership variable as potentially endogenous. To test whether our results are affected by the inclusion of this variable, we have both re-run our regressions excluding the ESCB membership variable and excluding the countries that were ESCB members. In both cases, the results indicate that relationship between trust and our dependent variable still holds.

We have also used 1985 as the starting point for our dependent variable rather than 1980, as a sensitivity check, and the empirical findings are virtually unchanged.

Finally, we have also tested to what extent our results are affected by extreme observations by re-estimating models on a sample excluding the top and bottom 5 percentiles of the social trust distribution. The results remain unchanged.¹⁷

5. Concluding remarks

It comes with the job for politicians to present reform proposals in order to better achieve desired outcomes. But it is one thing to want a reform, another to see it become reality. While some reforms are implemented quickly, others take a long time and may never see the light of day. In this paper, we try to explain the speed of reforms. What factors may shed light on how fast reform comes about? We look at economic and political factors but especially highlight a

¹⁷ All results are available upon request.

cultural variable, social trust, as an explanatory factor. Do reforms – fruitfully viewed as instances of institutional change – come about faster depending on whether trust is high, low or intermediate?

We try to answer this question by looking at a particular kind of reform, to increase central-bank independence in order to increase chances for credible low-inflation policies. We argue, on theoretical grounds, that social trust should matter for bringing about CBI, by affecting both the ability and the perceived need to undertake reforms. This implies an inverse u-shaped relationship, such that both low and high trust levels are associated with earlier reforms. In the former case, the *need* for reform is sufficiently high to bring about political action and quick reform; in the latter case, the *ability* to undertake reform, by mitigation of various obstacles, is sufficiently high to bring about fast reform. In the intermediate case, neither need nor ability is strong enough for trust to speed up reform, and the time it takes is consequently longer.

Our empirical investigation, comprising a sample of 149 countries, indicates that the inverse u shape indeed obtains. CBI reform comes about more quickly in countries with low and in countries with high trust, but it takes longer time in the countries in between. In countries where about 25 percent think that others can be trusted (the intermediate case), it took about 22 years from 1980 for CBI reform to come about. The corresponding figure for countries with really low trust was around 19 years and for countries with really high trust about 17 years – in the latter case a five-year difference.

The inverse u shape is found for both democracies and autocracies when studying them separately. However, the shape of the curve for democracies is heavily skewed to the right, implying primarily that high trust speeds up reforms in such countries. Presumably, this is because the political process comes to agreement much faster in the presence of central actors trusting each other. For the autocracies, the effect of trust is such that low levels are related to faster reform, arguably because in such low-trust settings, the need for reform is especially great for a goal of credible low inflation to be obtained.

What we find particularly interesting is that in addition to ‘traditional’ explanatory factors, e.g. previous experiences with inflation, the unemployment rate, membership in the European System of Central Banks and in organizations within which other countries had undertaken reforms before, a cultural factor is at least as central, and often more important (quantitatively), for explaining the time it takes until institutional change comes about. This points at the importance of incorporating social trust and other cultural factors in future studies of reforms of institutions of various kinds.

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