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PERSONAL BANKRUPTCY LAW AND INNOVATION AROUND THE WORLD

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ABSTRACT

Because corporate limited liability prevents creditors from founder's personal assets, creditors often require founders of new, small and risky firms to contract around limited liability by pledging their personal assets as collateral for loans to their firms. This makes personal bankruptcy law (PBL) relevant to corporate finance. We find that pro-debtor PBL reforms increase the number of patents filed, citations to those patents, and début patents by firms with no previous patents. These reforms also redistribute innovation across industries in closer alignment to its distribution in the U.S., which we take to approximate industry innovative potential. These effects are driven by firms without histories of high-intensity patenting, and are damped in countries that impose minimum capital requirements on new firms. Firms with largescale legacy technology may avoid radical innovations that devalue that technology. Consequently, new, initially small and risky firms often develop the disruptive innovations that contribute most to economic growth. Consistent with this, we also find pro-debtor PBL reforms increasing value-added growth rates across all industries, and by larger margins in industries with more innovation potential. Our difference-in-differences regressions use patents and PBL reforms for 33 countries from 1990 to 2002, with subsequent years used to measure citations to patents in this period.

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1. Introduction

Established firms readily undertake incremental innovation (Garcia-Macia, Hsieh, and Klenow, 2019) but avoid disruptive innovation that threatens the value of their existing human and physical capital (Schumpeter, 1911). Consequently, much innovation occurs in new, initially small firms (Acs and Audretsch, 1988; Knott and Vieregger, 2020), whose entrepreneurial founders need external capital (Cosh, Cumming, and Hughes, 2009). Innovation is risky (Audretsch, 1995; Moshirian et al., 2021), and entrepreneurial founders' firms often fail (Xie, Zhang, and Zhang, 2021). Thus, we find debtor-friendly personal bankruptcy law (PBL) reforms precede sharp increases in patenting, patent importance, and new patenter entry. These effects are independent of and as economically significant as those associated with corporate bankruptcy law (CBL) reforms found by Acharya and Subramanian (2009).

Incorporation provides innovators with limited liability in patent infringement lawsuits, so patent applications are almost always by corporations, not individuals. However, developing an innovation requires capital and creditors, and corporate limited liability also prevents creditors from seizing the founder's personal assets. Creditors therefore often require founders to contract around CBL limited liability by personally guaranteeing loans to their startup firms (Fan and White, 2003; Armour and Cumming, 2008). Consequently, readier discharge of individuals' debts in PBL could affect entrepreneurial investment in innovation. On one hand, readier discharge leaves creditors with more nonperforming loans, which raises borrowing rates, reduces entrepreneurs' access to future credit, and deters prospective entrepreneur-borrowers. On the other hand, readier discharge, by reducing personal costs of failure for entrepreneur-borrowers and providing a "fresh re-start" option, encourages entrepreneurs to invest repeatedly in risky innovation – an economically important phenomenon called serial entrepreneurship (Landier, 2005; Ederer and Manso, 2011). Our results suggest the latter effect dominates in recent PBL reforms worldwide.

Successful, established technologically leading firms borrow without personal guarantees, and so likely not directly affected by PBL reforms. We therefore drop firms with 100 or more patents and one or more patents per year in 1990 to 2002, our data construction window. We call these

789 firms *legacy largescale patenter* (L) firms and call the remaining 135,969 *non-legacy* (NL) firms. Patents are distributed roughly equally across L and NL firms. The former are likely to borrow without personal guarantees and to be heavily invested in legacy technologies-related human and physical capital. The latter might need personal guarantees to borrow and are likely less heavily invested in legacy technologies. All NL firms are unlikely to be disruptive innovators, but disruptive innovators are likelier to arise from their ranks than among L firms, which are likely to be most disrupted by such innovations. Our primary tests use the sample of NL firms, but we later contrast the two samples. Our results are robust to alternative patent number cutoffs in defining L firms. We find that pro-debtor PBL reforms stimulate innovation by NL firms, but not by L firms.

We measure general innovative entrepreneurship using data from Hall, Jaffe, and Trajtenberg (2001) on successful patent applications – that is, patent applications filed with and subsequently granted by the United States Patent and Trademark Office (USPTO) – by firms in 33 non-US countries over 1990-2002. The sample includes nine countries with major PBL reforms, all increasing debtor access to discharge (debt voidance). We measure innovation for a country-industry-year by three variables: patent filings by NL firms, citations of those patents by subsequent patents, and new patenter débuts, which includes no L firms by construction. We interpret patent counts and citation counts as measuring innovation intensity and importance in general, and new patenter counts as a more focused measure of new entrepreneurial innovation.

Our identification assumption is that PBL reforms are exogenous. Our difference-in-differences (DID) tests use Poisson regressions, appropriate where the explained variables are non-negative integers, including controls and year and country-industry fixed effects, to show how pro-debtor PBL reforms affect the three innovation counts. Our key findings, which survive a battery of robustness checks, are:

First, pro-debtor PBL reforms increase all three innovation counts across all industries for NL firms. PBL reforms herald industry average increases of 27.6% in patents, 33.5% in citations to these patents, and 24.1% in new patenters relative to the same industries in the same years in countries not experiencing PBL reforms. That is, PBL reforms increase innovation by firms without largescale prior investments in legacy technology.

Second, pro-debtor PBL reforms redistribute all three innovation counts across industries to better approximate the distributions in the U.S., which we take as reflecting industry innovation potential. The average PBL reform increases patent counts, citation counts, and new patenter counts by 46.3%, 43.8%, and 20.6%, respectively, more in industries with innovation potential at the 75th percentile than in those at the 25th percentile. That is, PBL reforms cause firms not heavily invested in legacy technology to innovate more in industries with more innovation potential.

Third, the above two patterns are not evident for L firms, which instead exhibit a small increase in patenting related to industry innovation potential just prior to pro-debtor PBL reforms (i.e. in the transition period) and not so after those reforms. That is, firms with largescale legacy patent stocks appear to rush to patent what they can in high-potential industries. We speculate that this behavior might be defensive.

Fourth, pro-debtor PBL reforms predict economic growth acceleration and more functionally efficient investment across industries. Such reforms predict elevated value-added growth in industries with and without high innovative potential, consistent with innovations having positive spillovers outside the innovators' sectors. Tobin (1984) argues that, while the financial sector is unlikely to allocate capital perfectly efficiently (i.e. directing capital unerringly to its highest value-creating uses), investment that better approximates this can be deemed more functionally efficient. We follow Wurgler's (2000) use of the simple correlation of investment with value-added across industries to proxy for functional efficiency and find pro-debtor PBL reforms predict significantly more functionally efficient investment.

These findings refine conclusions from prior work as follows. First, prior work linking pro-debtor PBL reforms to increased entrepreneurship, measured by self-employment (Armour and Cumming, 2008), is subject to the criticism that, in many countries, much self-employment is involuntary, reflecting disguised unemployment rather than genuine entrepreneurship (Kautonen, Down, and Welter, 2011). Our findings show that pro-debtor PBL reforms increase and redistribute innovation, consistent with PBL reforms affecting genuine entrepreneurship. Second, prior work associates creditor-friendly corporate bankruptcy law (CBL) with reduced innovation across countries (Acharya and Subramanian, 2009). Our findings are unaffected by controlling for CBL changes in Acharya and Subramanian (2009), suggesting the effect of PBL on innovation is largely independent of CBL. Third, prior work shows that the cross-industry allocation of investment within countries affects country value-added growth (Wurgler, 2000). Our findings highlight PBL reforms as altering the cross-industry distribution of innovation effort and increasing value-added growth. Fourth, prior work suggests new and (initially) small firms' innovation is especially important to productivity growth. Our findings implicate PBL reforms as important to such firms' innovation activity and its distribution across industries. Finally, recent studies (Djankov et al., 2002; Acharya and Subramanian, 2009; Brown, Martinsson, and Petersen, 2013; Hsu, Tian, and Xu, 2014; Moshirian et al., 2021) associate CBL, legal institutions, equity market development, and stock market liberalization with innovation. We highlight PBL as an additional finance-related institutional variable relevant to innovation, economic growth, and the functional efficiency of investment.

2. Hypothesis Development

PBL varies across countries and over time. English common law began granting bankrupt individuals discharge (voiding) of their personal debts in the 17th century and common law legal systems worldwide tend towards debtor-friendly PBL. In contrast, civil code legal systems historically treated bankrupt individuals as criminals (Di Martino, 2008). Common law legal systems worldwide likewise tend towards more debtor-friendly CBL than do civil law systems, and these historical patterns persist despite individual countries' CBL reforms (La Porta et al., 1998).

The literature highlights two political motivations for PBL reforms, each with opposite implications for creditors versus debtors. First, economic crises over the past century or more were often attributed to fraudulent, overly speculative, or excessively risky borrowing and therefore precipitated pro-creditor PBL reforms (Di Martino, 2008). Second, in more recent decades, progressive policymakers have argued that pro-debtor PBL reforms help the poor (Fan and White, 2003; Berkowitz and White, 2004) and mitigate income inequality (Gala, Kirshner, and Volpin, 2013). The 21st century PBL reforms we study all granted debtors readier access to discharge.

Neither political motivation is obviously justified. Pro-creditor PBL may not curtail credit run-ups in bubbles, when behavioral factors eclipse rational decision making (Shiller, 2001). Pro-debtor PBL raises interest rates and decreases loan supply (Berkowitz and White, 2004), which does not obviously help the poor.

Rather, pro-debtor PBL reforms may be of primary importance as innovation-boosting policies. By raising loan costs and decreasing loan supply (Berkowitz and White 2004), pro-debtor PBL makes every new debt-financed innovative venture costlier to personally guarantee. By more readily letting innovator-entrepreneurs void lingering personal debts from a prior failed venture, pro-debtor PBL reforms allow them a "fresh start" to try again (Landier, 2005; White, 2005; Ederer and Manso, 2011).[1] Faster entrepreneurial re-entry is important (Georgakopoulos, 2002; Landier, 2005; Ayotte, 2007) because major entrepreneurial success often follows repeated failures and "fresh starts" (Baird and Morrison, 2005; Stam, Audretsch, and Meijaard, 2008; Lee et al., 2011; Fossen, 2014; Jia, 2015).

Consistent with this, self-employment rates, a standard measure of entrepreneurship, rise after pro-debtor PBL reforms across U.S. states (e.g., Fan and White, 2003) and countries (e.g., Armour and Cumming, 2008). However, self-employment is now widely criticized as a measure of entrepreneurial activity. As Blanchflower (2004, p. 15) puts it, more self-employment "may not be better". Kautonen, Down, and Welter (2011) and Henrekson and Sanandaji (2014) argue that self-employment and small business counts pool innovative entrepreneurs and necessity entrepreneurs, the latter defined desiring but unable to obtain above-reservation-wage employment.[2] Necessity entrepreneurship ranges from roadside tea stands to informal-sector

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1 This amounts to giving individuals an insurance option (Jackson, 1985; Alder, Polack and Schwartz, 2000; Frouté, 2007; Cerqueiro and Penas, 2017).

2 Also called forced, involuntary, or push (Amit and Muller, 1995) entrepreneurship, necessity entrepreneurship can be a survival strategy (Block and Koellinger, 2009) or even disguised unemployment (Robinson, 1936; Thurik et

shantytown shops to laid-off engineers spending severance payments to set up consulting businesses to do the same work on contract they previously did as employees, and explains why self-employment is very high in many of the poorest countries in the world.[3] If personal bankruptcy becomes less costly, individuals may prefer risky self-employment to reducing their reservation wages to obtain new wage employment. If increased self-employment after pro-debtor PBL reforms is necessity entrepreneurship, PBL reforms may spur little innovative entrepreneurship.

We therefore explore whether pro-debtor PBL reforms stimulate innovative entrepreneurship measured directly using patent counts, patent citation counts, and new patenter début counts. We observe these direct patent-based measures of innovation rising after pro-debtor PBL reforms. Our findings thus validate the original conclusions of prior work, regardless of conflicting interpretations of self-employment.

Our findings also cast light on a second issue, the importance of innovation by new firms versus large established firms (Acs and Audretsch, 1988). Schumpeter (1911) initially argued that initially small new upstart firms are essential innovators because large established firms, with substantial physical and human capital investments in legacy technologies, are prone to suppressing disruptive innovation that might destroy those investments. A more prominent and established Schumpeter (1942) saw more prominent and established firms as having more cash flows to spend on innovation, but on innovation to augment, rather than displace, their technologies in place. If PBL reforms reduce innovative entrepreneurs' risk in founding new firms, the increased innovation subsequent to such reforms would tend to arise in new firms and be radical, rather than incremental. We observe this, and find PBL reforms to have no discernable impact on innovation by established firms with large accumulations of prior patents.

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al., 2008). However, forced entrepreneurs with high human capital can become significant innovators (Hacamo and Kleiner, 2022), as with some ethnic diasporas (Chirot and Reid, 1997). Labor Economics stresses a dual view of self-employment as a mix of the two (Dennis, 1996; Taylor, 1996).

[3] The World Bank lists the top five countries by self-employment as Niger (95.1% self-employed), Central African Republic (93.2%), Chad (92.6%), Guinea (91.9%), and Somalia (91.7%). Self-employment is negatively correlated with per capita GDP (Acs, Audretsch, and Evans, 1994; Nica, 2019).

Winter (1984, p. 297) reasons that small new firms develop radical innovations, whereas large established firms favor innovations that incrementally enhance the value of their existing technologies; and that the former have far larger positive spillovers and are therefore of more fundamental importance to long-run productivity growth (Bloom, Schankerman, and Van Reenen, 2013). Winter's reasoning has accumulated substantial theoretical (e.g., Aghion and Howitt, 1992) and empirical support (e.g., Fogel, Morck, and Yeung, 2008; Faccio and McConnell, 2020; Aghion, Antonin, and Bunel, 2021). Our finding that PBL reforms stimulate the sort of innovation associated with long-run prosperity therefore has public policy relevance.

3. Variables Construction

Table 1 provides summary statistics for the innovation measures, PBL reform indicator, and control variables used in the regressions. The subsequent subsections deal with each in turn.

3.1. Innovation measures

Our tests use country-industry-level data. To measure innovation, we use the NBER Patents Data File (Hall, Jaffe, and Trajtenberg, 2001), which covers all patents filed with the USPTO from some 85 countries. Examiners assign patents to patent classes by technology, which are matched to Standard Industrial Classification (SIC) codes using the Office of Technology Assessment and Forecast (OTAF) concordance table, which the USPTO provides at www.uspto.gov.[4] The 2008 OTAF Concordance Table matches each of the 216,606 USPC subclasses to one to seven of 42 industries described by "SIC sequence numbers" (SSN), listed in ascending order. Most SSNs correspond to one 3-digit Standard Industry Code (SIC), though a few correspond to a 2-digit SIC codes and some are matched to several SIC codes. The SIC codes run from 200 to 390, spanning all manufacturing industries. Online Appendix A provides details.

The USPC subclasses that are linked to multiple SSNs necessitate judgment calls. Some prior studies do rough matches using only the first (numerically lowest) SSN; however, this may

[4] Hirabayashi (2003) describes how USPTO examiners manually review the USPC (U.S. Patent Classification) categories and assign them to a set of industry-based product fields based on 1984 SIC codes.

not be its most important SSN. We therefore use machine learning to match each patent to one *primary* SSN. Specifically, we first obtain the text of the title and abstract of each successful patent application from PATSTAT or, failing that, from Google Patents, by publication number. Google's Word2Vec300, a two-layer neural net, then transforms this text into numerical 300 element feature vectors suitable as input for deep-learning neural networks.[5]

We next partition the universe of successful patent applications into 2,284,033, whose USPC subclass corresponds to a single SSN (Group 1), and 924,822, whose USPC subclass corresponds to multiple SSNs (Group 2). We randomly draw ten disjoint training subsamples of roughly 200,000 patent applications each from Group 1. The draw is proportional to the population distribution across SSNs, so the subsample sizes vary slightly. This leaves 283,540 Group 1 patent applications for out-of-sample validation tests.

We then apply logistic, lasso, elastic net, and ridge regressions as well as artificial neural network (ANN), and convolution neural network (CNN) to these training subsamples to use patent applications' feature vectors to ascertain a principal SSN for each. This yields ten alternative versions of each technique. Each technique is then tested out-of-sample using the 283,540 patent applications excluded from the random draw. The deep-learning neural net approaches stand out as markedly more accurate, with CNN slightly more accurate than ANN. Out-of-sample success rates (average predicted probabilities across the ten versions) are 0.58 for logit regressions, 0.59 for elastic net regressions, 0.58 for lasso regressions, 0.58 for ridge regressions, 0.66 for ANNs, and 0.67 for CNNs. CNNs require more computer time than ANNs, but not prohibitively more in this case.

We therefore use CNNs. A 67% success rate is substantially above the baseline 2.4% probability a uniform distribution accords each of the 42 SSNs. Consequently, we deem a CNN "valid" if it assigns a probability higher than 2.4% (better than chance) to the matched SSN.

Finally, we use the average choices of the ten CNNs trained as above to assign probabilities to each of the multiple SSNs associated with a Group 2 patent application. Specifically, we declare

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[5] See https://code.google.com/archive/p/word2vec/ for details.

the primary SSN of each Group 2 patent application to be that with the highest probability, averaged across valid CNNs. For patent applications with no valid CNN (about 2.75%), we rely on the CNN that accords highest probability to the patent's SSNs to make the decision. This approach successfully assigns primary SSN to 923,422 of the 924,822 patent applications in Group 2. The remaining 1,400 (0.15%) are randomly assigned a primary SSN from its SSNs.

We assess this approach by assigning a second false (placebo) SSN to each one-SSN patent application in the out-of-sample validation subset of Group 1. Our approach selects the correct SSN in 97% of cases. Our approach selects the first (lowest) SSN as primary in only 36% of Group 2 patent applications.

Established technology leader firms, whose innovation is readily financed without personal guarantees, are unlikely to be directly affected by PBL reforms. We therefore flag firms with 100 or more patents and one or more new patents per year in 1990 to 2002 data. These 789 *legacy* (L) firms have almost as many patents as the other 135,969 *non-legacy* (NL) firms. Our main tests use NL firms only, though we compare L and NL firms later. Robustness checks defining L firms with patent stock cutoffs of 50 or 150 generate similar results.

We are interested in private-sector patents with business applications and require data for the U.S. and other countries. The NBER data classify patents by assignee, and we retain patents with assignee codes 2 (U.S. non-government organizations, mostly firms) and 3 (non-U.S. non-government organizations, mostly firms). These comprise 47% and 31%, respectively, of all patents.[6]

The first innovation intensity variable, $patents_{i,c,t}$, is the number of successful (i.e. subsequently granted) patent applications by NL firms in industry i in country c in year t = 1990 through 2002. Patent counts can be an imperfect measure of innovation because individual patents can vary substantially in quality. This concern is mitigated because foreign applicants are likely to file for U.S. patent protection for their more important innovations. This integer variable measures

[6] A patent class for foreign individual assignees is rarely used, containing only 0.25% of all USPTO patents. Prior incorporation may help limit personal liability in patent infringement lawsuits.

general innovative intensity.

Our second innovation intensity variable, $cites_{i,c,t}$, directly addresses patent quality heterogeneity. Following Bena and Li (2014) and Hirshleifer, Low, and Teoh (2012), we count citations of each successful patent application filed by NL firms in 1992 to 2002 in all subsequent patent filings in all years through 2016 using the 2016 PATSTAT database. The variable $cites_{i,c,t}$ is the subsequent-citation-weighted count of all successful patent applications by NL firms in industry i in country c in year t = 1990 through 2002. Using 1990 through 2002 leaves at least 14 years (2016 minus 2002) for citations to accumulate, mitigating citation truncation bias (Hall, Jaffe, and Trajtenberg 2001). This measures general innovation importance.

Both $patents_{i,c,t}$ and $cites_{i,c,t}$ are constructed using NL firms only. For comparison, we construct analogous measures for L firms, $patents^{L}_{i,c,t}$ and $cites^{L}_{i,c,t}$, and for all firms, $patents^{ALL}_{i,c,t}$ and $cites^{ALL}_{i,c,t}$. Our main variables focus on NL firms because firms needing personal guarantees and firms with disruptive innovations are more likely to be found among their number than among L firms.

Our third innovation measure, $débuts_{i,c,t}$, counts the number of patenters filing their first-ever patents in each industry in each country each year. Again, all début patenters neither need personal loan guarantees nor harbor disruptive innovations, but $débuts_{i,c,t}$ may be a more focused proxy for such firms.

Table 1 provides summary statistics for our three measures of innovation. We interpret $patents_{i,c,t}$ and $cites_{i,c,t}$ as gauging general PBL-dependent innovative activity and its importance and $débuts_{i,c,t}$ as a more focused measure of innovation by outsiders, which potentially might be more disruptive and consequential.

3.2. Personal bankruptcy law reform indicator

Our data on PBL reforms extend those of Armour and Cumming (2008), who track PBL changes in 15 countries, and encompass PBL changes in all other patent-active countries, defined as countries with total patent counts of over 100 in the sample period of 1992 to 2002. We end this exercise in 2002 so a sufficiently large number of subsequent years' citations can be used to assess patent quality. Reading each country's PBL laws and regulations and consulting other relevant legal documents where possible, we identify where and when meaningful changes in discharge accessibility and delay (years from bankruptcy to discharge) occurred.

This yields nine countries with PBL reforms and 24 without in 1990 to 2002. Panel B of **Table 1** presents these 33 countries' patenting information and PBL reform years. We denote country c's PBL reform implementation year as t_c. All the reforms in our data make PBL more debtor friendly.

From these country-level PBL chronologies, we construct a PBL post-reform binary indicator

[1] $$\delta_{c,t}^{XPBL} = \begin{cases} 1 & \text{if } t \geq t_c \\ 0 & \text{otherwise} \end{cases}$$

set to one for country c after t_c, the year its PBL reform is implemented, and to zero otherwise. This variable is zero throughout for countries without PBL reforms.

Legal reforms typically occur well after a government's intention to change laws becomes public information. **Figure 1** uses Google Trends counts of the term for "personal bankruptcy law" in each country's primary language each year. Counts increase sharply the year before the reform occurs. We therefore construct a second binary indicator

[2] $$\delta_{c,t}^{TPBL} = \begin{cases} 1 & \text{if } t \in \{t_c - 2, t_c - 1\} \\ 0 & \text{otherwise} \end{cases}$$

set to one in the transition period, the year two years before and the year one year before country c's PBL reform year t_c, and to zero otherwise. This variable is zero throughout for countries without PBL reforms.

3.3. Control variables

Following Moshirian et al. (2021), we subsume all time-invariant country-industry-level latent variables by including country-industry dummies and subsume all global business cycle latent variables by including year dummies. We also control for several industry-level and country-level characteristics that may be correlated with PBL changes and/or innovation.

First, to account for time-varying comparative advantages (Acharya and Subramanian, 2009), we include the ratio of value-added in industry i to the total value-added of country c in year t, denoted $value\text{-}added_{i,c,t}$.[7]

Second, innovators in countries exporting more to the U.S. might disproportionately seek U.S. patents to protect their intellectual property in the U.S. market. This could distort our innovation measures, which are based on foreigners' patents recorded at the USPTO. To address this potential bias, we control for industry i's imports from and exports to the U.S., expressed fractions of country c's total imports from and total exports to the U.S., respectively, in year t. Denoted $exports_{i,c,t}$ and $imports_{i,c,t}$, both are constructed using data from Feenstra, Romalis, and Schott (2002).

Third, wealthier and larger economies may innovate more (Liang, 2018). To address this, we control for the natural logs of real GDP per capita and population of country c in year t and denote these $\ln(pcGDP_{c,t})$ and $\ln(pop_{c,t})$. Changes in per capita GDP also reflect changes in innovation associated with asynchrony in business cycles across countries.

Fourth, innovation opportunities can vary across industries and time (Hall, Jaffe, and Trajtenberg, 2001). Cohen, Nelson, and Walsh (1996) argue that U.S. patenting intensity in an industry reflects the fundamental technological characteristics of that industry. Therefore, we follow Rajan and Zingales (1998), Acharya and Subramanian (2009), and others in using U.S. innovation as a proxy for each industry's innovative potential. Denoted $pot_{i,t}$, this is the natural log of the mean USPTO patent counts for U.S. firms in industry i in year t.

We also control for variations in creditor rights in corporate bankruptcy law (CBL). We take Acharya and Subramanian's (2009) change in credit rights index, denoted as $CRI_{c,t}$ because we wish to assess the marginal importance of PBL reforms over and above the effects they find for this measure of CBL changes. For details, see Acharya and Subramanian (2009).

[7] The dataset, from Nicita and Olarreaga (2006), provides value-added by 3-digit ISIC codes, with a 3-digit SIC code concordance table.

4. Estimation Results

4.1. The main effect of PBL reforms on innovation

To examine the relationship between a country's PBL reform and its industries' subsequent innovation, we estimate the following fixed-effects Poisson regressions of the form[8]

[3] $$E\left[\pi_{i,c,t}\right] = \mathrm{e}^{\lambda_0\, \delta_{c,t}^{XPBL} + \lambda_1 \delta_{c,t}^{TPBL} + \sum_{k=1}^{K} \beta_k X_{k,\cdots,t-1} + \mu_{i,c} + \tau_t}$$

The subscripts *i*, *c*, and *t* denote industry, country, and year. The explained variable, $\pi_{i,c,t}$, is one of the three innovation measures described in detail in section 3.1: $patents_{i,c,t}$, $cites_{i,c,t}$, or $d\acute{e}buts_{i,c,t}$. The expectation is conditional on the values of the explanatory variables in the exponent term on the right-hand side. Poisson regressions are designed for explaining integer count variables.

The key explanatory variable is the PBL post-reform indicator $\delta_{c,t}^{XPBL}$ whose coefficient λ_0 quantifies differences in innovation $\pi_{i,c,t}$ associated with differences in PBL and is our primary interest.

Collectively denoted $X_{k,\cdots,t-1}$ in [3], and described in detail in section 3.3, the control variables are industry innovative potential, $pot_{i,t}$, industry value-added as fraction of national value-added, $value\text{-}added_{i,c,t}$, industry exports to the U.S. as fraction of national exports to the U.S., $exports_{i,c,t}$, industry imports from the U.S. as fraction of national imports from the U.S., $imports_{i,c,t}$, log of national per capita GDP, $\ln(pcGDP_{c,t})$, log of national population, $\ln(pop_{c,t})$, and change in credit rights index, $CRI_{c,t}$. In the regression, all controls are lagged one year except $CRI_{c,t}$, which is concurrent to align with the PBL reform indicator $\delta_{c,t}^{XPBL}$. All of the regressions subsume all time-invariant country-industry-level latent factors and time-varying global latent factors with country-industry fixed effects $\mu_{i,c}$ and year fixed effects τ_t, respectively. Statistical significance tests cluster bi-directionally, by country and by industry.

Table 2 summarizes the results. For each explained variable, $patents_{i,c,t}$, $cites_{i,c,t}$, or

[8] Cohn, Liu, and Wardlaw (2022) show OLS regressions explaining natural logs of count measures can be biased and recommend Poisson regressions. OLS regressions, available on request, nonetheless give very similar results.

$d\acute{e}buts_{i,c,t}$, regressions 2.1, 2.4, and 2.7, respectively, include only the PBL post-reform indicator $\delta_{c,t}^{XPBL}$, the PBL transition indicator $\delta_{c,t}^{TPBL}$, and industry innovation potential, $pot_{i,t}$; then 2.2, 2.5, and 2.8 include all the controls except change in creditor rights index, $CRI_{c,t}$; and finally 2.3, 2.6, and 2.9 include all controls. Note that the sample sizes differ for different explained count variables because Poisson estimation optimally drops observations with no variation in a fixed effect category (Silva and Tenreyro, 2010, 2011). The coefficient λ_0 on the PBL post-reform indicator is positive and significant at 5% or better across all nine specifications. This associates the typical PBL reform with significantly increased innovation. As all the PBL reforms make debtor discharges more accessible, these DID regressions can be interpreted as evidence that readier PBL discharge boosts innovation.

The magnitudes of the point estimates for λ_0 show these positive effects to be economically significant. The marginal effects, $e^{\lambda_0} - 1$ in Poisson regressions, of the typical reform having been enacted are $27.6\% = e^{0.244} - 1$ more patents, 33.5% more subsequent patent citations, and 24.1% more first-time patenters using coefficients from 2.3, 2.6, and 2.9, which include all controls.

There are increases from the transition period. The values of λ_1, the coefficient of the reform transition indicator $\delta_{c,t}^{TPBL}$, in 2.3, 2.6, and 2.9 show patents, patent citations, and new patenter counts rising by 7.8%, 7.3%, and 25.7% respectively in the transition period. Section 4.4.2 examines these findings in more detail. The general conclusion from Table 2 is that PBL reforms are associated with statistically and economically significant increases in innovation.

Consistent with Acharya and Subramanian (2009), higher CRI (i.e. less debtor-friendly CBL) is associated with less innovation. However, comparing the second and third regressions explaining each of the three innovation measures shows that accounting for changes in creditor rights or not leaves the coefficients on the PBL post-reform indicator essentially unchanged. This is consistent with PBL reforms having an independent effect on innovation.

The significant coefficients of the control variables are unremarkable. Higher GDP per capita, larger population size, being in an industry that imports from the U.S., and being in an industry-year with a higher innovation potential are all positively associated with innovation. A higher U.S.

output ratio is sporadically significant, with positive signs, suggesting local patenting is associated with importing from the U.S., rather than exporting to it. Prior competitive advantage, as captured by value added ratios, is insignificant.

4.2. Effects of PBL reforms in varying with industry innovation potential

Specification [3] tests for PBL reforms affecting innovation uniformly across industries. However, innovations can arise and diffuse across different industries with different economic impact (Acharya and Subramanian, 2009; Moshirian et al., 2021). We therefore explore heterogeneity in how PBL reforms affect innovation in industries with different innovation potential using a varying coefficients model. Specification [3] is modified by changing the coefficients on the post-reform and trans-reform indicators, $\delta_{c,t}^{XPBL}$ and $\delta_{c,t}^{TPBL}$, from λ_0 and λ_1 to $\lambda_0 + \mu_0\, pot_{i,t}$ and $\lambda_1 + \mu_1\, pot_{i,t}$, respectively. The resulting specification is

[4] $$E\left[\pi_{i,c,t}\right] = \mathrm{e}^{(\lambda_0+\mu_0\, pot_{i,t})\, \delta_{c,t}^{XPBL} + (\lambda_1+\mu_1\, pot_{i,t})\, \delta_{c,t}^{TPBL} + \sum_{k=1}^{K} \beta_k X_{k,\cdots,t-1} + \mu_{i,c} + \tau_t}$$

All else is as in [3]. For brevity, we present only analogs to Table 2 regressions using all control variables – that is, 2.3, 2.6, and 2.9.

Table 3 regressions 3.1, 3.2, and 3.3 summarize these results. The main effects of PBL reform, the λ_0 coefficients on $\delta_{c,t}^{XPBL}$, are now uniformly insignificant, while the μ_0 coefficients on its interactions with $pot_{i,t}$ reveal that the impact of PBL reforms on innovation rises statistically and economically significantly with industry-year innovation potential[9]. The impact of debtor-friendly PBL reform on patent counts is 46.3% (= $\mathrm{e}^{0.697*(1.057-0.511)} - 1$) higher in an industry at the innovation potential distribution's 75th percentile (1.057) than that at its 25th percentile (0.511). The comparable differences for citation and new patenter counts are 43.8% and 20.6%, respectively.

Regressions 3.4, 3.5, and 3.6 modify [4] by putting interactions of innovation potential with the control variables in the RHS exponent, alongside the control variable main effects. This specification

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[9] Interaction significance tests can be problematic in nonlinear estimation. However, the significance of the coefficient of an interaction of a continuous variable with a dummy in a Poisson regression is precisely the significance of the interaction term in the Poisson regression. See **Appendix Note 1** for details.

[5] $$E[\pi_{i,c,t}] = e^{(\lambda_0+\mu_0\, pot_{i,t})\,\delta_{c,t}^{XPBL}+(\lambda_1+\mu_1\, pot_{i,t})\,\delta_{c,t}^{TPBL}+\sum_{k=1}^{K}(\beta_k+\gamma_k\, pot_{i,t})\,x_{k,\cdots,t-1}+\mu_{i,c}+\tau_t}$$

allows the control variables to have different effects in industry-years with different innovation potential. The coefficients μ_0 are slightly reduced in magnitude, but still highly statistically and economically significant.

The control variables largely track the pattern in Table 2. One exception is innovation potential attracting a negative coefficient in explaining new patenter counts $debuts_{i,c,t}$ in 3.6. This is difficult to interpret economically alongside its many interaction terms.

Figure 2 represents these patterns graphically using simple means. The increase in innovation intensity, as measured by all three variables, is visibly larger for industries with innovation potential in its top quartile than bottom quartile, and even flips signs.

Table 3 and Figure 2 summarize evidence supporting PBL reforms making debt discharge more readily available boosting innovation more in industry-years with high innovation potential and not greatly affecting innovation in industry-years with low innovation potential.

4.3. Robustness checks

Our main results, Tables 2 and 3, are highly robust. Online Appendix (OA) provides tables summarizing robustness check regressions. In general, the robustness checks lead to qualitatively similar results, meaning identical patterns of signs and significance and roughly comparable point estimates. Where the results are not qualitatively similar, implications for interpreting the main results are explained. The robustness checks are as follows.

One possible concern is that our results are driven by improvements in intellectual property protection (IPP), which might correlate with both PBL reforms and innovation. Four countries (Austria, Ireland, Israel, and Russia) reformed their IPP in our 1992 to 2002 sample period (Acharya and Subramanian, 2009). Dropping these four countries and rerunning our baseline regressions yields results qualitatively similar to those in the tables (see Appendix **Table OA1**). This is inconsistent with IPP reforms driving our main results.

We aggregate USPTO patent technology classes to 3-digit SIC codes. An alternative approach, following Hsu et al. (2014), is to use USPTO class-level variables. Appendix **Table OA2** describes these alternative versions of our three explained variables, denoted $patents^{*}_{i,c,t}$, $cites^{*}_{i,c,t}$, and $débuts^{*}_{i,c,t}$, and the innovation potential measure $pot^{*}_{i,c,t}$ (US patenting), by 3-digit USPTO classification code each year. Because they are industry-level variables, *value-added*, *exports*, and *imports*, are dropped. As the Appendix table shows, qualitatively similar results ensue.

Innovation potential is taken as the average patent count for U.S. firms each industry-year. We also rerun our regressions using Japanese, rather than U.S., firms' average patent counts to construct the innovation potential benchmark. We then exclude Japan from the regressions. Qualitatively similar results ensue (Appendix **Table OA3**).

To further address the possibility that CRI changes might affect our results, we exclude three event countries with CRI changes in 1992 through 2002 and rerun the regressions. Qualitatively similar results ensue (Appendix **Table OA4**).

We also rerun our regressions by defining the PBL trans-reform period as the year before and the year of the reform and the PBL post-reform period as years after the PBL reform. Qualitatively similar results ensue (Appendix **Table OA5**).

Poisson regressions are used to explain counts because OLS estimates can be biased (Cohn, Liu, and Wardlaw, 2022). Negative binomial regressions are also used for this purpose. We therefore rerun our regressions in this form. All fail to converge if country-industry fixed effects are included, so we substitute country and industry fixed effects. This yields qualitatively similar results to the tables, though with reduced statistical significance (Appendix **Table OA6**). These tests do not undermine Tables 2 and 3, but rather show industry-country fixed effects are important.

Another approach uses indicators (one if count > 0, zero otherwise) rather than counts as LHS variables. These regressions can be interpreted as extensive margin tests (tests for some innovative activity where there was previously none) that exclude intensive margin effects (more innovation where there was some innovation previously). Linear probability regressions explaining zero-one dummies for $patents_{i,c,t} > 0$, $cites_{i,c,t} > 0$, and $débuts_{i,c,t} > 0$ generate uniform insignificance for $\delta^{XPBL}_{c,t}$ and its interaction with $pot_{i,t}$ (Appendix **Table OA7**). Logit and probit regressions generate results similar to linear probability models. This robustness check shows that pro-debtor PBL reforms affect innovation's intensive, rather than extensive, margin.

Another concern is citations truncation bias (Hall, Jaffe, and Trajtenberg, 2001). We track citations through to 2016, so a 1992 patent, filed at the start of our 1992 to 2002 sample, has 24 years to accumulate citations, whereas a 2002 patent has only 14 years. A minimum 14-year period largely ameliorates this problem because most citations occur within this period; and we include year fixed effects to further mitigate this concern. As a further robustness check, we implement an approach devised by Hirshleifer, Low, and Teoh (2012) that avoid throwing away later years' data. We normalize each patent's citations by the average citation count of all patents in the same technology class and year. We then calculate a normalized citation count, denoted $ncites_{c,i,t}$, for each industry in each country each year. Additionally, we also use a rolling 14-year window so all patents have the same number of years to accumulate citations and generate $cites\_14y_{c,i,t}$ for each industry in each country each year. Rerunning the citation count regressions using these two alternative measures yields qualitatively similar results (Appendix **Table OA8**).

An additional concern is whether our main results also apply to radical innovation, which is crucial to a firm's long-term success. We thus estimate the effect of PBL reform on radical innovation using two new measures. Following Balsmeier, Fleming, and Manso (2017), our first measure is $radical\_1_{i,c,t}$, defined as the number of successful patent applications filed by firms in country c's industry i in year t whose citation counts rank in the top 10% of all USPTO patents in that industry that year. Following Griffith and Macartney (2014), our second measure is $radical\_2_{i,c,t}$, defined as the number of successful patent applications by firms in country c's industry i in year t that cite at least one non-patent literature (NPL). Rerunning the patent count regressions using these two alternative measures yields qualitatively similar results (Appendix **Table OA9**), suggesting that our major results are also valid regarding radical innovation.

Last, a new patenter may file more than one patent application in its first year, and these patents may fall in different SSNs. Our variable $débuts_{i,c,t}$ counts a new patenter with three new patents, two in one industry and one in another industry, as one new patenter in both industries. This would inflate the aggregate number of new patenters (a figure we do not use); but is defensible in accurately recording one innovative entry in both industries. However, as robustness checks, we consider two alterative measures. The number of patenters filing their very first successful patent application, denoted $débuts\_1_{i,c,t}$, counts only new patenters' unique first patent and that patent's SSN, and thus counts each new patenter only once. Prioritizing patenters' very first patents in their début years is not always appropriate, so we also use $début\ patents_{i,c,t}$, the number of successful patent applications in each industry by that year's first-time patenters. This adds two to the industry in which the above-mentioned first-time patenter has two patents and adds one to the industry in which it has one patent. This measures new patenter patents in each industry, not new patenters, and so assigns more weight to industries in which individual new patenters are more prolific. Rerunning the début patenter regressions using these two alternative measures yields qualitatively similar results (Appendix **Table OA10**), showing our main results for innovative entrepreneurship robust to these alternative measures and thus unlikely driven by patenter inflation or counting new patenters rather than new patenters' patents.

4.4. Robustness regarding identification

To ensure that the effect of PBL reform is causal, we conduct three additional tests. Now we rely on the interaction effect to draw conclusions.

4.4.1. Controlling for the effects of financial and institutional development

Tables 2 and 3 include country-industry and time fixed effects, which fully subsume all time-invariant latent factors with variation across country-industries and all time varying latent factors with no variation across country-industries. This leaves time varying country-, industry-, or industry-country-level latent factors requiring control variables. This subsection considers potential control variables along these lines.

PBL reforms and innovation may be associated with general financial development, deemed a major driver of sustained economic growth (Levine and King, 1993, 2003; Rajan and Zingales, 1998; Hsu et al., 2014). Financial development is associated with legal and regulatory changes to securities, corporations, corporate governance, and accounting law, all of which interact with bankruptcy law (Beck and Levine, 2005). Indeed, PBL reforms may be associated with general institutional development, which might also foster innovation (Klenow and Rodriguez-Clare, 1997). Much variation in financial and institutional development may have roots in countries' overarching legal systems, one of English common law, the French Civil Code, Scandinavian law, or the German Civil Code (La Porta, Lopez-de-Silanes, and Shleifer, 2008).

We therefore rerun our tests including additional control variables: $findev_{c,t}$, the IMF's overall financial development indicator, developed by Svirydzenka (2016), $instdev_{c,t}$, a general measure of institutional quality from Bekaert, Harvey, and Lundblad (2005), as well as interactions all of the above with innovation potential. We also control for interactions of innovation potential with indicator variables for each of the four legal origins (La Porta, Lopez-de-Silanes, and Shleifer, 2008). Because the legal-origin dummies are time-invariant within a country, they are already subsumed by the country-industry fixed effects.

In **Table 4**, we augment regressions 3.4, 3.5, and 3.6 in Table 3 with all these additional control variables to subject our main results to maximal pressure. The coefficients of $\delta_{c,t}^{XPBL} \times pot_{i,t}$ remain positive and statistically significant in all three columns, suggesting that our main results are unlikely to be driven by financial or institutional development. When $d\acute{e}buts_{i,c,t}$ is examined, the coefficient of $findev_{c,t} \times pot_{i,t}$ is positive and statistically significant, consistent with the above-mentioned findings associating entrepreneurial innovation with financial development.

To address the issue of time-varying country-level latent factors more generally, we then rerun our regressions of Table 3 replacing year fixed effects with country-year fixed effects. This subsumes the main effects of all time-varying country-level factors, such as country-level policy shocks. To avoid curse of dimensionality problems from too many fixed effects, we also replace country-industry dummies with industry dummies. **Table 5** summarizes the results. By including country-year fixed effects in regressions 5.4, 5.5, and 5.6, the coefficient of $\delta_{c,t}^{XPBL} \times pot_{i,t}$ retains significance with similar point estimates. Overall, these robustness tests suggest our main results are unlikely to be driven by omitted latent variables.

4.4.2. Dynamics of innovation

In Table 2, the PBL reform transition period dummy $\delta_{c,t}^{TPBL}$ is substantially more prominent in explaining new patenter counts than in explaining patent counts or citation counts. To explore timing differences in more detail, we follow Bertrand and Mullainathan (2003) and, with t_c the year in which country c implements its PBL reform, define eight indicator variables $\delta_{-4,c,t}$, $\delta_{-3,c,t}$, $\delta_{-2,c,t}$, $\delta_{-1,c,t}$, $\delta_{0,c,t}$, $\delta_{1,c,t}$, $\delta_{2,c,t}$, and $\delta_{\geq 3c,t}$, as follows

[6] $$\delta_{s,c,t} = \begin{cases} 1 & \text{if } t = t_c + s \\ 0 & \text{otherrwise} \end{cases} \qquad \forall\, s \in \{-4, -3, -2, -1, 0, 1, 2\}$$

[7] $$\delta_{\geq 3,c,t} = \begin{cases} 1 & \text{if } t \geq t_c + 3 \\ 0 & \text{otherrwise} \end{cases}$$

leaving the baseline (omitted) category for assessing the significance of the above indicators the periods $t \leq -5$.

For each event country c with a PBL reform in year t_c, we drop observations more than six years before or after that year. We first rerun the regressions 2.3, 2.6, and 2.9 of Table 2 replacing the reform indicator variables $\delta_{c,t}^{TPBL}$ and $\delta_{c,t}^{XPBL}$ with the eight indicator variables. These regressions assess changes in innovation relative to the period from six to five years before each country's PBL reform.

Panel A of Table 6 summarizes these three regressions (i.e., 6A.1, 6A.3, and 6A.5). Three innovation measures begin rising two years before the reform. Larger coefficients on later time dummies show this pattern growing increasingly economically significant in subsequent years. **Panel A of Figure 3** graphically summarizes the key takeaway: actual innovation grows increasingly two years before PBL reforms.

We then rerun the regressions 3.4, 3.5, and 3.6 of Table 3 replacing the reform indicator variables $\delta_{c,t}^{TPBL}$ and $\delta_{c,t}^{XPBL}$ and their interactions with $pot_{i,t}$ with the eight indicator variables and their interactions with $pot_{i,t}$. These regressions assess changes in innovation relative to the period from six to five years before each country's PBL reform.

Panel B of Table 6 summarizes these three regressions (i.e., 6B.1, 6B.3, and 6B.5). Three innovation measures begin rising in proportion to industry innovation potential in the year of the reform. Innovation intensification in proportion to industry innovation potential sets in across all three innovation measures in the first post-reform year. Larger coefficients on later time dummies interacted with innovation potential for the first two innovation measures show this pattern growing increasingly economically significant in subsequent years. **Panel B of Figure 3** graphically summarizes the key takeaway: actual innovation grows increasingly correlated with innovation potential after PBL reforms.

4.4.3. Event study

Another approach to clarifying timing is to study changes in innovation in the years surrounding each country c's PBL reform year, t_c. We thus rearrange the data in event time, retaining data for the seven years surrounding each PBL reform and ordering observations in event time and dropping countries without PBL reforms. Thus, for a country with PBL reform year t_c, we retain data for $(t_c - 4, t_c - 3, t_c - 2, t_c - 1, t_c, t_c + 1, t_c + 2)$ only.

Table 7 summarizes regressions paralleling Table 3, but using this sample and dropping *CRI*. As we have deleted all non-event countries, we are unable to reliably estimate its coefficient. The coefficient of $\delta_{c,t}^{XPBL} \times pot_{i,t}$ is positive and statistically significant across all regressions in the table.

Expending the event window from the seven years surrounding each PBL reform to the nine surrounding years generates similar results. See panel A of Appendix **Table OA11**. Including *CRI* also generates similar results except for regression OA11B.6 (the analog to 3.4 explaining *patents* and including all the interactions of innovation potential with the controls), in which the coefficient loses significance (p = 0.185). See panel B of Appendix **Table OA11**. The coefficients of *CRI* turn less significant, confirming our concern that its effect may not be reliably estimated in this setting.

These tests affirm that innovation not only increases, but becomes more aligned across industries with innovation potential.

5. PBL Reform, Established Firms, and Innovation

The section explores two further dimensions of heterogeneity: firm size and minimum capital requirements. These are of interest because entrepreneurs must often form new firms to develop radical and disruptive innovations that could erode the value of established firms' existing assets and technologies. Most newly founded firms are initially small, so larger firm size can loosely capture reliance on existing assets and technologies, and thus coolness towards disruptive innovations. Minimum capital requirements are legal size thresholds imposed on new firms in countries' laws and regulations, and can function as barriers to entry that protect incumbents from competition, perhaps especially from disruptive entrants (Djankov et al., 2002).

5.1 Established leaders versus other firms

Table 8 revisits **Table 3**, running regressions of the forms [3] and [4] to explain the innovation intensity measures with and without interactions of industry innovation potential with the full set of control variables. As above, the coefficients of $\delta_{c,t}^{XPBL} \times pot_{i,t}$ are positive and statistically significant for NL firms. In regressions explaining innovation intensity by established leaders (L firms), the analogous coefficient point estimates are mostly statistically insignificant, and their magnitude is small.

This finding is robust across both innovation intensity measures and robust to including or excluding the full set of control variables' interactions with innovation potential. The finding is also robust to different definitions of established leaders: using 50 or 150, rather than 100, patents in total preserves the main result in Table 8. See Appendix **Table OA13**.

These findings are consistent with debtor-friendly PBL reforms stimulating innovation and better aligning innovation with innovative potential by other firms, but not by established leaders. When personal debt discharge is more accessible, potential upstart innovators are more inclined to take risks in terms of developing an innovation away from the purview of established leaders.

We note that the coefficient of $CRI_{c,t} \times pot_{i,t}$ is negative and significant for both established leaders' and other firms' innovation intensity. This implies that the interaction effect of CRI changes reported by Acharya and Subramanian (2009) has relevance for both types of firms, a markedly different pattern.

Analogs to Figure 3 using L firms are consistent with Table 8, confirming that PBL reforms have scant impact on innovation by established leaders.

5.2 Minimum capital requirements for startups

Minimum capital requirements, legal minimum amounts of capital new firms must meet to be legally registered, can serve as a barrier to entry and, along with other regulatory barriers to establishing a new firm, are implicated in stalled economic development (Djankov et al., 2002). Our minimum capital requirement (MCR) measure is the country's regulatory minimum capital requirement, scaled by income per capita. The World Bank provides MCRs from 2004 on, postdating our 1992 to 2002 sample period. This ratio changes slowly over time within countries in the available data, so we use the 2004 value to partition the nine countries with PBL reforms by whether each has MCRs.

Four of the countries with PBL reforms have no MCRs. Five others have MCRs ranging from 24.1% (Belgium) to 67.2% (Netherlands). We employ two indicator variables, δ_c^{NOMCR} set to one for the former four countries and zero for all others, and δ_c^{MCR} set to one for the latter five countries and zero for all others. We then explore how the presence or absence of an MCR affects the extent to which innovation increasingly aligns with industry innovation potential after PBL reforms.

Table 9 revisits **Table 3**, but includes two interactions of the post-reform indicator with innovative potential, one for PBL reform countries with an MCR and another for PBL reform countries with no MCR. In regressions explaining *citation count* and *new patenter count*, the coefficients of the interaction $\delta_c^{MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$, which measures the PBL reform alignment effect in the presence of an MCR, are smaller than those of $\delta_c^{NO\ MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$, which measures the effect where there is no MCR. Chi-square tests show that the differences between the two are significant for *new patenter count*. This result is unaffected for *new patenter count* when we use a slightly different specification in 9.4 to 9.6.[10]

6. PBL Reform, Economic Growth, and Investment Efficiency

The above results show pro-debtor PBL reforms stimulating economically and statistically

[10] The difference becomes insignificant when multiple interaction terms are included. See Appendix **Table OA14**.

significantly increased innovation, especially among firms not previously prominent as patent filers. This section explores broader economic changes potentially stemming from PBL reforms for economic growth and capital allocation efficiency.

6.1 PBL reform and economic growth

Innovation is associated with productivity growth, the primary driver of sustained economic growth in developed economies (Aghion, Antonin, and Bunel, 2021). Consequently, the policy-relevance of PBL reforms includes its implications for economic growth.

We focus on country-industry-year-level value-added growth as a rough proxy for increased economic activity. To facilitate cross-country comparisons, we standardize industry-country-year value-added growth rates as z-scores, denoted $z(va_{i,c,t})$, by subtracting country-means within each industry-year and dividing this difference by its standard deviation across countries within that industry-year. We flag growth spurts as instances of $z(va_{i,c,t})$ exceeding a high-growth threshold. Thus, sets $\delta_{i,c,t}^{z>0.50}$ is one if $z(va_{i,c,t}) > 0.5$, the top quartile boundary of the z-score distribution, and zero otherwise. Regressions predicting growth spurts are analogous to [1], [2], and [3] above, but include the additional control variable $\delta_{i,c,t-1}^{z>0.50}$ to control for possible mean reversion. Robustness checks consider slightly different cutoffs – for example, $\delta_{i,c,t}^{z>0.45}$ is one if $z(va_{i,c,t}) > 0.45$ and zero otherwise.

Table 10 summarizes these regressions. The post-reform indicator $\delta_{i,c,t}^{XPBL}$ attracts positive significant coefficients in regressions 10.1 and 10.2, indicating a generally elevated incidence of growth spurts in all industries subsequent to PBL reforms. The coefficient 0.33 in regression 10.1 indicates a 33% probability of an industry experiencing a highest-quartile growth rate than the default. Note that the null hypothesis is an unconditional probability 25%, so the coefficient 0.33 implies a probability of (1+33%)*(1+25%)-1= 66.2%.

To explore timing differences, we again follow Bertrand and Mullainathan (2003), as in Table 6 Panel A. Regressions 10.3 and 10.4 replace the reform indicator variables $\delta_{c,t}^{TPBL}$ and $\delta_{c,t}^{XPBL}$ in

10.1 and 10.2 with the eight indicator variables $\delta_{-4,c,t}$, $\delta_{-3,c,t}$, $\delta_{-2,c,t}$, $\delta_{-1,c,t}$, $\delta_{0,c,t}$, $\delta_{1,c,t}$, $\delta_{2,c,t}$, and $\delta_{\geq 3c,t}$. For each country c with a PBL reform in year t_c, we drop observations more than six years before or after that year. These regressions thus assess changes in $\delta_{i,c,t}^{z>0.50}$ and $\delta_{i,c,t}^{z>0.45}$ relative to the period from six to five years before each country's PBL reform. Value added growth spurts are evident the year after the reform and several years on. **Figure 4** graphically summarizes the key takeaway: value-added growth jumps after PBL reforms and this does not reverse.

However, while post PBL reform increases in innovation align with innovative potential, growth spurts do not. Regressions analogous to 10.1 and 10.2, but also including interactions of innovation potential with the PBL reform dummies, as in [2], and with the full slate of controls, as in [3], essentially reproduce Table 10. The interaction terms are not robustly significant. Appendix **Table OA15** summarizes these results.[11] Table 10 is robust to reasonable alternate cutoffs x in $\delta_{i,c,t}^{z>x}$ – 0.40. 0.45, 0.50, 0.55. Appendix **Table OA16** shows that Table 10 is also robust to probit, rather than linear probability, estimation.

These combinations of results could reflect innovation spillovers rapidly spreading growth opportunities beyond the industries in which new technologies are actually implemented. One firm's innovation can elevate productivity in other sectors by reducing costs and increasing product quality in other industries in its supply chain (Forni and Paba, 2002) and by providing new solutions to old problems in entirely unrelated industries (Enkel and Gassmann, 2010). If strict PBL reform previously held up the arrival of important innovations, these effects might explain the results in the table.

6.2 PBL reform and the functional efficiency of investment

Tobin (1984) argues that, although the financial sector is unlikely to allocate capital perfectly efficiently – that is, to direct investment to its highest value-creating uses, investment that better

[11] The sole exception in Appendix **Table OA15** is regressions explaining $\delta_{i,c,t}^{z>0.45}$, which show more growth spurts in higher-innovative potential industries following a PBL reform. However, we are reluctant to overstress these tests because the 0.45 threshold appears exceptional. Using $\delta_{i,c,t}^{z>0.55}$, $\delta_{i,c,t}^{z>0.40}$, etc. yields insignificant or only sporadically significant interaction coefficients.

approximates this distribution can be regarded as more functionally efficient. Wurgler (2000) argues that the correlation of investment with value-added across an economy's industries provides a rough but workable proxy for functional efficiency.

The prior sections show PBL reform better aligns the distributions of innovation intensity and innovation potential across sectors. This section explores whether PBL reform also better aligns the distribution of investment across sectors with the distribution of value-added across sectors.

These tests use country-year-level data analogous to the industry-country-year data in the tests above. We use four alternative approaches to assessing the correlation of investment with value-added across 28 3-digit ISIC-level industries in country c in year t. The first measure, denoted $\rho_{(VA_{c,t}/A_{c,t}\ ,\ I_{c,t}/A_{c,t})}$, is the correlation of industry value-added over total output with industry investment rate, defined as investment over total output. The second, denoted $\rho^{rank}_{(VA_{c,t}/A_{c,t}\ ,\ I_{c,t}/A_{c,t})}$, is the rank correlation of the same variables. The third, $\rho_{(\ln VA_{c,t}\ ,\ \ln I_{c,t})}$ is the correlation of the natural log of value-added with the natural log of investment. This more closely approximates Wurgler's (2000) measure, but the sample size is reduced slightly because logarithms of the sporadically negative value-added are undefined. The fourth measure, $\rho^{rank}_{(VA_{c,t}\ ,\ I_{c,t})}$ is the rank correlation of value-added with investment.[12]

To see if PBL reforms increase functional efficiency, we estimate OLS regressions of the form

$$[5] \qquad \rho_{c,t} = \lambda_2\, \delta^{XPBL}_{c,t} + \lambda_3\, \delta^{TPBL}_{c,t} + X^1_{c,t-1}\beta_k + \mu_c + \tau_t + e_{c,t}$$

The explained variable $\rho_{c,t}$ is one of the four functional efficiency proxies defined above. The key explanatory variable is the PBL post-reform indicator $\delta^{XPBL}_{c,t}$ whose coefficient λ_2 quantifies

[12] The related data, from Nicita and Olarreaga (2006), report value added and gross fixed capital formation for 28 three-digit ISIC manufacturing industries. Value added is defined as "the value of shipments of goods produced (output) minus the cost of intermediate goods and required services (but not including labor), with appropriate adjustments made for inventories of finished goods, work-in-progress, and raw materials". Gross fixed capital formation is used to proxy investment, which is defined as "the cost of new and used fixed assets minus the value of sales of used fixed assets, where fixed assets include land, buildings, and machinery and equipment".

difference in functional efficiencies associated with a difference in PBL. Collectively denoted $X^1_{c,t-1}$, the control variables are the log of national per capita GDP $\ln(pcGDP_{c,t})$, the log of national population $\ln(pop_{c,t})$, and the CRI change indicator $CRI_{c,t}$. Consistent with the tests in the prior tables, the first two controls are lagged by one year but $CRI_{c,t}$ is current. The model subsumes country and year fixed effects, denoted μ_c and τ_t, respectively.

Panel A of Table 11 presents the summary statistics of all these country-year variables. The functional efficiency measures are all positive on average, though negative values occur, indicating greater investment flowing into sectors with lower value-added in some countries and years. The correlations of value-added with investment, $\rho_{(\ln VA_{c,t}\,,\ \ln I_{c,t})}$ and $\rho^{rank}_{(VA_{c,t}\,,\ I_{c,t})}$ are close to one. This may reflect larger values of both variables in larger industries, however both functional efficiency proxies nonetheless exhibit substantial variation around their means. The correlations of value-added with investment, both scaled by industry output, $\rho_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$ and $\rho^{rank}_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$ mitigate any latent industry size covariation. Both have substantially lower means. The summary statistics of the other variables are comparable to those of their industry-country-year analogs in Table 1.

Table 11 Panel B summarizes these regressions, which show PBL reforms heralding statistically and economically significant increases in functional efficiency. The post-reform indicator $\delta^{XPBL}_{c,t}$ attracts a statistically significantly positive coefficient in every case. The 0.281 point estimate on the post-PBL reform indicator in regression 11B.2 implies an increase of roughly one standard deviation (0.251) of $\rho_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$, the explained variable. The point estimates of $\delta^{XPBL}_{c,t}$ in regressions 11B.3 and 11B.4, which explain the corresponding rank correlation, $\rho^{rank}_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$, also indicate a highly economically significant effect. Those in both 11B.2 and 11B.4, which include the full array of control variables, indicate a roughly one standard deviation increase in their respective functional efficiency proxies.

Though also highly statistically significant, the coefficients in regressions 11B.6 and 11B.8

imply a somewhat smaller economic effect. The point estimates of 0.049 and 0.066 in regressions 11B.6 and 11B.8, respectively, suggest increases in functional efficiency equal to 48% and 75% of the standard deviations of the functional efficiency proxies $\rho_{(\ln VA_{c,t}\ ,\ \ln I_{c,t})}$ and $\rho^{rank}_{(VA_{c,t}\ ,\ I_{c,t})}$, respectively.

To explore the timing of the above changes in more detail, **Panel C** again follows Bertrand and Mullainathan (2003) and, denoting years in event time with t_c the year in which country c implements its PBL reform, examines eight subsequent time intervals captured by the indicator variables $\delta_{-4,c,t}$, $\delta_{-3,c,t}$, $\delta_{-2,c,t}$, $\delta_{-1,c,t}$, $\delta_{0,c,t}$, $\delta_{1,c,t}$, $\delta_{2,c,t}$, and $\delta_{\geq 3c,t}$. For each country c with a PBL reform in year t_c, we drop observations more than six years before or after that year.

Panel C summarizes regressions analogous to 11B.2, 11B.4, 11B.6, and 11B.8, but replacing the PBL reform indicators $\delta^{TPBL}_{c,t}$ and $\delta^{XPBL}_{c,t}$ with the eight time period indicators above. These regressions assess changes in innovation relative to the period from six to five years before each country's PBL reform. These first two allocative efficiency measures rise in the PBL reform year, the next year, and the period from 3 years on after reform. The latter two rise a year or so later, but the pattern is less stark as both also show large, though statistically insignificant, values in the years immediately surrounding the event year. **Figure 5** graphically summarizes the key takeaways: functional efficiency increases after PBL reforms.

7. Conclusion

Personal bankruptcy law (PBL) reforms ease insolvent individuals' access to discharges from their obligations. Difference-in-differences (DID) regressions show PBL reforms have four statistically and economically significant consequences. First, debtor-friendly PBL reforms increase patenting intensity measured by counts of new patents, of subsequent citations to those patents, and of new patenter débuts. Second, debtor-friendly PBL reallocates all three measures of innovation intensity across a country's industries to more closely resemble their distributions across U.S. industries, which we take as approximating innovation potential across industries. Third, neither of the above results is evident for the small subset of firms with large-scale legacy accumulations of patents.

Rather, both results are most prominent when such firms are excluded, though both are also evident using all firms. Fourth, after PBL reforms, value-added growth spurts occur across diverse industries, not only those in which innovation intensifies and investment becomes more functionally efficient (Tobin, 1984; Wurgler, 2000); that is, capital flows more reliably to higher value-added sectors.

These tests use annual industry-level patent data from 1992 to 2002 and counts of subsequent citations to these patents through 2016 for 33 countries, nine of which enacted debtor-friendly PBL reforms in 1992 to 2002. Because all three innovation measures are count variables with many zeros, the DID tests are Poisson regressions controlling for factors previously associated with innovation and institutional reforms, include year and country-industry fixed effects, cluster bidirectionally by country and industry, and are robust to reasonable specification changes.

Our analyses rely on patent data, a proxy for innovative activity that provides consistency across countries. Our results show that large-scale legacy patenter firms and other firms, notably first-time patenter firms, respond quite differently to the same pro-debtor PBL reforms. Such differences might be evident around other reforms with different implications for established firms and potential upstart firms. All the reforms in our data make PBL more debtor friendly. Reforms that make PBL more creditor friendly might be found in other periods, and whether their impacts are opposite to those we find merits investigation. In addition, future research could examine how PBL affects other household financial decisions and economic outcomes.

References

Acharya, V. V., & Subramanian, K. V., 2009. Bankruptcy codes and innovation. Review of Financial Studies 22, 4949–4988.

Acs, Z. J., & Audretsch, D. B., 1988. Innovation in large and small firms: An empirical analysis. American Economic Review 78 (4), 678–690.

Acs, Z. J., Audretsch, D. B., & Evans, D. S., 1994. Why does the self-employment rate vary across countries and over time? CEPR Discussion Papers, 871.

Aghion, P., & Howitt, P., 1992. A model of growth through creative destruction. Econometrica 60 (2), 323–351.

Aghion, P., Antonin, C., & Bunel, S., 2021. The power of creative destruction. In The Power of Creative Destruction. Harvard University Press.

Alder, B., Polak, B., & Schwartz, A., 2000. Regulating consumer bankruptcy: A theoretical inquiry. Journal of Legal Studies 29 (2), 585–613.

Amit, R., & Muller, E., 1995. "Push" and "pull" entrepreneurship. Journal of Small Business and Entrepreneurship, 12 (4), 64–80.

Armour, J., & Cumming, G., 2008. Bankruptcy law and entrepreneurship. American Law and Economics Review 10 (2), 303–350.

Audretsch, D. B., 1995. Innovation and Industry Evolution, Cambridge, MA. MIT Press.

Ayotte, K., 2007. Bankruptcy and entrepreneurship: The value of a fresh start. Journal of Law, Economics, and Organization 23, 161–185.

Baird, D., & Morrison, E., 2005. Serial entrepreneurs and small business bankruptcies. Columbia Law Review 105, 2310–2368.

Balsmeier, B., Fleming, L., & Manso, G., 2017. Independent boards and innovation. Journal of Financial Economics 123 (3), 536–557.

Beck, T. & Levine, R., 2005. Legal institutions and financial development. Handbook of New Institutional Economics. Springer, Boston, 251–278.

Bekaert, G., Harvey, C., & Lundblad, C., 2005. Does financial liberalization spur growth? Journal of Financial Economics 77, 3–55.

Bena, J., & Li, K., 2014. Corporate innovations and mergers and acquisitions. Journal of Finance 69, 1923–1960.

Berkowitz, J., & White, M., 2004. Bankruptcy and small firms' access to credit. RAND Journal of Economics 35, 69–84.

Bertrand, M., & Mullainathan, S., 2003. Enjoying the quiet life? Corporate governance and managerial preferences. Journal of Political Economy 111, 1043–1075.

Blanchflower, David G. 2004. Self-employment: More may not be better. Swedish Economic Policy Review 11, 15–73.

Block, J., & Koellinger, P. 2009. I can't get no satisfaction—Necessity entrepreneurship and procedural utility. Kyklos 62 (1), 191–209.

Bloom, N., Schankerman, M., & Van Reenen, J., 2013. Identifying technology spillovers and product market rivalry. Econometrica 81 (4), 1347–1393.

Brown, J. R., Martinsson, G., & Petersen, B. C., 2013. Law, stock markets, and innovation. Journal of Finance 68, 1517–1549.

Cerqueiro, G., & Penas, M. F., 2017. How does personal bankruptcy law affect startups? Review of Financial Studies 30 (7), 2523–2554.

Chirot, D., & Reid, A., eds. 1997. Essential Outsiders: Chinese and Jews in the Modern Transformation of Southeast Asia and Central Europe. University of Washington Press.

Cohen, W., Nelson, R., & Walsh, J., 1996. Appropriability conditions and why firms patent and why they do not in the American manufacturing sector. Paper presented at the OECD Conference on New Indicators for the Knowledge-Based Economy.

Cohn, J. B., Liu, Z., & Wardlaw, M. I., 2022. Count (and count-like) data in finance. Journal of Financial Economics, 146 (2), 529–551.

Cosh, A., Cumming, D. J., & Hughes, A., 2009. Outside entrepreneurial capital. Economic Journal 119,

1494–1533.
Dennis, W. J. 1996. Self-employment when nothing else is available? Journal of Labor Research 17 (4), 645–661.
Di Martino, P., 2008. The historical evolution of bankruptcy law in England, the US and Italy up to 1939: Determinants of institutional change and structural differences. Södertörns Bögskola Working Paper. https://www.diva-portal.org/smash/get/diva2:213033/FULLTEXT01.pdf
Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. 2002. The regulation of entry. Quarterly Journal of Economics 117 (1), 1–37.
Ederer, E., & Manso, G., 2011. Incentives for innovation: Bankruptcy, corporate governance, and compensation system. In R. E. Litan (Ed.), Handbook on Law, Innovation and Growth. Edward Elgar.
Enkel, E., & Gassmann, O. 2010. Creative imitation: Exploring the case of cross-industry innovation. R&D Management 40 (3), 256–270.
Faccio, M., & McConnell. J. J., 2020. Impediments to the Schumpeterian process in the replacement of large firms. NBER Working Paper No. 27871.
Fan, W., & White, M., 2003. Personal bankruptcy and the level of entrepreneurial activity. Journal of Law and Economics 46, 543–568.
Feenstra, R. C., Romalis, J., & Schott, P. K. 2002. US imports, exports, and tariff data, 1989-2001, NBER Working Paper No. 9387.
Fogel, K., Morck, R., & Yeung, B., 2008. Big business stability and economic growth: Is what's good for General Motors good for America? Journal of Financial Economics 89 (1), 83–108.
Forni, M. & Paba, S. 2002. Spillovers and the growth of local industries. Journal of Industrial Economics 50(2), 151–171.
Fossen, F. M., 2014. Personal bankruptcy law, wealth, and entrepreneurship—Evidence from the introduction of a "fresh start" policy. American Law and Economics Review 16 (1), 269–312.
Frouté, P., 2007. Theoretical foundation for a debtor friendly bankruptcy law in favour of creditors. European Journal of Law and Economics 24, 201–214.
Gala, V., Kirshner, J. A., & Volpin, P. F., 2013. The political economy of personal bankruptcy law. Working Paper. Available at SSRN: https://ssrn.com/abstract=2359591.
Garcia-Macia, D., Hsieh, C., & Klenow, P., 2019. How destructive is innovation? Econometrica 87 (5), 1507–1541.
Georgakopoulos, N., 2002. Bankruptcy law for productivity. Wake Forest Law Review 37, 51–95.
Griffith, R., & G. Macartney (2014). Employment protection legislation, multinational firms, and innovation. Review of Economics and Statistics 96, 135–150.
Hacamo, I., & Kleiner, K., 2022. Forced entrepreneurs. Journal of Finance 77 (1), 49–83.
Hall, B., Jaffe, A., & Trajtenberg, M., 2001. The NBER patent citation data file: Lessons, insights and methodological tools. NBER Working Paper No. w8498.
Henrekson, M., & Sanandaji, T., 2014. Small business activity does not measure entrepreneurship. Proceedings of the National Academy of Sciences 111 (5), 1760–1765.
Hirabayashi, J., 2003. Revisiting the USPTO concordance between the U.S. patent classification and the Standard Industrial Classification Systems. Working Paper (USPTO).
Hirshleifer, D. A., Low, A., & Teoh, S. H., 2012. Are overconfident CEOs better innovators? Journal of

Finance 67, 1457–1498.
Hsu, P. H., Tian, X., & Xu, Y., 2014. Financial development and innovation: Cross-country evidence. Journal of Financial Economics 112 (1), 116–135.
Jackson, T., 1985. The fresh-start policy in bankruptcy law. Harvard Law Review 98, 1393–1448.
Jia, Y. G., 2015. The impact of personal bankruptcy law on entrepreneurship. Canadian Journal of Economics 48, 464–493.
Kautonen, T., Down, S., & Welter, F., 2011. Involuntary entrepreneurship. World Encyclopedia of Entrepreneurship. Edward Elgar Publishing.
King, R. G., & Levine, R. 1993. Finance and growth: Schumpeter might be right. Quarterly Journal of Economics 108 (3), 717–737.
Klenow, P. J., & Rodriquez-Clare, A., 1997. Economic growth: A review essay. Journal of Monetary Economics 40, 597–617.
Knott, A. M., & Vieregger, C., 2020. Reconciling the firm size and innovation puzzle. Organization Science 31 (2), 245–534.
La Porta, R., Lopez-de-Silanes, F., & Shleifer, A., 2008. The economic consequences of legal origins. Journal of Economic Literature 46 (2), 285–332.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W., 1998. Law and finance. Journal of Political Economy 106 (6), 1113–1155.
Landier, A., 2005. Entrepreneurship and the Stigma of Failure. Available at SSRN: https://ssrn.com/abstract=850446.
Lee, S. H., Yamakawa, Y., Peng, M. W., & Barney, J. B., 2011. How do bankruptcy laws affect entrepreneurship development around the world? Journal of Business Venturing 26 (5), 505–520.
Liang, J., 2018. The Demographics of Innovation, Wiley.
Moshirian, F., Tian, X., Zhang, B., & Zhang, W., 2021. Stock market liberalization and innovation. Journal of Financial Economics, 139 (3), 985–1014.
Nica, M., 2019. The relationship between self-employment and economic development. Southwestern Economic Review 46, 59–85.
Nicita, A., & Olarreaga, M., 2006. Trade, production and protection: 1976–2004. World Bank Economic Review 21 (1), 165–171.
Rajan, R. G., & Zingales, L., 1998. Financial dependence and growth. American Economic Review 88, 559–586.
Rajan, R. G., & Zingales, L., 2003. The great reversals: The politics of financial development in the twentieth century. Journal of Financial Economics 69 (1), 5–50.
Robinson, J., 1936. Disguised unemployment. Economic Journal 46 (182), 225–237.
Schumpeter, J., 1911. Theorie der wirtschaftlichen Entwicklung. Duncker & Humblot.
Schumpeter, J., 1942. Capitalism, socialism, and democracy. Routledge.
Silva, J. S., & Tenreyro, S., 2010. On the existence of the maximum likelihood estimates in Poisson regression. Economics Letters, 107 (2), 310–312.
Silva, J. S., & Tenreyro, S., 2011. Poisson: Some convergence issues. The Stata Journal, 11 (2), 207–212.
Stam, E., Audretsch, D., & Meijaard, J., 2008. Renascent entrepreneurship: Entrepreneurial preferences subsequent to firm exit. Journal of Evolutionary Economics 18 (3), 493–507.

Svirydzenka, K., 2016. Introducing a new broad-based index of financial development. IMF Working Paper No. 1605.

Taylor, M. P., 1996. Earnings, independence or unemployment: Why become self-employed? Oxford Bulletin of Economics & Statistics 58 (2), 253–266.

Thurik, A. R., Carree, M. A., Van Stel, A., & Audretsch, D. B., 2008. Does self-employment reduce unemployment? Journal of Business Venturing 23 (6), 673–686.

Tobin, J., 1984. On the efficiency of the financial system. Lloyds Bank Annual Review, (153), 1–15.

White, M., 2005. A general model of personal bankruptcy: Insurance, work effort, and opportunism. Working Paper presented at 2005 ALEA Meeting.

Winter, S. G., 1984. Schumpeterian competition in alternative technological regimes. Journal of Economic Behavior & Organization, 5(3–4), 287–320.

Wurgler, J., 2000. Financial markets and the allocation of capital. Journal of Financial Economics 58 (1–2), 187–214.

Xie, F., Zhang, B., & Zhang, W., 2021. Trust, incomplete contracting, and corporate innovation. Management Science 68 (5), 3419–3443.

Appendix

Table A1. Variable definitions

Variable	Definition
Explained variables: Innovation intensity measures	
$patents_{i,c,t}$	Number of successful (i.e. later granted) patent applications filed at USPTO by NL (not legacy large-scale patenter) firms in industry i in country c in year t.
$patents^{L}_{i,c,t}$	Number of successful (i.e. later granted) patent applications filed at USPTO by L (legacy large-scale patenters with ≥100 patents and ≥ 1 patent / year in 1992 – 2002) firms in industry i in country c in year t.
$patents^{ALL}_{i,c,t}$	Number of successful (i.e. later granted) patent applications filed at the USPTO by firms in industry i in country c in year t. Note that $patents^{ALL}_{i,c,t} = patents_{i,c,t} + patents^{L}_{i,c,t}$
$cites_{i,c,t}$	Number citations in subsequent patents through to 2016 to successful (i.e. later granted) patent filings at USPTO by NL (not legacy largescale patenter) firms in industry i in country c in year t.
$cites^{L}_{i,c,t}$	Number citations in subsequent patents through to 2016 to successful (i.e. later granted) patent filings at USPTO by LT (i.e. later granted) patent applications filed at USPTO by L (legacy large-scale patenters with ≥100 patents and ≥ 1 patent / year in 1992 – 2002) firms in industry i in country c in year t.
$cites^{ALL}_{i,c,t}$	Number citations in subsequent patents through to 2016 to successful (i.e. later granted) patent filings at USPTO by firms in industry i in country c in year t. Note that $citations^{ALL}_{i,c,t} = citations_{i,c,t} + citations^{L}_{i,c,t}$
$d\acute{e}buts_{i,c,t}$	Number of successful (i.e. later granted) patent applications at USPTO by firms in industry i in country c in year t that filed no patents in any previous year. Debuts by first-time patenters is interpreted as capturing entrepreneurial innovators' new firms.
Explained variables: Follow up regressions	
$\delta^{z>0.50}_{i,c,t}$	Growth spurt indicator I. Set to one if $z(va_{i,c,t}) > 0.5$, the top quartile boundary of the z-score distribution, and zero otherwise. $z(va_{i,c,t})$ is industry-country-year value-added growth rates, standardized by subtracting country-means within each industry-year and dividing this difference by its standard deviation across countries within that industry-year.
$\delta^{z>0.45}_{i,c,t}$	Growth spurt indicator II. Set to one if $z(va_{i,c,t}) > 0.45$, and zero otherwise.
$\rho_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$	Investment efficiency measure I. Correlation of value-added over total output with investment over total output across 28 3-digit ISIC industries in country c in year t.
$\rho^{rank}_{(VA_{c,t}/A_{c,t}\,,\ I_{c,t}/A_{c,t})}$	Investment efficiency measure II. Rank correlation of value-added over total output with investment over total output across 28 3-digit ISIC industries in country c in year t.
$\rho_{(\ln VA_{c,t}\,,\ \ln I_{c,t})}$	Investment efficiency measure III. Correlation of the natural log of value-added with the natural log of investment across 28 3-digit ISIC industries in country c in year t.
$\rho^{rank}_{(VA_{c,t}\,,\ I_{c,t})}$	Investment efficiency measure IV. Rank correlation of value-added with investment across 28 3-digit ISIC-level industries in country c in year t.
Variables of interest – personal bankruptcy law (PBL) reform indicators and industry innovation potential	
$\delta^{XPBL}_{c,t}$	PBL post-reform indicator. Set to one for country c with PBL reform in year t_c in years $t \geq t_c$ and to zero otherwise. Zero throughout for countries without PBL reforms.
$\delta^{TPBL}_{c,t}$	PBL transition period reform indicator. Set to one for country c with PBL reform in

	year t_c in years $t_c - 2$ and $t_c - 1$ and to zero otherwise. Zero throughout for countries without PBL reforms.
$pot_{i,t}$	Industry innovation potential. The natural log of U.S. firms' average patent count in industry i in year t.
Control variables	
$CRI_{c,t}$	Creditor rights index change. Measures the change in strength of creditor rights in corporate bankruptcy law in country c in year t. From Acharya and Subramanian (2009).
$exports_{i,c,t}$	Industry export intensity. Value of exports to the U.S. by industry i in country c in year t over total value exports to U.S. by all industries in that country that year.
$imports_{i,c,t}$	Industry import intensity Value of imports from the U.S. by industry i in country c in year t over value of total imports to U.S. by all industries in that country that year.
$value\text{-}added_{i,c,t}$	Industry value added. Value-added, sales revenue minus costs of inputs excluding capital, of industry i in country c in year t over value-added of all industries in that country that year.
$\ln(pop_{c,t})$	Country size. Natural log of population of country c in yea t.
$\ln(pcGDP_{c,t})$	Country prosperity. Natural log of GDP per capita of country c in year t.

Figure 1. Attention to personal bankruptcy elevates a year before the reform

Mentions of personal bankruptcy law reform from Google n-grams in the five years before and after the year of the reform (year 0) in countries with such a reform divided by the average mentions per year through the eleven years. Countries and reform years are in Table 1 Panel B, with Finland dropped because Google n-grams data are unavailable in Finnish. If the local language term for "personal bankruptcy law" has insufficient mentions to generate results in Google Trends, the term "bankruptcy law" is used instead. Details are in online Appendix Table 17.

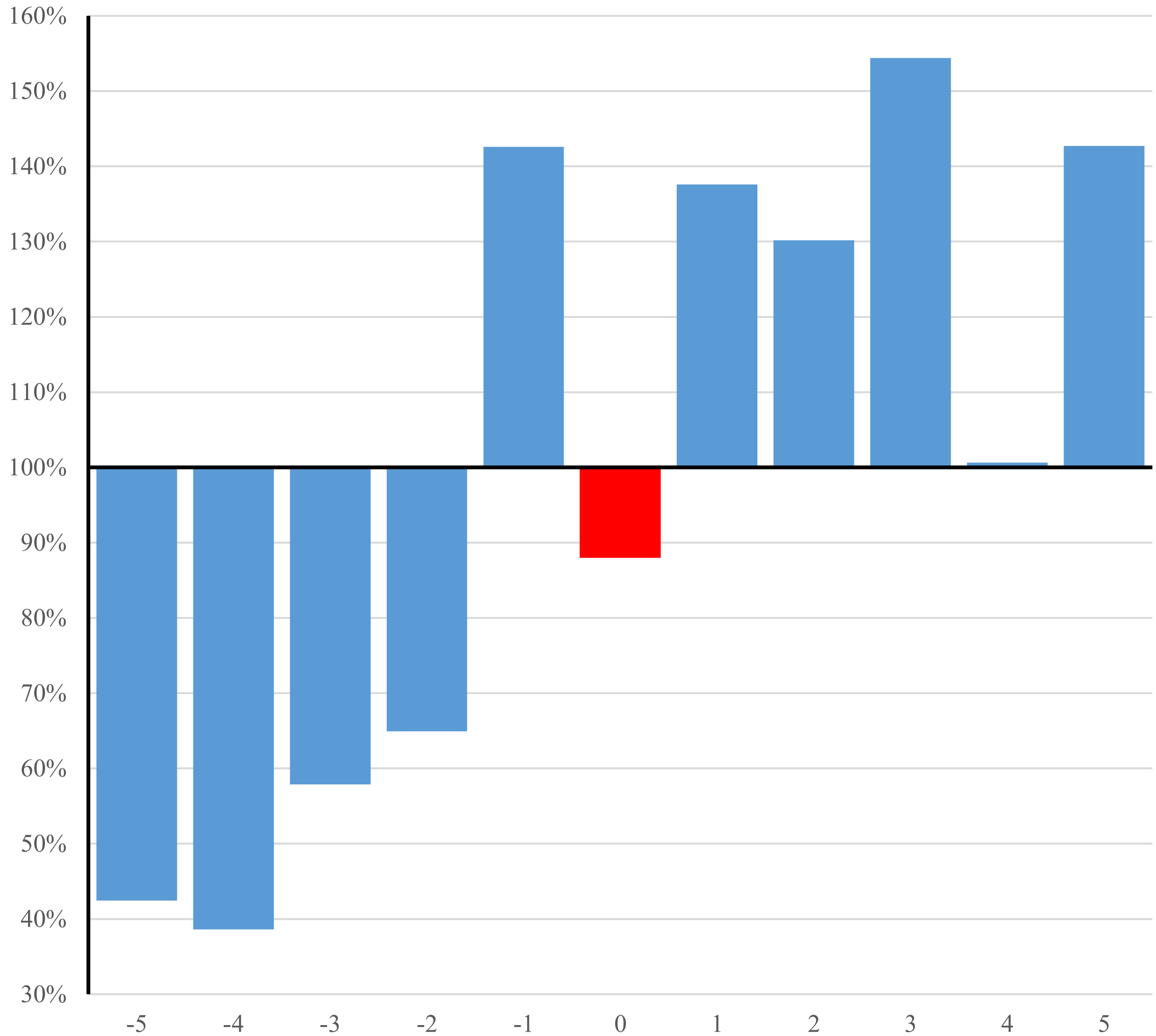


Figure 2. Dynamics of firm patenting around PBL reform

This figure summarizes the comparisons of three main explained variables of innovation before and after the PBL reforms for both low-intensity industries and high-intensity industries.

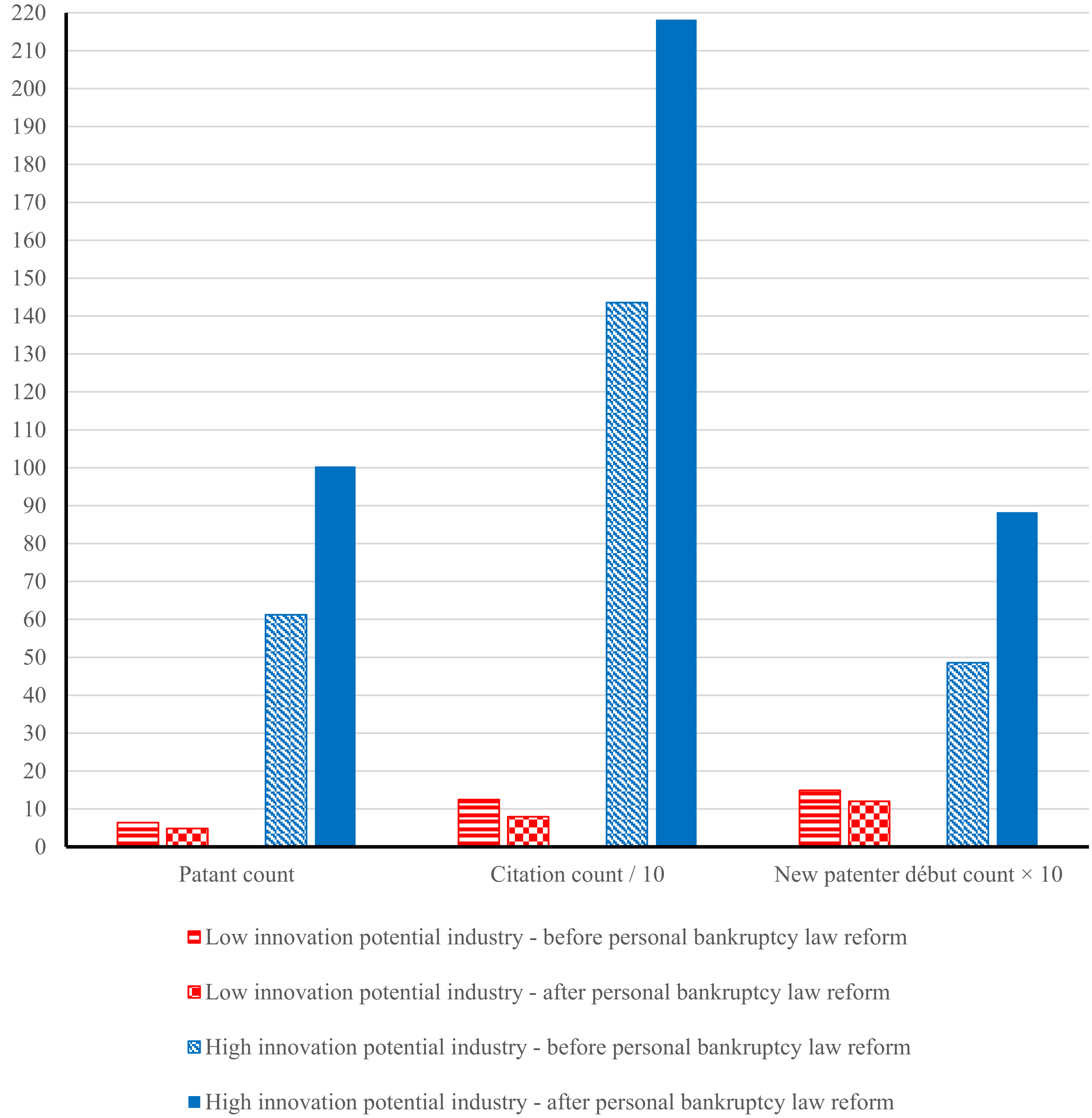
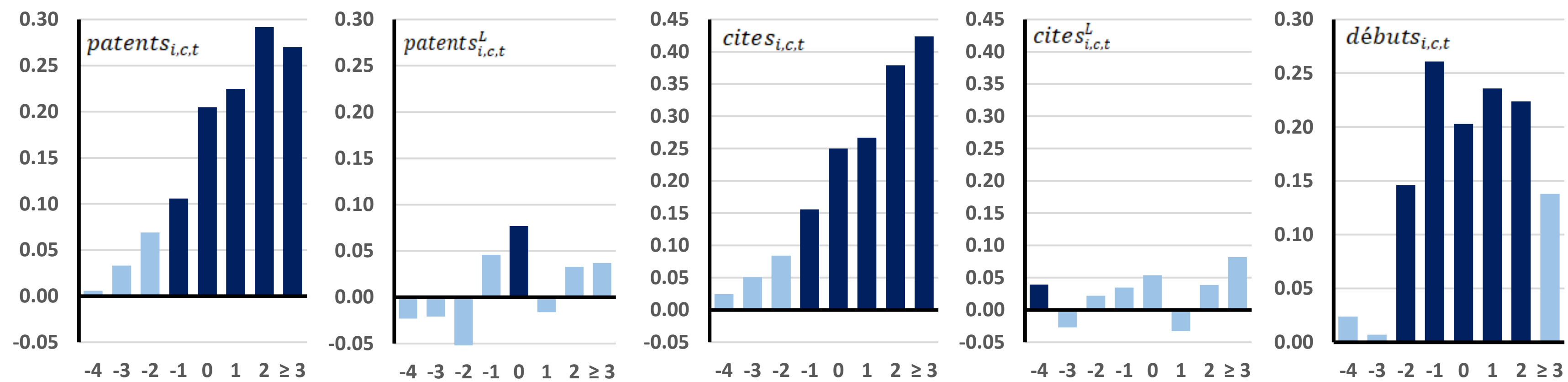


Figure 3. Dynamics of patenting around PBL reform

This figure presents the dynamic effects of PBL reform on innovation across industries with different innovation intensity, estimated as in Table 6. Panel A presents the average effects; each marker represents the estimated coefficients on event year dummies. Panel B presents the interaction effects; each marker represents the estimated coefficients on the interaction terms of patent density and event year dummies. t = 0 represents the PBL reform year. Dark colored bars indicate statistically significant ($p \leq 10\%$) differences from the baseline omitted category $t \in [-5, -6]$.

Panel A. Main effect of PBL reform



Panel B. Interaction of PBL reform with $pot_{i,t}$ (Industry innovation potential)

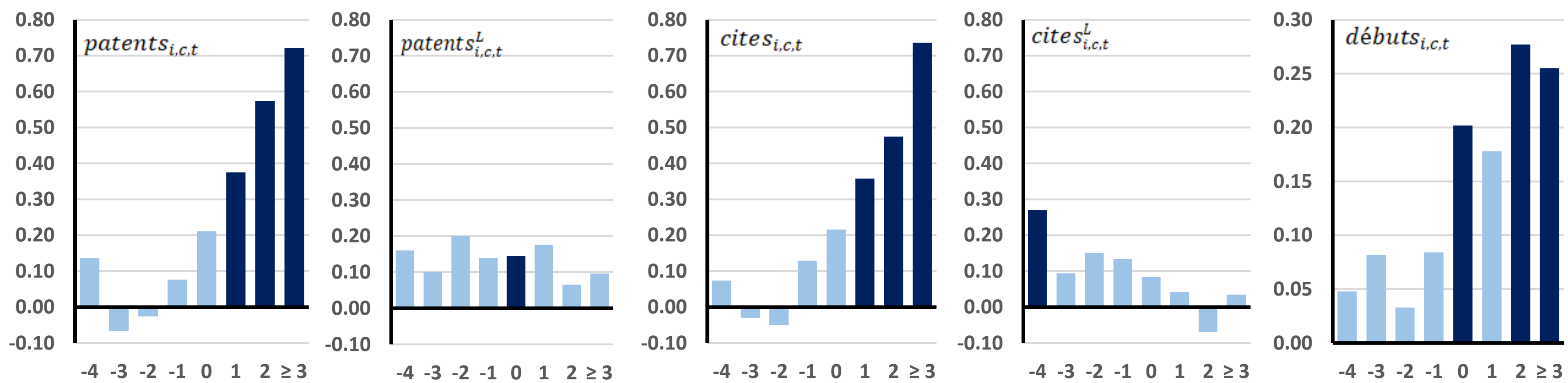
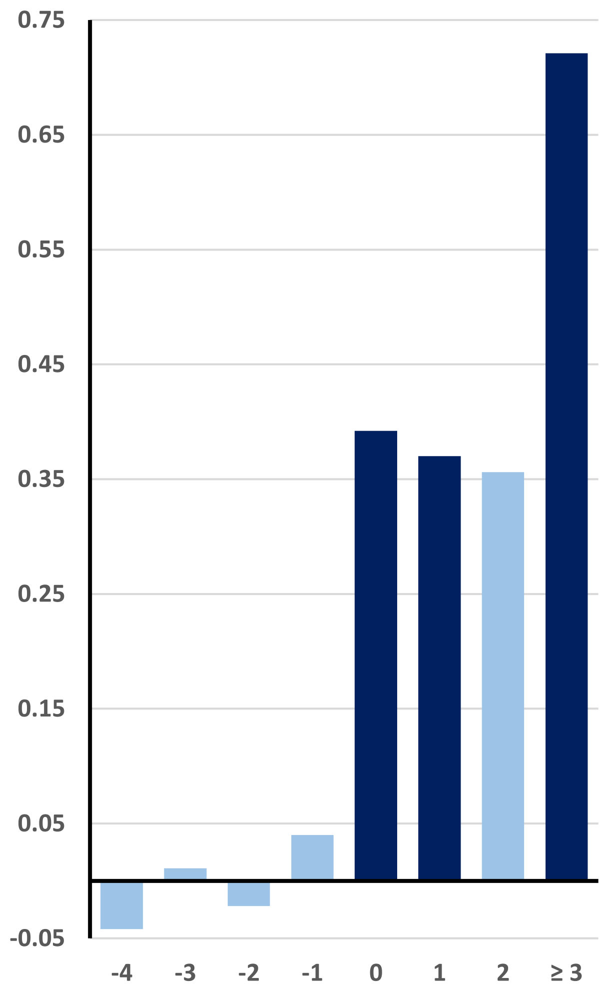


Figure 4. Dynamics of growth spurts around PBL reform

This figure presents the dynamic effects of PBL reform on value-added growth ranking across countries, estimated as in panel B of Table 10. Panels A and B define a growth spurt as standardized value-added growth z-score > 0.50 and 0.45, respectively. Each marker represents the estimated coefficients on the event year dummies. $t = 0$ represents the PBL reform year. Dark colored bars indicate statistically significant ($p \leq 10\%$) differences from the baseline omitted category $t \in [-5, -6]$.

Panel A. Growth spurt indicator $\delta_{i,c,t}^{SGz>0.50}$



Panel B. Growth spurt indicator $\delta_{i,c,t}^{SGz>0.45}$

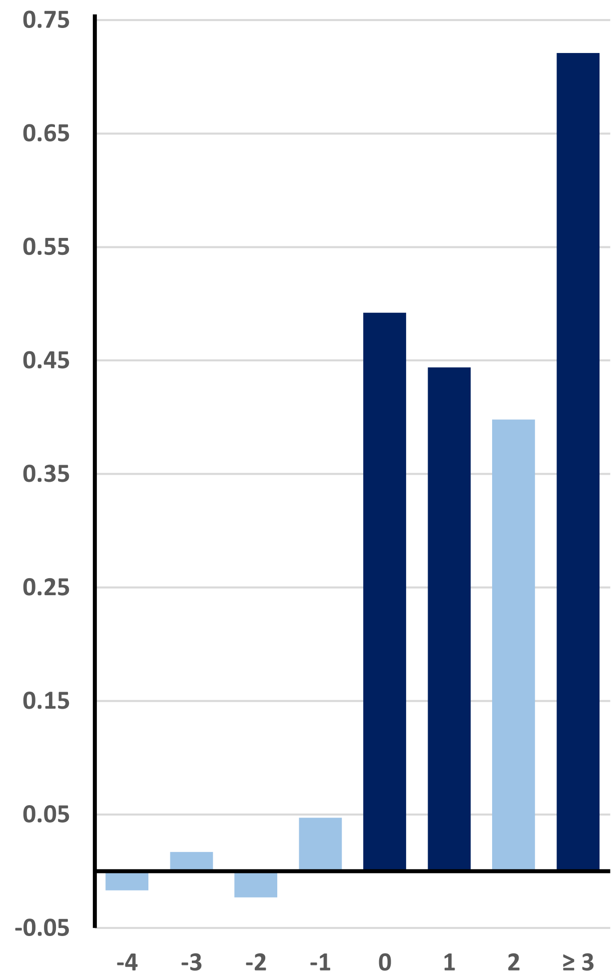


Figure 5. Functional efficiency measures around personal bankruptcy reforms

These graphs present the dynamic effects of PBL reform on four alternative measures of functional efficiency, constructed along the lines of Wurgler (2000), to measure the propensity of capital to flow to sector with greater value-added, estimated as Panel C of Table 11. $t = 0$ represents the PBL reform year. Dark colored bars indicate statistically significant ($p \leq 10\%$) differences from the baseline omitted category $t \in [-5, -6]$.

Panel A. Correlation of value-added over output with investment over output

Panel B. Rank correlation of value-added over output with investment over output

Panel C. Correlation of log of value-added with log of investment

Panel D. Rank correlation of value-added with investment

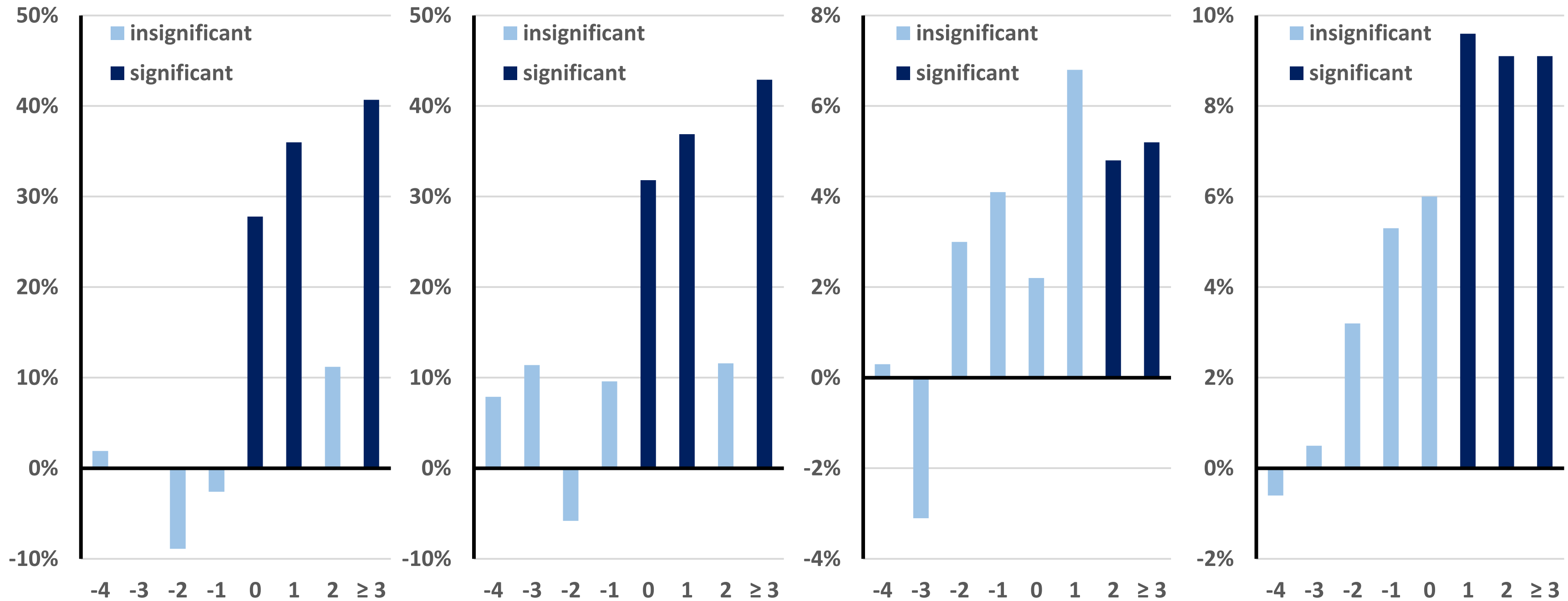


Table 1. Summary statistics

This table presents summary statistics of main variables. For details, see Section 3 and Appendix Table A1.

Panel A. Summary statistics for industry-country-year-level variables

Variables	Count	Mean	S.D.	Min.	P25	Median	P75	Max.
Explained variables								
$patents_{i,c,t}$	17807	17.5	70.3	0.000	0.000	1.000	7.000	2526
$patents_{i,c,t}^{L}$	17807	22.4	266.6	0.000	0.000	0.000	1.000	10816
$patents_{i,c,t}^{ALL}$	17807	40.0	316.8	0.000	0.000	1.000	9.000	12866
$cites_{i,c,t}$	17807	353.3	1489.0	0.000	0.000	8.000	121.000	39163
$cites_{i,c,t}^{L}$	17807	477.2	6542.3	0.000	0.000	0.000	2.000	285578
$cites_{i,c,t}^{ALL}$	17807	832.3	7477.4	0.000	0.000	11.000	158.000	308302
$débuts_{i,c,t}$	17807	2.9	8.8	0.000	0.000	0.000	2.000	158
Variables of interest								
$\delta_{c,t}^{XPBL}$ (PBL post-reform indicator)	17807	0.127	0.333	0.000	0.000	0.000	0.000	1.000
$\delta_{c,t}^{TPBL}$ (PBL trans-reform indicator)	17807	0.042	0.201	0.000	0.000	0.000	0.000	1.000
$pot_{i,t}$ (Industry innovation potential)	17807	0.802	0.407	0.000	0.511	0.721	1.057	1.930
Control variables								
$exports_{i,c,t}$ (Ind. Exports to US /total)	17807	0.024	0.064	0.000	0.001	0.005	0.019	0.848
$imports_{i,c,t}$ (Ind. imports from US /total)	17807	0.024	0.040	0.000	0.004	0.010	0.024	0.762
$value\text{-}added_{i,c,t}$ (Ind. value-added/total)	17807	0.018	0.041	0.000	0.002	0.007	0.015	0.539
$\ln(pcGDP)$ (Country prosperity)	17807	0.798	0.637	-1.672	0.384	1.017	1.201	2.028
$\ln(pop_{c,t})$ (Country size)	17807	3.045	1.341	1.078	1.908	2.884	4.046	6.977
$CRI_{c,t}$ (Creditor rights change in CBL)	17807	0.089	0.309	0.000	0.000	0.000	0.000	2.000

Panel B. Industry-year observations, patenting variables, and PBL reform years t_c

Economy	N	$patents_t$	$cites_t$	$débuts_t$	t_c	Economy	N	$patents_t$	$cites_t$	$débuts_t$	t_c
Argentina	546	91	1,413	61		Israel	546	4,845	204,884	1,764	1995
Australia	546	5,167	148,297	1,957		Italy	546	12,951	185,488	3,079	
Austria	542	3,101	47,760	658	1995	Japan	546	82,259	1,495,118	8,868	
Belgium	546	2,460	42,754	489	1998	Mexico	546	278	4,638	122	
Brazil	545	477	6,155	196		Netherlands	546	12,618	265,193	1,591	1999
Britain	546	21,914	523,252	4,988		New Zealand	546	706	17,547	312	
Bulgaria	501	20	203	14		Norway	545	1,860	39,712	689	
Canada	546	21,080	708,847	5,371	1993	Poland	538	37	671	26	
Denmark	546	2,825	62,494	814		Russia	419	245	3,296	198	
Finland	544	7,185	154,441	1,013	1993	Singapore	546	1,448	41,419	239	2000
France	546	28,470	528,699	3,846		S Africa	542	595	10,740	310	
Germany	546	60,049	1,008,448	8,262	1999	S Korea	546	12,986	214,547	1,574	
Greece	546	49	913	34		Spain	546	1,477	18,895	556	
Hong Kong	545	1,283	31,951	502	2000	Sweden	546	9,737	200,370	2,099	
Hungary	536	386	3,914	94		Switzerland	546	13,973	276,170	2,091	
India	542	434	5,551	150		Venezuela	546	50	883	20	
Ireland	542	908	36,668	388		Total	17,807				

Table 2. The effect of PBL reform on innovation

This table summarizes difference-in-difference Poisson regressions testing the average effect of PBL reform on innovation. Appendix Table A1 provides variable definitions. Control variables are lagged one year. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9
Explained variable	$patents_{i,c,t}$ (# successful patent filings)			$cites_{i,c,t}$ (# subsequent citations)			$débuts_{i,c,t}$ (# first-time patent filers)		
PBL post-reform indicator $\boldsymbol{\delta_{c,t}^{XPBL}}$	0.263** (0.011)	0.257*** (0.000)	0.244*** (0.000)	0.333** (0.020)	0.314*** (0.000)	0.289*** (0.000)	0.234*** (0.009)	0.232*** (0.000)	0.216*** (0.000)
PBL trans-reform indicator $\boldsymbol{\delta_{c,t}^{TPBL}}$	0.037 (0.426)	0.059 (0.237)	0.075 (0.125)	0.038 (0.493)	0.053 (0.296)	0.070 (0.124)	0.196*** (0.000)	0.218*** (0.000)	0.229*** (0.000)
Industry innovation potential $pot_{i,t}$	0.992*** (0.000)	0.858*** (0.000)	0.857*** (0.000)	1.241*** (0.000)	1.073*** (0.000)	1.067*** (0.000)	0.427* (0.054)	0.368* (0.066)	0.366* (0.065)
Creditor rights index change $CRI_{c,t}$			-0.148*** (0.000)			-0.189*** (0.001)			-0.112*** (0.000)
Industry export intensity $exports_{i,c,t}$		0.065 (0.913)	0.096 (0.884)		0.379 (0.443)	0.378 (0.544)		0.594** (0.018)	0.640*** (0.009)
Industry import intensity $imports_{i,c,t}$		2.621*** (0.008)	2.560*** (0.007)		2.587*** (0.001)	2.482*** (0.001)		1.483* (0.076)	1.422* (0.086)
Industry value added $value\text{-}added_{i,c,t}$		0.244 (0.486)	0.299 (0.412)		-0.420 (0.470)	-0.346 (0.557)		0.049 (0.881)	0.091 (0.785)
Country prosperity $\ln(pcGDP_{c,t})$		1.398** (0.023)	1.470** (0.016)		1.363** (0.049)	1.488** (0.033)		1.995*** (0.002)	2.053*** (0.002)
Country size $\ln(pop_{c,t})$		3.134*** (0.000)	2.780*** (0.000)		3.354*** (0.000)	2.838*** (0.000)		2.091*** (0.000)	1.820*** (0.002)
Observations	14680	14680	14680	14553	14553	14553	13941	13941	13941
Pseudo R^2	0.937	0.940	0.940	0.956	0.959	0.959	0.790	0.793	0.793
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3. Different effects of PBL reform on innovation across industries

This table summarizes difference-in-difference Poisson regressions testing the varying effect of PBL reform on innovation in industries with different innovation potential. All regressions include year and country-industry fixed effects. Numbers in parentheses are t-test p-levels, with two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression Explained variable	3.1 $patents_{i,c,t}$	3.2 $cites_{i,c,t}$	3.3 $débuts_{i,c,t}$	3.4 $patents_{i,c,t}$	3.5 $cites_{i,c,t}$	3.6 $débuts_{i,c,t}$
PBL post-reform alignment $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.697*** (0.000)	0.665*** (0.000)	0.343*** (0.000)	0.509*** (0.000)	0.491*** (0.000)	0.218** (0.023)
PBL trans-reform alignment $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.107 (0.187)	0.145* (0.097)	0.085 (0.502)	0.048 (0.670)	0.081 (0.502)	0.046 (0.670)
PBL post-reform indicator $\delta_{c,t}^{XPBL}$	-0.509*** (0.000)	-0.477*** (0.000)	-0.116 (0.253)	-0.303*** (0.000)	-0.277*** (0.002)	0.010 (0.925)
PBL trans-reform indicator $\delta_{c,t}^{XPBL}$	-0.019 (0.765)	-0.064 (0.418)	0.154 (0.225)	0.039 (0.670)	-0.002 (0.986)	0.185 (0.104)
Industry innovation potential $pot_{i,t}$	0.708*** (0.000)	0.850*** (0.000)	0.274 (0.123)	-0.829*** (0.000)	0.578 (0.163)	-1.275*** (0.000)
Creditor rights index change $CRI_{c,t}$	-0.159*** (0.002)	-0.186*** (0.001)	-0.117*** (0.000)	0.117 (0.184)	0.264 (0.155)	0.033 (0.399)
Industry export intensity $exports_{i,c,t}$	-0.341 (0.439)	0.122 (0.831)	0.530** (0.026)	1.260 (0.110)	0.293 (0.729)	-0.403 (0.523)
Industry import intensity $imports_{i,c,t}$	2.170*** (0.008)	2.116*** (0.008)	1.143 (0.154)	-1.427 (0.373)	-4.482** (0.046)	-1.598 (0.164)
Industry value added $value\text{-}added_{i,c,t}$	0.682* (0.093)	0.072 (0.905)	0.157 (0.568)	0.885*** (0.005)	1.434* (0.080)	1.540*** (0.000)
Country prosperity $\ln(pcGDP_{c,t})$	1.475** (0.021)	1.487** (0.039)	2.053*** (0.002)	0.399 (0.631)	0.865 (0.301)	1.253* (0.087)
Country size $\ln(pop_{c,t})$	2.266*** (0.007)	2.199*** (0.007)	1.583** (0.011)	2.105*** (0.010)	2.065*** (0.007)	1.690*** (0.003)
$CRI_{c,t} \times pot_{i,t}$				-0.327*** (0.000)	-0.446*** (0.002)	-0.188*** (0.003)
$exports_{i,c,t} \times pot_{i,t}$				-1.513** (0.013)	-0.460 (0.470)	0.360 (0.389)
$imports_{i,c,t} \times pot_{i,t}$				2.081** (0.038)	3.991*** (0.002)	1.622** (0.017)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.557 (0.490)	-2.020 (0.217)	-2.330*** (0.000)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				1.163*** (0.000)	0.581*** (0.002)	0.902*** (0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.057 (0.558)	-0.137 (0.300)	0.133* (0.090)
Observations	14680	14553	13941	14680	14553	13941
Pseudo R^2	0.942	0.961	0.793	0.943	0.961	0.794

Table 4. PBL reform and innovation across industries, additional control variables

This table reruns the regressions of regressions 3.4 to 3.6 in Table 3 including additional control variables associated with financial and institutional development (a measure of financial development, three legal origin dummies, and one of institutional development) and their interactions with innovation intensity. Numbers in parentheses are t-test p-levels, with two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	4.1	4.2	4.3
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment to potential	0.449***	0.427***	0.183**
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.011)
Trans-reform alignment to potential	0.067	0.066	0.081
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.481)	(0.610)	(0.288)
Post-reform indicator	-0.229***	-0.197*	0.054
$\delta_{c,t}^{XPBL}$	(0.003)	(0.053)	(0.583)
Trans-reform indicator	0.005	0.010	0.154*
$\delta_{c,t}^{TPBL}$	(0.947)	(0.937)	(0.072)
Innovation potential	-0.494	0.782	-0.652
$pot_{i,t}$	(0.283)	(0.259)	(0.266)
Financial development index	-1.343***	-0.946**	-1.097**
$findev_{c,t}$	(0.000)	(0.011)	(0.032)
Institutional development index	-0.006	-0.019	-0.011
$instdev_{c,t}$	(0.643)	(0.137)	(0.292)
Financial development interaction	1.033***	0.833**	1.176***
$findev_{c,t} \times pot_{i,t}$	(0.003)	(0.047)	(0.009)
Institutional development interaction	0.003	0.019	0.006
$instdev_{c,t} \times pot_{i,t}$	(0.780)	(0.197)	(0.657)
English legal origin dummy interaction	-0.442	-0.321	-0.732**
$\delta_{English\ legal\ origin} \times pot_{i,t}$	(0.205)	(0.479)	(0.027)
French legal origin dummy interaction	-0.097	-0.303	-0.268
$\delta_{French\ legal\ origin} \times pot_{i,t}$	(0.816)	(0.516)	(0.413)
German legal origin dummy interaction	-0.422	-0.259	-0.347
$\delta_{German\ legal\ origin} \times pot_{i,t}$	(0.268)	(0.557)	(0.272)
Observations	14264	14150	13564
Pseudo R^2	0.943	0.962	0.796
Other Table 3 controls	Yes	Yes	Yes
Other Table 3 interaction terms	Yes	Yes	Yes
Country-industry & year FEs	Yes	Yes	Yes

Table 5. PBL reform and innovation across industries, policy shock controls

This table summarizes difference-in-difference tests for effects of PBL reform on innovation across industries with different innovation potential by including country-year fixed effects, which subsume time varying country-level controls (creditor rights index change, log per capita GDP and log population). Numbers in parentheses are t-test p-levels, with two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	5.1	5.2	5.3	5.4	5.5	5.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment to potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.694*** (0.000)	0.654*** (0.000)	0.394*** (0.000)	0.521*** (0.000)	0.471*** (0.000)	0.275*** (0.000)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.122 (0.200)	0.132 (0.230)	0.101 (0.333)	0.070 (0.542)	0.082 (0.479)	0.068 (0.447)
Industry innovation potential $pot_{i,t}$	0.696*** (0.000)	0.817*** (0.000)	0.293* (0.083)	-0.932** (0.023)	0.012 (0.978)	-1.284*** (0.001)
Industry export intensity $exports_{i,c,t}$	-0.531 (0.562)	-0.009 (0.991)	0.861*** (0.000)	1.914** (0.045)	1.387 (0.120)	0.401 (0.387)
Industry import intensity $imports_{i,c,t}$	2.107* (0.075)	1.097 (0.327)	0.583 (0.418)	-1.745 (0.321)	-4.368* (0.096)	-0.650 (0.601)
Industry value added $value\text{-}added_{i,c,t}$	0.423 (0.116)	0.299 (0.432)	0.099 (0.726)	1.432*** (0.000)	1.552** (0.040)	1.455*** (0.002)
Observations	14595	14449	13801	14595	14449	13801
Pseudo R^2	0.946	0.966	0.798	0.946	0.967	0.799
Controls $\times$ $pot_{i,t}$ interactions				Yes	Yes	Yes
Country-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table 6. PBL reform and innovation across industries, dynamics

This table estimates the dynamic effect of PBL reform on innovation across industries with different innovation potential. Panel A presents the average effects and panel B presents the interaction effects. Numbers in parentheses are t-test p-levels, with two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Average effect

Regression		6A.1	6A.2	6A.3	6A.4	6A.5
Explained variable	Years after reform	$patents_{i,c,t}$	$patents^{L}_{i,c,t}$	$cites_{i,c,t}$	$cites^{L}_{i,c,t}$	$d\acute{e}buts_{i,c,t}$
Level $\delta_{-4,c,t}$	-4	0.006 (0.828)	-0.023 (0.396)	0.025 (0.520)	**0.039**** **(0.085)**	0.024 (0.684)
Level $\delta_{-3,c,t}$	-3	0.033 (0.524)	-0.021 (0.749)	0.051 (0.383)	-0.027 (0.565)	0.007 (0.938)
Level $\delta_{-2,c,t}$	-2	0.069 (0.204)	-0.054 (0.261)	0.084 (0.158)	0.022 (0.724)	**0.146***** **(0.001)**
Level $\delta_{-1,c,t}$	-1	**0.106**** **(0.046)**	0.046 (0.376)	**0.156***** **(0.005)**	0.035 (0.654)	**0.261***** **(0.003)**
Level $\delta_{0,c,t}$	0	**0.205***** **(0.000)**	**0.077*** **(0.080)**	**0.250***** **(0.000)**	0.054 (0.226)	**0.203**** **(0.036)**
Level $\delta_{1,c,t}$	1	**0.225***** **(0.000)**	-0.016 (0.716)	**0.267***** **(0.001)**	-0.033 (0.619)	**0.236**** **(0.016)**
Level $\delta_{2,c,t}$	2	**0.292***** **(0.000)**	0.033 (0.603)	**0.379***** **(0.000)**	0.039 (0.539)	**0.224***** **(0.009)**
Level $\delta_{3+,c,t}$	≥ 3	**0.270***** **(0.001)**	0.037 (0.657)	**0.424***** **(0.001)**	0.082 (0.526)	0.138 (0.229)
Observations		13820	6552	13697	6500	13105
Pseudo R^2		0.942	0.984	0.961	0.990	0.793
Controls		Yes	Yes	Yes	Yes	Yes
Country-industry & year FEs		Yes	Yes	Yes	Yes	Yes

Panel B. Interaction effect

Regression		6B.1	6B.2	6B.3	6B.4	6B.5
Explained variable	Years after reform	$patents_{i,c,t}$	$patents^L_{i,c,t}$	$cites_{i,c,t}$	$cites^L_{i,c,t}$	$débuts_{i,c,t}$
Alignment with potential $\delta_{-4,c,t} \times pot_{i,t}$	-4	0.137 (0.144)	0.160 (0.196)	0.074 (0.574)	**0.270**** **(0.030)**	0.048 (0.723)
Alignment with potential $\delta_{-3,c,t} \times pot_{i,t}$	-3	-0.066 (0.537)	0.101 (0.176)	-0.030 (0.831)	0.094 (0.404)	0.082 (0.398)
Alignment with potential $\delta_{-2,c,t} \times pot_{i,t}$	-2	-0.026 (0.775)	**0.200**** **(0.016)**	-0.050 (0.676)	0.151 (0.105)	0.033 (0.752)
Alignment with potential $\delta_{-1,c,t} \times pot_{i,t}$	-1	0.076 (0.497)	0.139 (0.206)	0.129 (0.475)	0.134 (0.359)	0.084 (0.207)
Alignment with potential $\delta_{0,c,t} \times pot_{i,t}$	0	0.211 (0.148)	**0.145*** **(0.088)**	0.216 (0.259)	0.084 (0.352)	**0.202**** **(0.023)**
Alignment with potential $\delta_{1,c,t} \times pot_{i,t}$	1	**0.375***** **(0.001)**	0.176 (0.144)	**0.358**** **(0.035)**	0.041 (0.835)	0.178 (0.157)
Alignment with potential $\delta_{2,c,t} \times pot_{i,t}$	2	**0.574***** **(0.000)**	0.065 (0.666)	**0.475***** **(0.001)**	-0.069 (0.622)	**0.277**** **(0.027)**
Alignment with potential $\delta_{3+,c,t} \times pot_{i,t}$	≥ 3	**0.721***** **(0.000)**	0.096 (0.466)	**0.736***** **(0.000)**	0.035 (0.847)	**0.255**** **(0.013)**
Level $\delta_{-4,c,t}$	-4	-0.121 (0.237)	-0.195 (0.141)	-0.052 (0.720)	**-0.258**** **(0.047)**	-0.019 (0.826)
Level $\delta_{-3,c,t}$	-3	0.092 (0.484)	-0.140 (0.334)	0.081 (0.637)	-0.134 (0.370)	-0.082 (0.540)
Level $\delta_{-2,c,t}$	-2	0.101 (0.201)	-0.283*** (0.006)	0.142 (0.191)	-0.161 (0.210)	**0.111** **(0.137)**
Level $\delta_{-1,c,t}$	-1	0.037 (0.730)	-0.114 (0.287)	0.023 (0.883)	-0.124 (0.313)	**0.170**** **(0.046)**
Level $\delta_{0,c,t}$	0	-0.007 (0.964)	-0.067 (0.419)	0.022 (0.914)	-0.006 (0.955)	0.012 (0.894)
Level $\delta_{1,c,t}$	1	-0.170 (0.136)	-0.193 (0.140)	-0.132 (0.439)	-0.045 (0.811)	0.066 (0.550)
Level $\delta_{2,c,t}$	2	**-0.338***** **(0.001)**	-0.032 (0.848)	-0.168 (0.180)	0.132 (0.509)	-0.049 (0.697)
Level $\delta_{3+,c,t}$	≥ 3	**-0.540***** **(0.000)**	-0.081 (0.688)	**-0.494***** **(0.001)**	0.042 (0.890)	-0.121 (0.117)
Observations		13820	6552	13697	6500	13105
Pseudo R^2		0.944	0.984	0.964	0.991	0.794
Controls		Yes	Yes	Yes	Yes	Yes
Controls * Potential		Yes	Yes	Yes	Yes	Yes
Country-industry & year FEs		Yes	Yes	Yes	Yes	Yes

Table 7. Event study

This table adopts an event study among event countries from year t-4 to year t+2 (t represents the PBL reform year). Numbers in parentheses are t-test p-levels, with two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression Explained variable	7.1 $patents_{i,c,t}$	7.2 $cites_{i,c,t}$	7.3 $débuts_{i,c,t}$	7.4 $patents_{i,c,t}$	7.5 $cites_{i,c,t}$	7.6 $débuts_{i,c,t}$
Post-reform alignment to potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.452*** (0.000)	0.368*** (0.000)	0.242*** (0.003)	0.298*** (0.000)	0.288** (0.019)	0.227** (0.035)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.108 (0.147)	0.106 (0.452)	0.074 (0.254)	0.011 (0.904)	0.021 (0.889)	0.043 (0.629)
Post-reform indicator $\delta_{c,t}^{XPBL}$	-0.525*** (0.000)	-0.497* (0.074)	-0.271* (0.059)	-0.352*** (0.009)	-0.387** (0.025)	-0.252 (0.161)
Trans-reform indicator $\delta_{c,t}^{TPBL}$	-0.087 (0.122)	-0.111 (0.456)	0.017 (0.864)	0.011 (0.885)	-0.020 (0.891)	0.046 (0.691)
Industry innovation potential $pot_{i,t}$	0.302 (0.159)	0.453 (0.230)	0.182 (0.368)	-1.194 (0.104)	0.135 (0.848)	-0.635 (0.481)
Industry export intensity $exports_{i,c,t}$	-1.852* (0.089)	-2.241* (0.058)	-0.846 (0.512)	-1.047 (0.672)	-3.051 (0.226)	-3.277 (0.146)
Industry import intensity $imports_{i,c,t}$	2.535 (0.155)	4.034 (0.165)	-1.090 (0.504)	-3.501 (0.254)	-5.922 (0.368)	-0.526 (0.913)
Industry value added $value\text{-}added_{i,c,t}$	-0.549 (0.410)	-1.080 (0.191)	-0.338 (0.495)	0.373 (0.819)	1.986 (0.113)	1.985 (0.174)
Country prosperity $\ln(pcGDP_{c,t})$	0.697 (0.563)	2.105* (0.069)	-0.928 (0.432)	-1.766* (0.057)	0.219 (0.838)	-2.006 (0.227)
Country size $\ln(pop_{c,t})$	3.905*** (0.003)	3.892*** (0.000)	6.085*** (0.000)	3.846*** (0.002)	3.513*** (0.001)	6.238*** (0.000)
$exports_{i,c,t} \times pot_{i,t}$				-0.508 (0.696)	0.646 (0.579)	1.845 (0.376)
$imports_{i,c,t} \times pot_{i,t}$				4.013** (0.034)	6.398 (0.166)	-0.783 (0.784)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-1.620 (0.564)	-5.008** (0.026)	-3.525* (0.069)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				1.963*** (0.008)	1.131 (0.150)	1.135 (0.258)
$\ln(pop_{c,t}) \times pot_{i,t}$				-0.268** (0.021)	-0.367*** (0.000)	-0.143 (0.573)
Observations	2164	2152	1992	2164	2152	1992
Pseudo R^2	0.944	0.965	0.809	0.944	0.966	0.809
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table 8. PBL reform and innovation in established leaders versus other firms

This table estimates the effect of PBL reform on innovation across industries by separately counting patents and citation for largescale legacy patenter (L) firms (having over 100 patents in total in 1990-2002 and least one patent in each year) and all other (NL) firms. All regressions include year and country-industry fixed effects. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8
Firm type	Main sample of non-legacy technology firms				Large-scale legacy patenter firms			
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$
Post-reform alignment	0.697***	0.665***	0.509***	0.491***	0.016	-0.113**	0.085	0.004
$\delta^{XPBL}_{c,t} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.584)	(0.028)	(0.249)	(0.965)
In-reform alignment	0.107	0.145*	0.048	0.081	0.131**	0.100	0.153*	0.146
$\delta^{TPBL}_{c,t} \times pot_{i,t}$	(0.187)	(0.097)	(0.670)	(0.502)	(0.043)	(0.318)	(0.057)	(0.182)
Post-reform indicator	-0.509***	-0.477***	-0.303***	-0.277***	0.028	0.153	-0.042	0.035
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.002)	(0.699)	(0.139)	(0.669)	(0.751)
In-reform indicator	-0.019	-0.064	0.039	-0.002	-0.142	-0.106	-0.169*	-0.160
$\delta^{TPBL}_{c,t}$	(0.765)	(0.418)	(0.670)	(0.986)	(0.107)	(0.433)	(0.089)	(0.265)
Industry innovation	0.708***	0.850***	-0.829***	0.578	0.762***	0.848***	1.739**	2.510**
potential $pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.163)	(0.000)	(0.000)	(0.042)	(0.046)
Creditor rights index	-0.159***	-0.186***	0.117	0.264	-0.471***	-0.597***	0.066	0.098
change $CRI_{c,t}$	(0.002)	(0.001)	(0.184)	(0.155)	(0.000)	(0.000)	(0.840)	(0.787)
Export intensity	-0.341	0.122	1.260	0.293	2.468***	2.834***	2.936**	1.484
$exports_{i,c,t}$	(0.439)	(0.831)	(0.110)	(0.729)	(0.000)	(0.000)	(0.043)	(0.242)
Import intensity	2.170***	2.116***	-1.427	-4.482**	0.324	0.294	-2.319	-4.576
$imports_{i,c,t}$	(0.008)	(0.008)	(0.373)	(0.046)	(0.443)	(0.657)	(0.451)	(0.105)
Industry value-added	0.682*	0.072	0.885***	1.434*	1.076	1.031	2.081	2.948
$value\text{-}added_{i,c,t}$	(0.093)	(0.905)	(0.005)	(0.080)	(0.435)	(0.585)	(0.607)	(0.494)
Country prosperity	1.475**	1.487**	0.399	0.865	0.514	0.613	1.231	1.836
$\ln(pcGDP_{c,t})$	(0.021)	(0.039)	(0.631)	(0.301)	(0.526)	(0.480)	(0.273)	(0.130)
Country size	2.266***	2.199***	2.105***	2.065***	2.138	2.796	1.768	1.876
$\ln(pop_{c,t})$	(0.007)	(0.007)	(0.010)	(0.007)	(0.406)	(0.499)	(0.458)	(0.555)
$CRI_{c,t} \times pot_{i,t}$			-0.327***	-0.446***			-0.428	-0.507*
			(0.000)	(0.002)			(0.128)	(0.077)
$exports_{i,c,t} \times pot_{i,t}$			-1.513**	-0.460			-0.301	0.800
			(0.013)	(0.470)			(0.688)	(0.321)
$imports_{i,c,t} \times pot_{i,t}$			2.081**	3.991***			1.720	2.959*
			(0.038)	(0.002)			(0.340)	(0.055)
$value\text{-}added_{i,c,t}$			-0.557	-2.020			-1.325	-2.543
$\times pot_{i,t}$			(0.490)	(0.217)			(0.813)	(0.674)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$			1.163***	0.581***			-0.725*	-1.219**
			(0.000)	(0.002)			(0.089)	(0.022)
$\ln(pop_{c,t}) \times pot_{i,t}$			0.057	-0.137			-0.033	-0.083
			(0.558)	(0.300)			(0.828)	(0.634)
Observations	14680	14553	14680	14553	7046	6981	7046	6981
Pseudo R^2	0.942	0.961	0.943	0.961	0.984	0.990	0.984	0.990

Table 9. Minimum capital requirements, PBL reform, and innovation

This table estimates the effect of PBL reform on innovation across industries separately for countries with and without minimum capital requirements (MCR). Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	9.1	9.2	9.3	9.4	9.5	9.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment if MCR $\delta_c^{MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$	0.771*** (0.000)	0.650*** (0.000)	0.410*** (0.000)			
Post-reform alignment if no MCR $\delta_c^{NO\ MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$	0.675*** (0.000)	0.759*** (0.000)	0.619*** (0.000)	-0.084 (0.709)	0.104 (0.677)	0.217*** (0.000)
Post-reform alignment $\delta_{c,t}^{XPBL} \times pot_{i,t}$				0.715*** (0.000)	0.613*** (0.000)	0.377*** (0.000)
Post-reform if MCR $\delta_c^{MCR} \times \delta_{c,t}^{XPBL}$	-0.583*** (0.000)	-0.469*** (0.004)	-0.180** (0.032)			
Post-reform if no MCR $\delta_c^{NO\ MCR} \times \delta_{c,t}^{XPBL}$	-0.654*** (0.000)	-0.831*** (0.000)	-0.368*** (0.004)	-0.065 (0.742)	-0.344 (0.150)	-0.187** (0.017)
Post-reform $\delta_{c,t}^{XPBL}$				-0.512*** (0.000)	-0.385*** (0.002)	-0.142* (0.078)
Alignment to potential if MCR $\delta_c^{MCR} \times pot_{i,t}$	0.243 (0.348)	0.506 (0.190)	0.096 (0.462)			
Alignment to potential if no MCR $\delta_c^{NO\ MCR} \times pot_{i,t}$	0.557** (0.041)	0.846*** (0.000)	-0.798*** (0.000)	-0.011 (0.964)	0.214 (0.231)	-1.100*** (0.000)
Alignment to potential $pot_{i,t}$				0.714*** (0.000)	0.821*** (0.000)	0.379** (0.039)
Trans-reform align. to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.162 (0.124)	0.176 (0.193)	0.206*** (0.003)	0.101 (0.295)	0.138 (0.178)	0.174** (0.012)
Trans-reform indicator $\delta_{c,t}^{TPBL}$	-0.101 (0.213)	-0.154 (0.225)	0.037 (0.673)	-0.029 (0.700)	-0.084 (0.353)	0.070 (0.381)
Creditor rights index change $CRI_{c,t}$	-0.173*** (0.003)	-0.214*** (0.001)	-0.127*** (0.000)	-0.175*** (0.003)	-0.215*** (0.004)	-0.126*** (0.000)
Industry export intensity $exports_{i,c,t}$	-0.127 (0.761)	0.314 (0.628)	0.587* (0.098)	-0.369 (0.404)	0.114 (0.838)	0.532* (0.061)
Industry import intensity $imports_{i,c,t}$	2.696*** (0.005)	2.670** (0.017)	1.180 (0.185)	2.155** (0.011)	2.174** (0.029)	1.043 (0.196)
Industry value added $value\text{-}added_{i,c,t}$	0.592 (0.246)	-0.127 (0.852)	0.130 (0.642)	0.668 (0.137)	-0.056 (0.930)	0.167 (0.555)
Country prosperity $\ln(pcGDP_{c,t})$	1.377** (0.033)	1.369* (0.061)	2.035*** (0.002)	1.400** (0.028)	1.399* (0.054)	2.039*** (0.002)
Country size $\ln(pop_{c,t})$	2.757*** (0.009)	2.680** (0.014)	1.940*** (0.009)	2.903*** (0.003)	2.830*** (0.006)	2.051*** (0.004)
Observations	14680	14553	13941	14680	14553	13941
Pseudo R^2	0.941	0.960	0.793	0.942	0.961	0.794
Country-industry and year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table 10. PBL reform and growth spurts

This table estimates effects of PBL reforms on value-added growth in industries with different innovation potential. Growth rates are standardized as z-ratios (value minus mean across countries over standard deviation across countries, all by industry-year). Explained variable is a growth spurt indicator, either $\delta_{i,c,t}^{z>0.50}$ or $\delta_{i,c,t}^{z>0.45}$, set to one if standardized growth > 0.50 or 0.45, respectively. Regressions are linear probability models. Regressions 10.1 and 10.2 summarize regressions of the form of [1]. Regressions 10.3 and 10.4 are dynamic average effect regressions analogous to those in Table 6 Panel A. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	10.1	10.2	Regression		10.3	10.4
Growth spurt indicator	$\delta_{i,c,t}^{SGz>0.50}$	$\delta_{i,c,t}^{SGz>0.45}$	Growth spurt indicator		$\delta_{i,c,t}^{SGz>0.50}$	$\delta_{i,c,t}^{SGz>0.45}$
Post-reform indicator	0.330**	0.380**	Level	-4	-0.042	-0.017
$\delta_{c,t}^{XPBL}$	(0.024)	(0.012)	$\delta_{-4,c,t}$		(0.775)	(0.916)
Trans-reform indicator	-0.012	-0.025	Level	-3	0.011	0.017
$\delta_{c,t}^{TPBL}$	(0.854)	(0.707)	$\delta_{-3,c,t}$		(0.938)	(0.911)
Industry innovation	0.028	0.008	Level	-2	-0.022	-0.023
potential $pot_{i,t}$	(0.336)	(0.799)	$\delta_{-2,c,t}$		(0.886)	(0.877)
Lagged growth spurt	-0.068**	-0.063**	Level	-1	0.040	0.047
indicator	(0.038)	(0.044)	$\delta_{-1,c,t}$		(0.784)	(0.747)
Creditor rights index	-0.040	-0.051	Level	0	**0.392***	**0.492****
change $CRI_{c,t}$	(0.667)	(0.614)	$\delta_{0,c,t}$		**(0.053)**	**(0.016)**
Industry export intensity	0.112	0.023	Level	1	**0.370***	**0.444****
$exports_{i,c,t}$	(0.464)	(0.903)	$\delta_{1,c,t}$		**(0.095)**	**(0.043)**
Industry import intensity	0.104	0.089	Level	2	0.356	0.398
$imports_{i,c,t}$	(0.472)	(0.574)	$\delta_{2,c,t}$		(0.201)	(0.143)
Industry value added	-1.767**	-1.925**	Level	≥ 3	0.308	**0.354***
$value\text{-}added_{i,c,t}$	(0.028)	(0.022)	$\delta_{3+,c,t}$		(0.135)	**(0.092)**
Country prosperity	-0.556*	-0.545*				
$\ln(pcGDP_{c,t})$	(0.052)	(0.076)	Controls as in 10.1 & 10.2		Yes	Yes
Country size	-0.873	-1.016				
$\ln(pop_{c,t})$	(0.275)	(0.230)				
Observations	12,617	12,617			11,947	11,947
Adjusted R^2	0.146	0.140			0.141	0.138
Country and year FEs	Yes	Yes			Yes	Yes

Table 11. PBL reform and investment efficiency

This table estimates effects of PBL reform on four measures of investment efficiency at the country level. The explained variable $\rho_{(VA_{c,t}/A_{c,t}\,,\; I_{c,t}/A_{c,t})}$ is the correlation between value-added over output and investment over output at the 3-digit ISIC level. $\rho^{rank}_{(VA_{c,t}/A_{c,t}\,,\; I_{c,t}/A_{c,t})}$ is the correlation between these two variables' rankings. $\rho_{(\ln\, VA_{c,t}\,,\; \ln\, I_{c,t})}$ is the correlation between their log values. $\rho^{rank}_{(VA_{c,t}\,,\; I_{c,t})}$ is the correlation between the rankings of value-added and investment. OLS specifications are used. Panel A presents the summary statistics of the country-year-level variables used in these tests. Panel B presents the regression results. Panel C presents the dynamics. Numbers in parentheses are robust t-test p-levels, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Summary statistics

Variables	Count	Mean	S.D.	Min.	P25	Median	P75	Max.
Explained variables								
$\rho_{(VA_{c,t}/A_{c,t}\,,\; I_{c,t}/A_{c,t})}$	229	0.125	0.251	-0.746	-0.005	0.136	0.303	0.651
$\rho^{rank}_{(VA_{c,t}/A_{c,t}\,,\; I_{c,t}/A_{c,t})}$	229	0.135	0.249	-0.867	0.007	0.155	0.295	0.654
$\rho_{(\ln\, VA_{c,t}\,,\; \ln\, I_{c,t})}$	212	0.894	0.103	0.309	0.880	0.926	0.949	0.983
$\rho^{rank}_{(VA_{c,t}\,,\; I_{c,t})}$	229	0.886	0.088	0.382	0.863	0.912	0.938	0.984
Variables of interest								
$\delta^{XPBL}_{c,t}$ (Post-reform indicator)	229	0.118	0.323	0.000	0.000	0.000	0.000	1.000
$\delta^{TPBL}_{c,t}$ (Trans-reform indicator)	229	0.048	0.214	0.000	0.000	0.000	0.000	1.000
Control variables								
$CRI_{c,t}$ (Creditor rights index change)	229	0.105	0.347	0.000	0.000	0.000	0.000	2.000
$\ln(pcGDP_{c,t})$ (Country prosperity)	229	2.294	0.076	2.020	2.261	2.316	2.337	2.418
$\ln(pop_{c,t})$ (Country size)	229	3.084	1.441	1.078	1.794	2.927	4.047	6.959

Panel B. Estimation results

Regression	11B.1	11B.2	11B.3	11B.4	11B.5	11B.6	11B.7	11B.8
Explained variable	$\rho_{\left(\frac{VA_{c,t}}{A_{c,t}}\frac{I_{c,t}}{A_{c,t}}\right)}$		$\rho^{rank}_{\left(\frac{VA_{c,t}}{A_{c,t}}\frac{I_{c,t}}{A_{c,t}}\right)}$		$\rho_{(\ln VA_{c,t}\,, \ln I_{c,t})}$		$\rho^{rank}_{(VA_{c,t}\,,\; I_{c,t})}$	
Post-reform indicator	0.178**	0.281***	0.169**	0.231***	0.019	0.049**	0.029	0.066***
$\delta^{XPBL}_{c,t}$	(0.014)	(0.001)	(0.017)	(0.005)	(0.373)	(0.029)	(0.153)	(0.002)
Trans-reform indicator	-0.111	-0.068	-0.065	-0.052	0.003	0.043*	0.008	0.030
$\delta^{TPBL}_{c,t}$	(0.136)	(0.342)	(0.361)	(0.476)	(0.887)	(0.065)	(0.712)	(0.202)
Creditor rights index change		0.042		0.035		-0.035*		0.008
$CRI_{c,t}$		(0.534)		(0.585)		(0.079)		(0.608)
Country prosperity		3.879		4.391		0.580		0.578
$\ln(pcGDP_{c,t})$		(0.196)		(0.113)		(0.648)		(0.598)
Country size		-0.942		-0.495		-0.477**		-0.383**
$\ln(pop_{c,t})$		(0.109)		(0.359)		(0.020)		(0.036)
Observations	229	229	229	229	212	212	229	229
Adjusted R^2	0.340	0.343	0.356	0.357	0.377	0.384	0.355	0.360
Country and year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C. Dynamics

Regression Explained variable	Years after reform	11C.1 $\rho_{\left(\frac{VA_{c,t}}{A_{c,t}}, \frac{I_{c,t}}{A_{c,t}}\right)}$	11C.2 $\rho^{rank}_{\left(\frac{VA_{c,t}}{A_{c,t}}, \frac{I_{c,t}}{A_{c,t}}\right)}$	11C.3 $\rho_{(\ln VA_{c,t}, \ln I_{c,t})}$	11C.4 $\rho^{rank}_{(VA_{c,t}, I_{c,t})}$
Level $\delta_{-4,c,t}$	-4	0.019 (0.862)	0.079 (0.493)	0.002 (0.945)	-0.007 (0.880)
Level $\delta_{-3,c,t}$	-3	0.001 (0.994)	0.114 (0.345)	-0.032 (0.256)	0.004 (0.917)
Level $\delta_{-2,c,t}$	-2	-0.089 (0.442)	-0.058 (0.568)	0.030 (0.407)	0.032 (0.371)
Level $\delta_{-1,c,t}$	-1	-0.026 (0.836)	0.096 (0.422)	0.041 (0.220)	0.053 (0.159)
Level $\delta_{0,c,t}$	0	**0.278**** **(0.038)**	**0.318**** **(0.014)**	0.021 (0.609)	0.059 (0.106)
Level $\delta_{1,c,t}$	1	**0.360**** **(0.012)**	**0.369**** **(0.013)**	0.067 (0.123)	**0.096**** **(0.013)**
Level $\delta_{2,c,t}$	2	0.112 (0.532)	0.116 (0.445)	**0.048*** **(0.083)**	**0.091**** **(0.017)**
Level $\delta_{3+,c,t}$	≥ 3	**0.407***** **(0.002)**	**0.429***** **(0.000)**	**0.051*** **(0.067)**	**0.090***** **(0.002)**
Observations		217	217	202	217
Adjusted R^2		0.357	0.382	0.347	0.339
Controls		Yes	Yes	Yes	Yes
Country and year FEs		Yes	Yes	Yes	Yes

Online Appendix

Table OA1. Effect of PBL reform on innovation, excluding countries with IPP change

This table estimates the effect of PBL reform on innovation by excluding four countries with IPP change in the examination period. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA1A.1	OA1A.2	OA1A.3	OA1A.4	OA1A.5	OA1A.6	OA1A.7	OA1A.8	OA1A.9
Explained variable	$patents_{i,c,t}$ (# successful patent filings)			$cites_{i,c,t}$ (# subsequent citations)			$débuts_{i,c,t}$ (# first-time patent filers)		
Post-reform indicator $\delta_{c,t}^{XPBL}$	0.258**	0.274***	0.261***	0.304**	0.326***	0.303***	0.189***	0.233***	0.219***
	(0.011)	(0.000)	(0.000)	(0.026)	(0.000)	(0.000)	(0.005)	(0.000)	(0.001)
Trans-reform indicator $\delta_{c,t}^{TPBL}$	0.025	0.051	0.072	0.014	0.041	0.065	0.176***	0.219***	0.233***
	(0.582)	(0.336)	(0.170)	(0.744)	(0.486)	(0.263)	(0.000)	(0.000)	(0.000)
Ind. innovation potential $pot_{i,t}$	0.981***	0.846***	0.845***	1.205***	1.038***	1.033***	0.356*	0.320*	0.320*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.068)	(0.081)	(0.079)
Creditor rights index change $CRI_{c,t}$			-0.159***			-0.205***			-0.107***
			(0.002)			(0.009)			(0.001)
Ind. export intensity $exports_{i,c,t}$		-0.123	-0.091		0.355	0.338		0.607	0.654*
		(0.852)	(0.902)		(0.592)	(0.673)		(0.120)	(0.083)
Ind. import intensity $imports_{i,c,t}$		2.738**	2.671**		2.709***	2.588***		1.659**	1.597*
		(0.013)	(0.012)		(0.002)	(0.002)		(0.044)	(0.052)
Ind. value-added $value\text{-}added_{i,c,t}$		0.192	0.258		-0.425	-0.337		0.076	0.122
		(0.577)	(0.475)		(0.426)	(0.538)		(0.838)	(0.749)
Country prosperity $\ln(pcGDP_{c,t})$		1.382**	1.456**		1.399*	1.544**		2.240***	2.299***
		(0.031)	(0.023)		(0.058)	(0.038)		(0.001)	(0.001)
Country size $\ln(pop_{c,t})$		3.927***	3.628***		4.434***	4.003***		2.308**	2.135*
		(0.000)	(0.000)		(0.000)	(0.001)		(0.050)	(0.084)
Observations	12865	12865	12865	12748	12748	12748	12204	12204	12204
Pseudo R^2	0.939	0.942	0.942	0.957	0.960	0.960	0.796	0.799	0.800
Country-industry & year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA1B.1	OA1B.2	OA1B.3	OA1B.4	OA1B.5	OA1B.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment	0.705***	0.665***	0.318***	0.522***	0.514***	0.183
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.132)
Trans-reform alignment	0.110	0.146	0.072	0.053	0.089	0.029
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.200)	(0.110)	(0.623)	(0.664)	(0.429)	(0.825)
Post-reform indicator	-0.504***	-0.467***	-0.087	-0.303***	-0.291***	0.048
$\delta_{c,t}^{XPBL}$	(0.000)	(0.000)	(0.432)	(0.000)	(0.001)	(0.695)
Trans-reform indicator	-0.024	-0.071	0.169	0.033	-0.020	0.208
$\delta_{c,t}^{XPBL}$	(0.698)	(0.357)	(0.236)	(0.730)	(0.848)	(0.124)
Industry innovation potential	0.705***	0.837***	0.249	-0.776***	0.903	-1.623***
$pot_{i,t}$	(0.000)	(0.000)	(0.143)	(0.007)	(0.110)	(0.000)
Creditor rights index change	-0.173***	-0.202***	-0.115***	0.146*	0.303*	0.027
$CRI_{c,t}$	(0.002)	(0.003)	(0.000)	(0.090)	(0.083)	(0.601)
Ind. export intensity	-0.547	0.043	0.536	1.088	0.290	-0.357
$exports_{i,c,t}$	(0.263)	(0.952)	(0.106)	(0.220)	(0.801)	(0.598)
Ind. import intensity	2.301**	2.280***	1.374*	-1.294	-4.250	-1.271
$imports_{i,c,t}$	(0.013)	(0.010)	(0.087)	(0.436)	(0.102)	(0.356)
Ind. value-added	0.677*	0.096	0.195	0.920***	1.517*	1.400***
$value\text{-}added_{i,c,t}$	(0.100)	(0.872)	(0.569)	(0.001)	(0.078)	(0.000)
Country prosperity	1.455**	1.534**	2.292***	0.453	1.122	1.431*
$\ln(pcGDP_{c,t})$	(0.029)	(0.048)	(0.001)	(0.594)	(0.196)	(0.065)
Country size	3.059**	3.139**	2.027	2.783**	2.799**	2.160*
$\ln(pop_{c,t})$	(0.012)	(0.035)	(0.106)	(0.026)	(0.045)	(0.078)
$CRI_{c,t} \times pot_{i,t}$				-0.378***	-0.503***	-0.184**
				(0.000)	(0.000)	(0.011)
$exports_{i,c,t} \times pot_{i,t}$				-1.532**	-0.572	0.269
				(0.012)	(0.301)	(0.519)
$imports_{i,c,t} \times pot_{i,t}$				2.068*	3.976***	1.514**
				(0.064)	(0.003)	(0.041)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.629	-2.118	-2.095***
				(0.400)	(0.200)	(0.000)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				1.120***	0.421*	1.031***
				(0.000)	(0.050)	(0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.055	-0.169	0.175**
				(0.613)	(0.260)	(0.031)
Observations	12865	12748	12204	12865	12748	12204
Pseudo R^2	0.944	0.962	0.800	0.945	0.963	0.801
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA2. The effect of PBL reform on innovation, technology class level

This table estimates the effect of PBL reform on innovation redefining industries as USPTO technology classes. The variables are otherwise as in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively..

Panel A. Summary statistics

Variables	Count	Mean	S.D.	Min.	P25	Median	P75	Max.
Explained variables:								
$patents^*_{i,c,t}$	15989	19.5	41.1	0.000	2.000	6.000	19.000	695
$cites^*_{i,c,t}$	15989	392.7	879.0	0.000	26.000	98.000	360.000	21548
$débuts^*_{i,c,t}$	15989	3.3	5.3	0.000	1.000	1.000	4.000	94
Variable of interests:								
PBL post-reform indicator $\delta^{XPBL}_{c,t}$	15989	0.188	0.391	0.000	0.000	0.000	0.000	1.000
PBL trans-reform indicator $\delta^{TPBL}_{c,t}$	15989	0.057	0.231	0.000	0.000	0.000	0.000	1.000
Industry innovation potential $pot^*_{i,t}$	15989	1.716	0.496	1.000	1.354	1.538	1.973	5.455
Control variables:								
Creditor rights index change $CRI_{c,t}$	15989	0.115	0.348	0.000	0.000	0.000	0.000	2.000
Country prosperity $\ln(pcGDP_{c,t})$	15989	10.261	0.452	7.539	10.153	10.349	10.454	11.239
Country size $\ln(pop_{c,t})$	15989	3.007	1.219	1.078	1.898	2.873	4.052	6.977

Panel B. Main effects

Regression	OA2B.1	OA2B.2	OA2B.3	OA2B.4	OA2B.5	OA2B.6	OA2B.7	OA2B.8	OA2B.9
Explained variable		$patents^*_{i,c,t}$			$cites^*_{i,c,t}$			$débuts^*_{i,c,t}$	
Post-reform indicator $\boldsymbol{\delta^{XPBL}_{c,t}}$	0.258**	0.255***	0.243***	0.326**	0.303***	0.276***	0.229***	0.235***	0.219***
	(0.013)	(0.000)	(0.000)	(0.019)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)
Trans-reform indicator $\boldsymbol{\delta^{TPBL}_{c,t}}$	0.024	0.049*	0.066*	0.016	0.037	0.056*	0.173***	0.196***	0.208***
	(0.636)	(0.094)	(0.054)	(0.830)	(0.321)	(0.095)	(0.000)	(0.000)	(0.000)
Industry innovation potential $pot^*_{i,t}$	0.391***	0.371***	0.368***	0.365***	0.330***	0.323***	0.176**	0.165**	0.163**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.025)	(0.025)	(0.025)
Creditor rights index change $CRI_{c,t}$			-0.151***			-0.220***			-0.124***
			(0.002)			(0.000)			(0.003)
Country prosperity $\ln(pcGDP_{c,t})$		1.478*	1.553**		1.470*	1.610*		1.680**	1.745**
		(0.052)	(0.040)		(0.089)	(0.061)		(0.029)	(0.024)
Country size $\ln(pop_{c,t})$		2.194***	1.806***		2.642***	2.018***		1.174***	0.848*
		(0.000)	(0.005)		(0.001)	(0.009)		(0.006)	(0.066)
Observations	15811	15811	15811	15811	15811	15811	15697	15697	15697
Pseudo R^2	0.863	0.866	0.866	0.899	0.902	0.903	0.560	0.563	0.563
Country-tech class & year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C. Main and interaction effects

Explained variable	OA2C.1 $patents^*_{i,c,t}$	OA2C.2 $cites^*_{i,c,t}$	OA2C.3 $débuts^*_{i,c,t}$	OA2C.4 $patents^*_{i,c,t}$	OA2C.5 $cites^*_{i,c,t}$	OA2C.6 $débuts^*_{i,c,t}$
Post-reform alignment to	0.397***	0.317***	0.182*	0.363***	0.260***	0.139
potential $\delta^{XPBL}_{c,t} \times pot^*_{i,t}$	(0.000)	(0.000)	(0.053)	(0.000)	(0.001)	(0.153)
Trans-reform alignment to	0.036	0.053	0.021	0.064	0.059	0.033
potential $\delta^{TPBL}_{c,t} \times pot^*_{i,t}$	(0.768)	(0.714)	(0.875)	(0.525)	(0.657)	(0.779)
Post-reform indicator	-0.485***	-0.318*	-0.101	-0.427***	-0.218	-0.031
$\delta^{XPBL}_{c,t}$	(0.003)	(0.053)	(0.481)	(0.001)	(0.194)	(0.841)
Trans-reform indicator	0.007	-0.032	0.173	-0.045	-0.048	0.147
$\delta^{TPBL}_{c,t}$	(0.972)	(0.900)	(0.418)	(0.757)	(0.832)	(0.428)
Industry innovation potential	0.283***	0.225**	0.120	-3.141	0.270	-2.314*
$pot^*_{i,t}$	(0.003)	(0.020)	(0.135)	(0.177)	(0.934)	(0.060)
Creditor rights index change	-0.153***	-0.222***	-0.128***	0.230	0.297	0.165
$CRI_{c,t}$	(0.003)	(0.000)	(0.002)	(0.138)	(0.231)	(0.102)
Country prosperity	1.485*	1.548*	1.739**	1.057	1.604	1.430
$\ln(pcGDP_{c,t})$	(0.068)	(0.085)	(0.027)	(0.239)	(0.128)	(0.127)
Country size	1.392**	1.586**	0.671	1.327*	1.481**	0.647
$\ln(pop_{c,t})$	(0.045)	(0.031)	(0.172)	(0.051)	(0.033)	(0.179)
$CRI_{c,t} \times pot^*_{i.t}$				-0.227**	-0.293**	-0.178**
				(0.012)	(0.031)	(0.010)
$\ln(pcGDP_{c,t}) \times pot^*_{i.t}$				0.301	0.005	0.219*
				(0.156)	(0.988)	(0.062)
$\ln(pop_{c.t}) \times pot^*_{i.t}$				0.087	-0.011	0.056
				(0.112)	(0.882)	(0.108)
Observations	15811	15811	15697	15811	15811	15697
Pseudo R^2	0.867	0.904	0.563	0.868	0.904	0.563
Country-tech class & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA3. The effect of PBL reform on innovation, using Japan's patent counts to measure patent potential

This table estimates the effect of PBL reform on innovation by using Japanese firms' average patent counts in an industry to measure the industry's patent potential. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA3A.1	OA3A.2	OA3A.3	OA3A.4	OA3A.5	OA3A.6	OA3A.7	OA3A.8	OA3A.9
Explained variable		$patents_{i,c,t}$			$cites_{i,c,t}$			$débuts_{i,c,t}$	
Post-reform indicator $\boldsymbol{\delta_{c,t}^{XPBL}}$	0.273***	0.265***	0.253***	0.336**	0.310***	0.286***	0.235***	0.231***	0.216***
	(0.008)	(0.000)	(0.000)	(0.024)	(0.000)	(0.000)	(0.009)	(0.000)	(0.000)
Trans-reform indicator $\boldsymbol{\delta_{c,t}^{TPBL}}$	0.041	0.061	0.078	0.038	0.052	0.069	0.196***	0.218***	0.229***
	(0.380)	(0.231)	(0.133)	(0.543)	(0.376)	(0.161)	(0.000)	(0.000)	(0.000)
Industry innovation potential $pot_{i,t}$	0.836***	0.701***	0.699***	1.152***	1.007***	0.998***	0.396**	0.335**	0.332**
	(0.003)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.017)	(0.026)	(0.026)
Creditor rights index change $CRI_{c,t}$			-0.147***			-0.185***			-0.111***
			(0.000)			(0.001)			(0.000)
Ind. export intensity $exports_{i,c,t}$		-0.188	-0.154		-0.102	-0.094		0.468*	0.516**
		(0.840)	(0.874)		(0.901)	(0.916)		(0.071)	(0.040)
Ind. import intensity $imports_{i,c,t}$		2.935***	2.875***		2.771***	2.672***		1.482*	1.423
		(0.003)	(0.003)		(0.001)	(0.001)		(0.095)	(0.105)
Ind. value-added $value\text{-}added_{i,c,t}$		0.241	0.296		-0.366	-0.294		0.052	0.093
		(0.479)	(0.409)		(0.510)	(0.609)		(0.872)	(0.775)
Country prosperity $\ln(pcGDP_{c,t})$		1.408**	1.479**		1.402**	1.523**		1.990***	2.048***
		(0.017)	(0.012)		(0.034)	(0.023)		(0.002)	(0.001)
Country size $\ln(pop_{c,t})$		3.327***	2.976***		3.693***	3.188***		2.153***	1.884***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.001)
Observations	14642	14642	14642	14515	14515	14515	13910	13910	13910
Pseudo R^2	0.936	0.939	0.939	0.955	0.958	0.958	0.789	0.793	0.793
Country-industry & year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression Explained variable	OA3B.1 $patents_{i,c,t}$	OA3B.2 $cites_{i,c,t}$	OA3B.3 $débuts_{i,c,t}$	OA3B.4 $patents_{i,c,t}$	OA3B.5 $cites_{i,c,t}$	OA3B.6 $débuts_{i,c,t}$
Post-reform alignment to potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.431*** (0.000)	0.387*** (0.000)	0.205*** (0.000)	0.295*** (0.000)	0.268*** (0.000)	0.129*** (0.009)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.071 (0.102)	0.068 (0.162)	0.067 (0.149)	0.027 (0.536)	0.030 (0.495)	0.038 (0.475)
Post-reform indicator $\delta_{c,t}^{XPBL}$	-0.444*** (0.000)	-0.396** (0.014)	-0.083 (0.417)	-0.222*** (0.004)	-0.180 (0.127)	0.029 (0.709)
Trans-reform indicator $\delta_{c,t}^{XPBL}$	-0.016 (0.760)	-0.023 (0.706)	0.138 (0.110)	0.044 (0.440)	0.033 (0.602)	0.172* (0.050)
Industry innovation potential $pot_{i,t}$	0.547*** (0.005)	0.823*** (0.000)	0.251* (0.064)	-1.178*** (0.000)	0.079 (0.863)	-0.915*** (0.000)
Creditor rights index change $CRI_{c,t}$	-0.158*** (0.001)	-0.179*** (0.000)	-0.116*** (0.000)	0.059 (0.540)	0.167 (0.279)	-0.059 (0.312)
Ind. export intensity $exports_{i,c,t}$	-0.341 (0.661)	-0.080 (0.920)	0.529** (0.017)	1.846 (0.132)	0.604 (0.637)	0.248 (0.768)
Ind. import intensity $imports_{i,c,t}$	2.393*** (0.006)	2.260*** (0.007)	1.139 (0.172)	-2.525** (0.015)	-5.222*** (0.000)	-0.964 (0.311)
Ind. value-added $value\text{-}added_{i,c,t}$	0.514 (0.241)	-0.062 (0.924)	0.107 (0.719)	1.196* (0.073)	1.839* (0.087)	1.403** (0.032)
Country prosperity $\ln(pcGDP_{c,t})$	1.489** (0.016)	1.527** (0.028)	2.056*** (0.001)	0.196 (0.836)	0.437 (0.645)	1.243 (0.141)
Country size $\ln(pop_{c,t})$	2.405*** (0.002)	2.492*** (0.002)	1.630*** (0.007)	2.225*** (0.005)	2.297*** (0.001)	1.689*** (0.005)
$CRI_{c,t} \times pot_{i,t}$				-0.194*** (0.001)	-0.227*** (0.004)	-0.054 (0.311)
$exports_{i,c,t} \times pot_{i,t}$				-1.272 (0.141)	-0.467 (0.555)	-0.003 (0.994)
$imports_{i,c,t} \times pot_{i,t}$				1.648** (0.020)	2.773*** (0.000)	0.722 (0.227)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.792 (0.296)	-1.665 (0.139)	-1.264*** (0.002)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				0.975*** (0.000)	0.669** (0.015)	0.644*** (0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.142* (0.095)	-0.043 (0.694)	0.105 (0.174)
Observations	14642	14515	13910	14642	14515	13910
Pseudo R^2	0.941	0.960	0.793	0.942	0.961	0.794
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA4. The effect of PBL reform on innovation, excluding three event countries with CRI change

This table estimates the effect of the PBL reform on innovation by excluding three event countries with CRI change. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA4A.1	OA4A.2	OA4A.3	OA4A.4	OA4A.5	OA4A.6	OA4A.7	OA4A.8	OA4A.9
Explained variable		$patents_{i,c,t}$			$cites_{i,c,t}$			$débuts_{i,c,t}$	
PBL post-reform dummy	0.246***	0.249***	0.259***	0.281**	0.290***	0.300***	0.153**	0.178**	0.186**
$\boldsymbol{\delta^{XPBL}_{c,t}}$	(0.008)	(0.000)	(0.000)	(0.033)	(0.000)	(0.000)	(0.036)	(0.016)	(0.011)
PBL trans-reform dummy	0.062	0.063	0.073	0.075	0.064	0.075*	0.161***	0.177***	0.184***
$\boldsymbol{\delta^{TPBL}_{c,t}}$	(0.166)	(0.196)	(0.144)	(0.126)	(0.154)	(0.088)	(0.000)	(0.000)	(0.000)
Industry innovation potential	0.897***	0.776***	0.777***	0.996***	0.858***	0.860***	0.391**	0.357**	0.355**
$pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.039)	(0.040)	(0.040)
Creditor rights index change			-0.314***			-0.322***			-0.161***
$CRI_{c,t}$			(0.000)			(0.000)			(0.000)
Ind. export intensity		-0.197	-0.172		0.172	0.200		0.553**	0.553**
$exports_{i,c,t}$		(0.782)	(0.809)		(0.843)	(0.824)		(0.047)	(0.050)
Ind. import intensity		2.386**	2.380**		1.987**	1.958**		1.560*	1.520*
$imports_{i,c,t}$		(0.016)	(0.019)		(0.010)	(0.011)		(0.066)	(0.070)
Ind. value-added		0.349	0.361		-0.220	-0.213		0.211	0.212
$value\text{-}added_{i,c,t}$		(0.289)	(0.284)		(0.647)	(0.673)		(0.594)	(0.591)
Country prosperity		1.378**	1.371**		1.313*	1.322*		2.068***	2.077***
$\ln(pcGDP_{c,t})$		(0.019)	(0.021)		(0.061)	(0.059)		(0.001)	(0.001)
Country size		4.978***	4.966***		5.847***	5.828***		3.554***	3.567***
$\ln(pop_{c,t})$		(0.000)	(0.000)		(0.000)	(0.000)		(0.001)	(0.001)
Observations	13120	13120	13120	12993	12993	12993	12381	12381	12381
Pseudo R^2	0.941	0.944	0.944	0.958	0.961	0.961	0.790	0.794	0.794
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA4B.1	OA4B.2	OA4B.3	OA4B.4	OA4B.5	OA4B.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment to potential $\delta^{XPBL}_{c,t} \times pot_{i,t}$	0.665*** (0.000)	0.523*** (0.000)	0.407*** (0.000)	0.499*** (0.000)	0.428*** (0.000)	0.305*** (0.000)
Trans-reform alignment to potential $\delta^{TPBL}_{c,t} \times pot_{i,t}$	0.154* (0.058)	0.202** (0.043)	0.209*** (0.006)	0.073 (0.548)	0.126 (0.396)	0.140* (0.085)
Post-reform indicator $\delta^{XPBL}_{c,t}$	-0.466*** (0.000)	-0.307*** (0.001)	-0.209*** (0.008)	-0.281*** (0.001)	-0.193** (0.027)	-0.106 (0.146)
Trans-reform indicator $\delta^{XPBL}_{c,t}$	-0.072 (0.209)	-0.136* (0.087)	-0.006 (0.945)	0.011 (0.902)	-0.056 (0.630)	0.054 (0.540)
Industry innovation potential $pot_{i,t}$	0.691*** (0.000)	0.770*** (0.000)	0.300* (0.062)	-1.245*** (0.001)	-0.246 (0.576)	-1.355*** (0.000)
Creditor rights index change $CRI_{c,t}$	-0.312*** (0.000)	-0.320*** (0.000)	-0.162*** (0.000)	0.005 (0.976)	0.155 (0.543)	0.035 (0.715)
Ind. export intensity $exports_{i,c,t}$	-0.510 (0.308)	0.073 (0.926)	0.432 (0.140)	1.172 (0.196)	-0.408 (0.719)	-0.980 (0.115)
Ind. import intensity $imports_{i,c,t}$	1.990** (0.027)	1.669** (0.036)	1.227 (0.111)	-1.217 (0.482)	-4.239 (0.134)	-0.918 (0.512)
Ind. value-added $value\text{-}added_{i,c,t}$	0.767** (0.047)	0.132 (0.791)	0.317 (0.344)	1.008*** (0.000)	1.378** (0.047)	1.265*** (0.005)
Country prosperity $\ln(pcGDP_{c,t})$	1.400** (0.021)	1.339* (0.060)	2.090*** (0.001)	0.302 (0.728)	0.703 (0.406)	1.314* (0.060)
Country size $\ln(pop_{c,t})$	4.529*** (0.000)	5.308*** (0.000)	3.487*** (0.001)	4.326*** (0.000)	4.856*** (0.000)	3.597*** (0.000)
$CRI_{c,t} \times pot_{i,t}$				-0.406*** (0.009)	-0.529** (0.042)	-0.258** (0.016)
$exports_{i,c,t} \times pot_{i,t}$				-1.471** (0.035)	0.061 (0.925)	0.826* (0.062)
$imports_{i,c,t} \times pot_{i,t}$				1.861* (0.082)	3.543** (0.026)	1.179 (0.120)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.627 (0.207)	-1.902 (0.130)	-1.647* (0.062)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				1.193*** (0.000)	0.673** (0.024)	0.861*** (0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.146 (0.101)	0.022 (0.836)	0.162* (0.066)
Observations	13120	12993	12381	13120	12993	12381
Pseudo R^2	0.945	0.962	0.795	0.946	0.962	0.795
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA5. Effect of PBL reform on innovation, different definition of the reform period

This table estimates the effect of PBL reform on innovation by defining the trans- and post-reform period differently. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and by industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA5A.1	OA5A.2	OA5A.3	OA5A.4	OA5A.5	OA5A.6	OA5A.7	OA5A.8	OA5A.9
Explained variable		$patents_{i,c,t}$			$cites_{i,c,t}$			$débuts_{i,c,t}$	
PBL post-reform dummy $\boldsymbol{\delta^{XPBL}_{c,t}}$	0.279**	0.263***	0.244***	0.381**	0.349***	0.315***	0.204**	0.192***	0.178***
	(0.014)	(0.001)	(0.001)	(0.012)	(0.001)	(0.001)	(0.018)	(0.001)	(0.007)
PBL trans-reform dummy $\boldsymbol{\delta^{TPBL}_{c,t}}$	0.128**	0.147***	0.140***	0.148**	0.167***	0.150***	0.203***	0.236***	0.228***
	(0.016)	(0.003)	(0.006)	(0.048)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry innovation potential $pot_{i,t}$	0.990***	0.857***	0.856***	1.227***	1.065***	1.059***	0.427*	0.369*	0.368*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.052)	(0.063)	(0.062)
Creditor rights index change $CRI_{c,t}$			-0.138***			-0.171***			-0.068*
			(0.001)			(0.004)			(0.100)
Ind. export intensity $exports_{i,c,t}$		0.059	0.084		0.377	0.371		0.589**	0.615**
		(0.920)	(0.897)		(0.440)	(0.539)		(0.016)	(0.011)
Ind. import intensity $imports_{i,c,t}$		2.620***	2.566***		2.613***	2.523***		1.504*	1.470*
		(0.008)	(0.007)		(0.002)	(0.001)		(0.072)	(0.079)
Ind. value-added $value\text{-}added_{i,c,t}$		0.347	0.391		-0.303	-0.243		0.045	0.069
		(0.263)	(0.240)		(0.562)	(0.650)		(0.889)	(0.838)
Country prosperity $\ln(pcGDP_{c,t})$		1.411**	1.473**		1.391**	1.495**		2.023***	2.055***
		(0.023)	(0.017)		(0.049)	(0.036)		(0.001)	(0.001)
Country size $\ln(pop_{c,t})$		3.084***	2.760***		3.184***	2.731***		2.060***	1.900***
		(0.000)	(0.000)		(0.000)	(0.001)		(0.000)	(0.001)
Observations	14680	14680	14680	14553	14553	14553	13941	13941	13941
Pseudo R^2	0.937	0.940	0.940	0.956	0.959	0.959	0.790	0.793	0.793
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression Explained variable	OA5B.1 $patents_{i,c,t}$	OA5B.2 $cites_{i,c,t}$	OA5B.3 $débuts_{i,c,t}$	OA5B.4 $patents_{i,c,t}$	OA5B.5 $cites_{i,c,t}$	OA5B.6 $débuts_{i,c,t}$
Post-reform alignment to potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.784*** (0.000)	0.750*** (0.000)	0.365*** (0.000)	0.593*** (0.000)	0.579*** (0.000)	0.225*** (0.003)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.275*** (0.000)	0.311*** (0.001)	0.183*** (0.008)	0.174* (0.066)	0.206* (0.053)	0.122 (0.114)
Post-reform indicator $\delta_{c,t}^{XPBL}$	-0.614*** (0.000)	-0.565*** (0.000)	-0.178** (0.023)	-0.403*** (0.000)	-0.364*** (0.000)	-0.039 (0.541)
Trans-reform indicator $\delta_{c,t}^{XPBL}$	-0.132*** (0.001)	-0.174* (0.054)	0.059 (0.513)	-0.031 (0.709)	-0.063 (0.604)	0.113 (0.196)
Industry innovation potential $pot_{i,t}$	0.716*** (0.000)	0.839*** (0.000)	0.276 (0.123)	-0.711*** (0.002)	0.697* (0.088)	-1.213*** (0.000)
Creditor rights index change $CRI_{c,t}$	-0.151*** (0.004)	-0.168*** (0.004)	-0.075* (0.058)	0.112 (0.208)	0.240 (0.195)	0.072* (0.056)
Ind. export intensity $exports_{i,c,t}$	-0.464 (0.305)	0.033 (0.955)	0.484** (0.045)	1.271 (0.104)	0.297 (0.721)	-0.446 (0.479)
Ind. import intensity $imports_{i,c,t}$	2.094*** (0.009)	2.101** (0.010)	1.181 (0.147)	-1.279 (0.428)	-4.448* (0.052)	-1.513 (0.197)
Ind. value-added $value\text{-}added_{i,c,t}$	0.662* (0.079)	0.045 (0.937)	0.106 (0.705)	0.614 (0.181)	1.240 (0.167)	1.497*** (0.000)
Country prosperity $\ln(pcGDP_{c,t})$	1.497** (0.020)	1.513** (0.040)	2.060*** (0.001)	0.482 (0.556)	0.963 (0.253)	1.262* (0.082)
Country size $\ln(pop_{c,t})$	2.196** (0.013)	2.048** (0.024)	1.650*** (0.006)	2.045** (0.017)	1.916** (0.028)	1.769*** (0.001)
$CRI_{c,t} \times pot_{i,t}$				-0.309*** (0.000)	-0.403*** (0.006)	-0.184*** (0.002)
$exports_{i,c,t} \times pot_{i,t}$				-1.560*** (0.008)	-0.484 (0.437)	0.368 (0.396)
$imports_{i,c,t} \times pot_{i,t}$				1.974** (0.037)	3.991*** (0.002)	1.605** (0.014)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.137 (0.891)	-1.730 (0.307)	-2.301*** (0.001)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				1.091*** (0.000)	0.494*** (0.006)	0.890*** (0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.049 (0.598)	-0.146 (0.251)	0.121 (0.124)
Observations	14680	14553	13941	14680	14553	13941
Pseudo R^2	0.942	0.961	0.793	0.943	0.962	0.794
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA6. The effect of PBL reform on innovation using negative binomial estimation

This table estimates the effect of the PBL reform on innovation using the negative binomial specification. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, clustering by country, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA6A.1	OA6A.2	OA6A.3
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform indicator $\boldsymbol{\delta_{c,t}^{XPBL}}$	0.160** (0.036)	0.158 (0.384)	0.158** (0.043)
Trans-reform indicator $\boldsymbol{\delta_{c,t}^{TPBL}}$	0.110** (0.030)	0.208 (0.114)	0.197*** (0.000)
Industry innovation potential $pot_{i,t}$	0.589*** (0.000)	0.479*** (0.004)	0.311*** (0.000)
Creditor rights index change $CRI_{c,t}$	-0.099* (0.095)	-0.222 (0.217)	-0.129*** (0.000)
Ind. export intensity $exports_{i,c,t}$	2.835*** (0.000)	3.493*** (0.000)	1.420*** (0.000)
Ind. import intensity $imports_{i,c,t}$	2.801*** (0.007)	3.753*** (0.007)	1.863*** (0.003)
Ind. value-added $value\text{-}added_{i,c,t}$	1.103* (0.091)	1.113 (0.307)	1.007** (0.030)
Country prosperity $\ln(pcGDP_{c,t})$	2.279*** (0.000)	3.201*** (0.002)	2.103*** (0.001)
Country size $\ln(pop_{c,t})$	3.087** (0.010)	1.955 (0.348)	2.444*** (0.000)
Observations	17807	17807	17807
Pseudo R^2	0.307	0.103	0.367
Country, industry & year FEs	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA6B.1	OA6B.2	OA6B.3	OA6B.4	OA6B.5	OA6B.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment	0.408***	0.638***	0.228	0.457***	0.690***	0.223
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.006)	(0.001)	(0.228)	(0.000)	(0.000)	(0.117)
Trans-reform alignment	0.102	0.285*	-0.032	0.111	0.305*	-0.069
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.524)	(0.087)	(0.830)	(0.387)	(0.075)	(0.552)
Post-reform indicator	-0.216	-0.389*	-0.057	-0.269**	-0.439*	-0.061
$\delta_{c,t}^{XPBL}$	(0.137)	(0.071)	(0.771)	(0.043)	(0.073)	(0.701)
Trans-reform indicator	0.022	-0.019	0.227*	0.006	-0.037	0.258**
$\delta_{c,t}^{XPBL}$	(0.885)	(0.917)	(0.090)	(0.965)	(0.853)	(0.018)
Industry innovation	0.503***	0.366**	0.261***	0.058	0.063	0.672*
potential $pot_{i,t}$	(0.000)	(0.024)	(0.000)	(0.878)	(0.910)	(0.060)
Creditor rights index	-0.101*	-0.217	-0.130***	-0.100	-0.276	-0.168*
change $CRI_{c,t}$	(0.081)	(0.231)	(0.000)	(0.407)	(0.235)	(0.074)
Ind. export intensity	2.856***	3.507***	1.437***	1.189	-0.162	-0.125
$exports_{i,c,t}$	(0.000)	(0.000)	(0.000)	(0.150)	(0.871)	(0.830)
Ind. import intensity	2.685***	3.538***	1.818***	-0.232	3.509	0.694
$imports_{i,c,t}$	(0.005)	(0.007)	(0.002)	(0.903)	(0.233)	(0.588)
Ind. value-added	1.121*	1.110	1.026**	-2.614*	-2.411	0.019
$value\text{-}added_{i,c,t}$	(0.080)	(0.304)	(0.026)	(0.051)	(0.255)	(0.984)
Country prosperity	2.249***	3.165***	2.100***	2.231***	3.160***	2.329***
$\ln(pcGDP_{c,t})$	(0.000)	(0.002)	(0.002)	(0.000)	(0.004)	(0.001)
Country size	2.924**	1.824	2.344***	2.770**	1.775	2.217***
$\ln(pop_{c,t})$	(0.019)	(0.388)	(0.001)	(0.020)	(0.386)	(0.002)
$CRI_{c,t} \times pot_{i,t}$				0.006	0.084	0.053
				(0.973)	(0.683)	(0.630)
$exports_{i,c,t} \times pot_{i,t}$				1.493**	3.440***	1.626***
				(0.038)	(0.000)	(0.000)
$imports_{i,c,t} \times pot_{i,t}$				2.240	-0.441	0.519
				(0.169)	(0.848)	(0.595)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				6.183**	5.881	2.035
				(0.011)	(0.203)	(0.215)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				-0.042	-0.064	-0.339*
				(0.844)	(0.842)	(0.053)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.079	0.060	-0.052
				(0.231)	(0.591)	(0.331)
Observations	17807	17807	17807	17807	17807	17807
Pseudo R^2	0.308	0.104	0.367	0.310	0.104	0.369
Country, industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA7. The effect of PBL reform on innovation, at the extensive margin

This table estimates the effect of the PBL reform on innovation at the extensive margin. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA7A.1	OA7A.2	OA7A.3	OA7A.4	OA7A.5	OA7A.6	OA7A.7	OA7A.8	OA7A.9
Explained variable	$\delta_{patents_{i,c,t}>0}$ (new patent dummy)			$\delta_{cites_{i,c,t}>0}$ (patent cited dummy)			$\delta_{débuts_{i,c,t}>0}$ (new patenter dummy)		
Post-reform indicator $\boldsymbol{\delta_{c,t}^{XPBL}}$	0.016 (0.571)	0.001 (0.957)	0.000 (0.986)	0.022 (0.427)	0.008 (0.688)	0.006 (0.759)	0.048** (0.011)	0.039*** (0.003)	0.034*** (0.001)
Trans-reform indicator $\boldsymbol{\delta_{c,t}^{TPBL}}$	0.009 (0.752)	-0.007 (0.754)	-0.007 (0.766)	0.016 (0.597)	-0.001 (0.976)	0.000 (0.987)	0.034* (0.074)	0.022* (0.086)	0.025** (0.030)
Industry innovation potential $pot_{i,t}$	-0.006 (0.787)	-0.011 (0.667)	-0.011 (0.667)	-0.002 (0.925)	-0.006 (0.800)	-0.006 (0.800)	0.009 (0.736)	0.004 (0.868)	0.004 (0.869)
Creditor rights index change $CRI_{c,t}$			-0.003 (0.819)			-0.008 (0.535)			-0.021 (0.109)
Ind. export intensity $exports_{i,c,t}$		0.310* (0.066)	0.310* (0.066)		0.308* (0.088)	0.308* (0.088)		0.198* (0.077)	0.198* (0.075)
Ind. import intensity $imports_{i,c,t}$		0.022 (0.816)	0.022 (0.822)		0.011 (0.870)	0.011 (0.888)		0.212* (0.068)	0.211* (0.065)
Ind. value-added $value\text{-}added_{i,c,t}$		-0.199 (0.398)	-0.199 (0.398)		-0.215 (0.368)	-0.215 (0.368)		-0.224 (0.318)	-0.223 (0.318)
Country prosperity $\ln(pcGDP_{c,t})$		0.303*** (0.001)	0.304*** (0.001)		0.304*** (0.001)	0.305*** (0.001)		0.278*** (0.007)	0.281*** (0.006)
Country size $\ln(pop_{c,t})$		0.477** (0.019)	0.475** (0.020)		0.476** (0.017)	0.472** (0.018)		0.288** (0.026)	0.277** (0.024)
Observations	17807	17807	17807	17807	17807	17807	17807	17807	17807
Adjusted R^2	0.653	0.657	0.657	0.654	0.657	0.657	0.565	0.567	0.567
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA7B.1	OA7B.2	OA7B.3	OA7B.4	OA7B.5	OA7B.6
Explained variable	$\delta_{patents_{i,c,t}>0}$	$\delta_{cites_{i,c,t}>0}$	$\delta_{débuts_{i,c,t}>0}$	$\delta_{patents_{i,c,t}>0}$	$\delta_{cites_{i,c,t}>0}$	$\delta_{débuts_{i,c,t}>0}$
Post-reform alignment to Potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.013 (0.618)	0.017 (0.430)	0.034 (0.315)	0.001 (0.987)	0.001 (0.960)	0.010 (0.780)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.002 (0.914)	0.004 (0.846)	-0.005 (0.835)	0.001 (0.970)	0.004 (0.846)	-0.005 (0.809)
Post-reform indicator $\delta_{c,t}^{XPBL}$	-0.010 (0.665)	-0.008 (0.669)	0.006 (0.791)	0.001 (0.979)	0.005 (0.800)	0.026 (0.302)
Trans-reform indicator $\delta_{c,t}^{XPBL}$	-0.009 (0.717)	-0.003 (0.903)	0.029 (0.110)	-0.007 (0.782)	-0.003 (0.914)	0.029 (0.186)
Industry innovation potential $pot_{i,t}$	-0.012 (0.613)	-0.008 (0.727)	0.001 (0.973)	-0.102 (0.239)	-0.095 (0.248)	-0.138 (0.103)
Creditor rights index change $CRI_{c,t}$	-0.003 (0.816)	-0.008 (0.542)	-0.021 (0.135)	0.014 (0.709)	0.018 (0.651)	0.014 (0.615)
Ind. export intensity $exports_{i,c,t}$	0.307* (0.069)	0.305* (0.093)	0.192* (0.090)	-0.067 (0.735)	-0.083 (0.681)	0.051 (0.829)
Ind. import intensity $imports_{i,c,t}$	0.020 (0.838)	0.009 (0.919)	0.207* (0.073)	0.343 (0.309)	0.384 (0.218)	0.024 (0.930)
Ind. value-added $value\text{-}added_{i,c,t}$	-0.199 (0.398)	-0.215 (0.368)	-0.223 (0.318)	0.577 (0.211)	0.556 (0.225)	0.342 (0.470)
Country prosperity $\ln(pcGDP_{c,t})$	0.304*** (0.001)	0.305*** (0.001)	0.281*** (0.006)	0.269*** (0.004)	0.271*** (0.003)	0.237** (0.028)
Country size $\ln(pop_{c,t})$	0.475** (0.020)	0.471** (0.018)	0.277** (0.024)	0.456** (0.024)	0.452** (0.022)	0.250** (0.036)
$CRI_{c,t} \times pot_{i,t}$				-0.021 (0.648)	-0.032 (0.487)	-0.044 (0.118)
$exports_{i,c,t} \times pot_{i,t}$				0.317* (0.069)	0.328* (0.057)	0.105 (0.614)
$imports_{i,c,t} \times pot_{i,t}$				-0.295 (0.289)	-0.342 (0.201)	0.153 (0.396)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-1.046** (0.046)	-1.041** (0.046)	-0.766 (0.136)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				0.042 (0.211)	0.042 (0.201)	0.057* (0.070)
$\ln(pop_{c,t}) \times pot_{i,t}$				0.024 (0.247)	0.024 (0.206)	0.034 (0.105)
Observations	17807	17807	17807	17807	17807	17807
Adjusted R^2	0.657	0.657	0.567	0.657	0.657	0.567
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA8. The effect of PBL reform on innovation, alternative measures

This table estimates the effect of the PBL reform on innovation by using two different innovation measures. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA8A.1	OA8A.2	OA8A.3	OA8A.4	OA8A.5	OA8A.6
Explained variable		$ncites_{c,t}$			$cites\_14y_{c,t}$	
PBL post-reform dummy	0.283**	0.270***	0.249***	0.339**	0.320***	0.292***
$\boldsymbol{\delta_{c,t}^{XPBL}}$	(0.023)	(0.000)	(0.000)	(0.018)	(0.000)	(0.000)
PBL trans.-reform dummy	0.063	0.085*	0.104***	0.029	0.050	0.067
$\boldsymbol{\delta_{c,t}^{TPBL}}$	(0.138)	(0.051)	(0.010)	(0.634)	(0.280)	(0.142)
Industry innovation potential	0.966***	0.824***	0.819***	1.109***	0.943***	0.937***
$pot_{i,t}$	(0.003)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)
Creditor rights index change			-0.194***			-0.205***
$CRI_{c,t}$			(0.002)			(0.005)
Ind. export intensity		-0.001	0.007		0.754**	0.748
$exports_{i,c,t}$		(0.999)	(0.991)		(0.026)	(0.138)
Ind. import intensity		2.887***	2.786***		1.572***	1.469***
$imports_{i,c,t}$		(0.005)	(0.006)		(0.008)	(0.009)
Ind. value-added		-0.148	-0.076		-0.670	-0.587
$value\text{-}added_{i,c,t}$		(0.704)	(0.850)		(0.237)	(0.304)
Country prosperity		1.552**	1.664**		1.466***	1.612***
$\ln(pcGDP_{c,t})$		(0.018)	(0.012)		(0.005)	(0.002)
Country size		3.383***	2.875***		4.071***	3.502***
$\ln(pop_{c,t})$		(0.000)	(0.000)		(0.000)	(0.000)
Observations	14553	14553	14553	14423	14423	14423
Pseudo R^2	0.917	0.920	0.920	0.956	0.959	0.960
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA8B.1	OA8B.2	OA8B.3	OA8B.4
Explained variable	$ncites_{c,t}$	$cites\_14y_{c,t}$	$ncites_{c,t}$	$cites\_14y_{c,t}$
Post-reform alignment to potential	0.688***	0.630***	0.468***	0.470***
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)
Trans-reform alignment to potential	0.161*	0.157	0.089	0.096
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.063)	(0.128)	(0.484)	(0.466)
Post-reform indicator	-0.493***	-0.434***	-0.254***	-0.251***
$\delta_{c,t}^{XPBL}$	(0.000)	(0.001)	(0.001)	(0.008)
Trans-reform indicator	-0.040	-0.082	0.029	-0.026
$\delta_{c,t}^{XPBL}$	(0.571)	(0.347)	(0.799)	(0.827)
Industry innovation potential	0.645***	0.725***	-0.375	0.857*
$pot_{i,t}$	(0.002)	(0.000)	(0.183)	(0.098)
Creditor rights index change	-0.192***	-0.202***	0.243*	0.256
$CRI_{c,t}$	(0.002)	(0.005)	(0.085)	(0.170)
Ind. export intensity	-0.414	0.525	0.263	1.193*
$exports_{i,c,t}$	(0.464)	(0.225)	(0.670)	(0.096)
Ind. import intensity	2.365**	1.166**	-2.953	-4.330**
$imports_{i,c,t}$	(0.018)	(0.032)	(0.145)	(0.012)
Ind. value-added	0.282	-0.131	0.834**	1.134
$value\text{-}added_{i,c,t}$	(0.519)	(0.828)	(0.041)	(0.239)
Country prosperity	1.670**	1.606***	0.647	1.155*
$\ln(pcGDP_{c,t})$	(0.015)	(0.003)	(0.454)	(0.073)
Country size	2.281***	2.850***	2.142***	2.644***
$\ln(pop_{c,t})$	(0.005)	(0.000)	(0.006)	(0.000)
$CRI_{c,t} \times pot_{i,t}$			-0.467***	-0.446***
			(0.000)	(0.004)
$exports_{i,c,t} \times pot_{i,t}$			-0.906*	-0.743
			(0.084)	(0.329)
$imports_{i,c,t} \times pot_{i,t}$			3.180***	3.378***
			(0.001)	(0.007)
$value\text{-}added_{i,c,t} \times pot_{i,t}$			-0.994	-1.856
			(0.378)	(0.273)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$			1.047***	0.428**
			(0.000)	(0.016)
$\ln(pop_{c,t}) \times pot_{i,t}$			-0.060	-0.183
			(0.620)	(0.173)
Observations	14553	14423	14553	14423
Pseudo R^2	0.922	0.961	0.923	0.962
Country-industry & year FEs	Yes	Yes	Yes	Yes

Table OA9. The effect of PBL reform on radical innovation

This table estimates the effect of the PBL reform on radical innovation by using two different measures. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA9A.1	OA9A.2	OA9A.3	OA9A.4	OA9A.5	OA9A.6
Explained variable		$radical\_1_{i,c,t}$			$radical\_2_{i,c,t}$	
PBL post-reform dummy $\delta_{c,t}^{XPBL}$	0.339** (0.035)	0.332*** (0.000)	0.305*** (0.000)	0.350*** (0.000)	0.344*** (0.000)	0.325*** (0.000)
PBL trans.-reform dummy $\delta_{c,t}^{TPBL}$	0.097 (0.135)	0.118** (0.025)	0.137** (0.012)	0.030 (0.750)	0.053 (0.635)	0.080 (0.462)
Industry innovation potential $pot_{i,t}$	0.870** (0.011)	0.711** (0.012)	0.701** (0.012)	0.968*** (0.000)	0.891*** (0.000)	0.888*** (0.000)
Creditor rights index change $CRI_{c,t}$			-0.220*** (0.007)			-0.265*** (0.000)
Ind. export intensity $exports_{i,c,t}$		-0.384 (0.530)	-0.400 (0.596)		-0.690*** (0.006)	-0.707** (0.035)
Ind. import intensity $imports_{i,c,t}$		3.807*** (0.007)	3.676*** (0.009)		1.402 (0.111)	1.285 (0.119)
Ind. value-added $value\text{-}added_{i,c,t}$		-0.714 (0.228)	-0.639 (0.284)		-0.029 (0.957)	0.056 (0.919)
Country prosperity $\ln(pcGDP_{c,t})$		2.029*** (0.003)	2.159*** (0.002)		1.480** (0.018)	1.596** (0.010)
Country size $\ln(pop_{c,t})$		3.034*** (0.000)	2.447*** (0.001)		3.096*** (0.000)	2.492*** (0.001)
Observations	9456	9456	9456	12264	12264	12264
Pseudo R^2	0.733	0.737	0.737	0.892	0.894	0.894
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA9B.1	OA9B.2	OA9B.3	OA9B.4
Explained variable	$radical\_1_{i,c,t}$		$radical\_2_{i,c,t}$	
Post-reform alignment to potential	0.629***	0.414***	0.493***	0.344***
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)
Trans-reform alignment to potential	0.100	0.009	-0.042	-0.085
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.430)	(0.950)	(0.707)	(0.538)
Post-reform indicator	-0.391***	-0.151	-0.268***	-0.092
$\delta_{c,t}^{XPBL}$	(0.002)	(0.148)	(0.005)	(0.469)
Trans-reform indicator	0.052	0.133	0.139*	0.192*
$\delta_{c,t}^{XPBL}$	(0.719)	(0.422)	(0.068)	(0.082)
Industry innovation potential	0.528**	0.393	0.795***	-0.237
$pot_{i,t}$	(0.028)	(0.248)	(0.000)	(0.576)
Creditor rights index change	-0.211**	0.186	-0.266***	0.116
$CRI_{c,t}$	(0.012)	(0.446)	(0.000)	(0.163)
Ind. export intensity	-0.738	-0.188	-0.920***	-0.364
$exports_{i,c,t}$	(0.311)	(0.843)	(0.005)	(0.696)
Ind. import intensity	3.239**	-3.653**	0.868	-4.333***
$imports_{i,c,t}$	(0.019)	(0.033)	(0.239)	(0.007)
Ind. value-added	-0.353	2.245***	0.389	-1.013
$value\text{-}added_{i,c,t}$	(0.561)	(0.001)	(0.568)	(0.329)
Country prosperity	2.161***	1.227	1.585**	0.739
$\ln(pcGDP_{c,t})$	(0.002)	(0.179)	(0.012)	(0.280)
Country size	1.872**	1.904***	2.120**	2.006**
$\ln(pop_{c,t})$	(0.021)	(0.009)	(0.015)	(0.018)
$CRI_{c,t} \times pot_{i,t}$		-0.386**		-0.358***
		(0.030)		(0.000)
$exports_{i,c,t} \times pot_{i,t}$		-0.813*		-0.493
		(0.097)		(0.544)
$imports_{i,c,t} \times pot_{i,t}$		4.308***		3.091**
		(0.000)		(0.012)
$value\text{-}added_{i,c,t} \times pot_{i,t}$		-3.878**		1.689
		(0.011)		(0.325)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$		0.842***		0.686***
		(0.000)		(0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$		-0.236		0.036
		(0.123)		(0.741)
Observations	9456	9456	12264	12264
Pseudo R^2	0.739	0.740	0.895	0.895
X^2 p-level	0.000	0.000	0.000	0.000
Country-industry & year FEs	Yes	Yes	Yes	Yes

Table OA10. The effect of PBL reform on innovative entrepreneurship, other measures

This table estimates the effect of the PBL reform on innovative entrepreneurship by using two different measures. The variables are defined in Appendix Table A1. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Main effects

Regression	OA10A.1	OA10A.2	OA10A.3	OA10A.4	OA10A.5	OA10A.6
Explained variable		$d\acute{e}but\_1_{i,c,t}$			$d\acute{e}but\ patents_{i,c,t}$	
PBL post-reform dummy $\boldsymbol{\delta^{XPBL}_{c,t}}$	0.196** (0.031)	0.180** (0.029)	0.162* (0.071)	0.237** (0.011)	0.236*** (0.000)	0.222*** (0.001)
PBL trans.-reform dummy $\boldsymbol{\delta^{TPBL}_{c,t}}$	0.131** (0.013)	0.151*** (0.000)	0.163*** (0.000)	0.191*** (0.000)	0.216*** (0.000)	0.227*** (0.000)
Industry innovation potential $pot_{i,t}$	0.541*** (0.005)	0.485*** (0.003)	0.483*** (0.002)	0.502** (0.047)	0.437* (0.063)	0.435* (0.062)
Creditor rights index change $CRI_{c,t}$			-0.126*** (0.001)			-0.103*** (0.008)
Ind. export intensity $exports_{i,c,t}$		0.330 (0.673)	0.373 (0.623)		0.887*** (0.005)	0.927*** (0.002)
Ind. import intensity $imports_{i,c,t}$		1.892** (0.014)	1.832** (0.016)		1.123 (0.143)	1.067 (0.159)
Ind. value-added $value\text{-}added_{i,c,t}$		0.331 (0.460)	0.374 (0.385)		0.053 (0.881)	0.092 (0.803)
Country prosperity $\ln(pcGDP_{c,t})$		1.869*** (0.005)	1.937*** (0.004)		2.106*** (0.002)	2.159*** (0.001)
Country size $\ln(pop_{c,t})$		2.293*** (0.000)	1.976*** (0.003)		2.318*** (0.000)	2.070*** (0.001)
Observations	10579	10579	10579	13941	13941	13941
Pseudo R^2	0.585	0.588	0.588	0.798	0.801	0.801
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Main and interaction effects

Regression	OA10B.1	OA10B.2	OA10B.3	OA10B.4
Explained variable	$début\_1_{i,c,t}$		$début\ patents_{i,c,t}$	
Post-reform alignment to potential $\delta_{c,t}^{XPBL} \times pot_{i,t}$	0.486*** (0.009)	0.350*** (0.004)	0.317** (0.027)	0.270** (0.015)
Trans-reform alignment to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.056 (0.528)	0.013 (0.916)	-0.008 (0.897)	-0.023 (0.670)
Post-reform indicator $\delta_{c,t}^{XPBL}$	-0.322 (0.106)	-0.167 (0.189)	-0.158 (0.410)	-0.104 (0.474)
Trans-reform indicator $\delta_{c,t}^{XPBL}$	0.037 (0.748)	0.068 (0.688)	0.115*** (0.010)	0.127** (0.036)
Industry innovation potential $pot_{i,t}$	0.546*** (0.000)	1.057 (0.168)	0.669*** (0.000)	1.664** (0.039)
Creditor rights index change $CRI_{c,t}$	-0.304*** (0.003)	0.277 (0.211)	-0.425*** (0.002)	0.090 (0.570)
Ind. export intensity $exports_{i,c,t}$	0.236 (0.549)	-1.125 (0.162)	0.767 (0.170)	0.495 (0.681)
Ind. import intensity $imports_{i,c,t}$	1.963*** (0.001)	-1.594 (0.338)	-0.481 (0.442)	-4.089*** (0.006)
Ind. value-added $value\text{-}added_{i,c,t}$	-0.113 (0.854)	2.122** (0.049)	0.344 (0.654)	-0.124 (0.935)
Country prosperity $\ln(pcGDP_{c,t})$	1.813*** (0.002)	1.333* (0.094)	1.700*** (0.003)	1.884*** (0.003)
Country size $\ln(pop_{c,t})$	2.493*** (0.005)	2.695*** (0.001)	4.176*** (0.001)	4.293*** (0.001)
$CRI_{c,t} \times pot_{i,t}$		-0.501*** (0.002)		-0.406*** (0.007)
$exports_{i,c,t} \times pot_{i,t}$		0.641 (0.302)		0.090 (0.896)
$imports_{i,c,t} \times pot_{i,t}$		2.071** (0.015)		2.204** (0.010)
$value\text{-}added_{i,c,t} \times pot_{i,t}$		-3.248* (0.066)		0.593 (0.785)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$		0.324 (0.390)		-0.237 (0.392)
$\ln(pop_{c,t}) \times pot_{i,t}$		-0.233* (0.057)		-0.192 (0.170)
Observations	9677	9677	12602	12602
Pseudo R^2	0.896	0.897	0.963	0.963
Country-industry & year FEs	Yes	Yes	Yes	Yes

Table OA11. Event study, robustness checks

In this table, panel A adopts an event study among event countries from year *t*-5 to year *t*+3 (*t* represents the PBL reform year). Panel B adopts an event study among event countries within year *t*-4 to year *t*+2, by including *CRI*. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Panel A. Event study, t-5 to t+3

Regression	OA11A.1	OA11A.2	OA11A.3	OA11A.4	OA11A.5	OA11A.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment to potential	0.560***	0.471***	0.326***	0.256***	0.311**	0.271**
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.009)	(0.038)	(0.046)
Trans-reform alignment to potential	0.124	0.127	0.119*	-0.036	0.002	0.085
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.205)	(0.337)	(0.066)	(0.740)	(0.988)	(0.352)
Post-reform indicator	-0.620***	-0.546***	-0.232**	-0.313**	-0.352*	-0.176
$\delta_{c,t}^{XPBL}$	(0.000)	(0.001)	(0.017)	(0.030)	(0.079)	(0.204)
Trans-reform indicator	-0.084	-0.096	0.038	0.054	0.026	0.069
$\delta_{c,t}^{TPBL}$	(0.204)	(0.531)	(0.689)	(0.552)	(0.868)	(0.560)
Industry innovation potential	0.212	0.342	0.173	-2.104**	-0.482	-0.648
$pot_{i,t}$	(0.303)	(0.380)	(0.349)	(0.022)	(0.420)	(0.418)
Ind. export intensity	-1.826	-1.547	-1.632**	1.047	-1.389	-1.297
$exports_{i,c,t}$	(0.200)	(0.332)	(0.044)	(0.663)	(0.459)	(0.630)
Ind. import intensity	3.630*	3.630	-0.992	-4.175	-4.695	-1.736
$imports_{i,c,t}$	(0.072)	(0.125)	(0.160)	(0.118)	(0.397)	(0.414)
Ind. value-added	-0.161	-0.475	-0.821*	0.452	3.444*	-0.002
$value\text{-}added_{i,c,t}$	(0.788)	(0.555)	(0.077)	(0.730)	(0.051)	(0.998)
Country prosperity	1.717	2.624**	-0.664	-2.248***	-0.514	-1.508
$\ln(pcGDP_{c,t})$	(0.145)	(0.024)	(0.505)	(0.009)	(0.612)	(0.173)
Country size	2.670**	2.490***	4.415***	3.103***	2.820***	4.620***
$\ln(pop_{c,t})$	(0.032)	(0.003)	(0.000)	(0.005)	(0.010)	(0.000)
$exports_{i,c,t} \times pot_{i,t}$				-1.952	-0.070	-0.271
				(0.175)	(0.953)	(0.892)
$imports_{i,c,t} \times pot_{i,t}$				4.692**	5.007	0.413
				(0.010)	(0.184)	(0.793)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-1.226	-6.001**	-1.268
				(0.610)	(0.035)	(0.397)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				3.091***	2.041***	0.868
				(0.000)	(0.000)	(0.177)
$\ln(pop_{c,t}) \times pot_{i,t}$				-0.375***	-0.480***	-0.045
				(0.001)	(0.000)	(0.822)
Observations	2747	2732	2533	2747	2732	2533
Pseudo R^2	0.944	0.961	0.809	0.945	0.963	0.809
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. Event study, t-4 to t+2, including *CRI*

Regression	OA11B.1	OA11B.2	OA11B.3	OA11B.4	OA11B.5	OA11B.6
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$débuts_{i,c,t}$
Post-reform alignment to potential	0.451***	0.368***	0.242***	0.195***	0.177**	0.176
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.000)	(0.000)	(0.003)	(0.000)	(0.031)	(0.185)
Trans-reform alignment to potential	0.104	0.102	0.072	-0.025	-0.022	0.025
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.159)	(0.485)	(0.265)	(0.815)	(0.881)	(0.788)
Post-reform indicator	-0.544***	-0.539**	-0.300**	-0.264**	-0.296*	-0.232
$\delta_{c,t}^{XPBL}$	(0.000)	(0.015)	(0.036)	(0.038)	(0.074)	(0.272)
Trans-reform indicator	-0.071	-0.105	0.021	0.057	0.030	0.066
$\delta_{c,t}^{TPBL}$	(0.155)	(0.466)	(0.820)	(0.541)	(0.859)	(0.588)
Industry innovation potential	0.302	0.455	0.183	-1.888**	-0.645	-0.944
$pot_{i,t}$	(0.159)	(0.181)	(0.362)	(0.032)	(0.274)	(0.324)
Creditor rights index change	-0.132*	-0.161*	-0.123*	0.147*	0.143	-0.011
$CRI_{c,t}$	(0.074)	(0.061)	(0.086)	(0.065)	(0.177)	(0.929)
Ind. export intensity	-1.831*	-2.219*	-0.794	-0.792	-2.835	-3.060
$exports_{i,c,t}$	(0.094)	(0.067)	(0.570)	(0.746)	(0.262)	(0.169)
Ind. import intensity	2.382	3.858*	-1.185	-3.122	-5.530	-0.418
$imports_{i,c,t}$	(0.152)	(0.083)	(0.474)	(0.318)	(0.477)	(0.940)
Ind. value-added	-0.538	-1.087	-0.351	-0.575	1.024	1.521
$value\text{-}added_{i,c,t}$	(0.409)	(0.229)	(0.457)	(0.722)	(0.427)	(0.363)
Country prosperity	1.236	2.688**	-0.429	-2.146***	-0.220	-1.886
$\ln(pcGDP_{c,t})$	(0.292)	(0.013)	(0.691)	(0.004)	(0.850)	(0.324)
Country size	3.158**	2.944***	5.325***	3.267***	2.879***	5.523***
$\ln(pop_{c,t})$	(0.023)	(0.001)	(0.000)	(0.005)	(0.007)	(0.000)
$CRI_{c,t} \times pot_{i,t}$				-0.277***	-0.279***	-0.121
				(0.002)	(0.000)	(0.129)
$exports_{i,c,t} \times pot_{i,t}$				-0.722	0.436	1.672
				(0.570)	(0.703)	(0.415)
$imports_{i,c,t} \times pot_{i,t}$				3.453*	5.862	-1.023
				(0.082)	(0.273)	(0.749)
$value\text{-}added_{i,c,t} \times pot_{i,t}$				-0.271	-3.737	-2.876
				(0.923)	(0.120)	(0.205)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$				2.759***	1.975**	1.498
				(0.000)	(0.011)	(0.194)
$\ln(pop_{c,t}) \times pot_{i,t}$				-0.325***	-0.416***	-0.169
				(0.000)	(0.000)	(0.551)
Observations	2164	2152	1992	2164	2152	1992
Pseudo R^2	0.944	0.966	0.809	0.945	0.967	0.809
Country-industry & year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA12. PBL reform & innovation by firm type, alternate thresholds, main effects

This table estimates the average effect of PBL reform on innovation by legacy (L) firms and non-legacy (NL) firms. The thresholds to differentiate these two groups of firms are 100, 50, and 150 patents in total for 1990-2002, respectively. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively. All regressions also contain the usual controls as well as country-industry and year fixed-effects.

Regression	OA12.1	OA12.2	OA12.3	OA12.4	OA12.5	OA12.6	OA12.7	OA12.8
Firm type	NL firms (non-largescale legacy patenters)				L firms (large-scale legacy patenters)			
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$
Panel A. Established firm defined as having > 100 patents and adding one patent per year								
Post-reform dummy	0.257***	0.314***	0.244***	0.289***	0.062	0.058*	0.046	0.018
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.126)	(0.098)	(0.386)	(0.761)
Trans.-reform dummy	0.059	0.053	0.075	0.070	-0.015	-0.031	0.006	0.011
$\delta^{TPBL}_{c,t}$	(0.237)	(0.296)	(0.125)	(0.124)	(0.581)	(0.346)	(0.885)	(0.844)
Innovation potential	0.858***	1.073***	0.857***	1.067***	0.778***	0.871***	0.766***	0.845***
$pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRI change			-0.148***	-0.189***			-0.469***	-0.587***
$CRI_{c,t}$			(0.000)	(0.001)			(0.000)	(0.000)
Observations	14680	14553	14680	14553	7046	6981	7046	6981
Pseudo R^2	0.940	0.959	0.940	0.959	0.983	0.990	0.984	0.990
Panel B. Established firm defined as having > 50 patents and adding one patent per year								
Post-reform dummy	0.263***	0.322***	0.250***	0.298***	0.067**	0.048*	0.052	0.006
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.040)	(0.095)	(0.284)	(0.919)
Trans.-reform dummy	0.054	0.055	0.072	0.073*	-0.005	-0.048	0.015	-0.005
$\delta^{TPBL}_{c,t}$	(0.336)	(0.281)	(0.195)	(0.092)	(0.872)	(0.174)	(0.637)	(0.920)
Innovation potential	0.855***	1.081***	0.853***	1.075***	0.782***	0.869***	0.772***	0.845***
$pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRI change			-0.154***	-0.186***			-0.441***	-0.595***
$CRI_{c,t}$			(0.000)	(0.000)			(0.001)	(0.000)
Observations	14693	14566	14693	14566	7579	7527	7579	7527
Pseudo R^2	0.938	0.958	0.939	0.958	0.983	0.990	0.983	0.990
Panel C. Established firm defined as having > 150 patents and adding one patent per year								
Post-reform dummy	0.267***	0.321***	0.254***	0.297***	0.067	0.062	0.050	0.019
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.113)	(0.136)	(0.325)	(0.773)
Trans.-reform dummy	0.058	0.046	0.074	0.063	-0.008	-0.046	0.015	0.002
$\delta^{TPBL}_{c,t}$	(0.320)	(0.433)	(0.198)	(0.251)	(0.784)	(0.198)	(0.695)	(0.970)
Innovation potential	0.827***	1.046***	0.825***	1.041***	0.809***	0.889***	0.797***	0.861***
$pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CRI change			-0.143***	-0.181***			-0.544***	-0.650***
$CRI_{c,t}$			(0.000)	(0.000)			(0.000)	(0.000)
Observations	14706	14605	14706	14605	6292	6227	6292	6227
Pseudo R^2	0.942	0.960	0.942	0.960	0.983	0.990	0.983	0.990

Table OA13. PBL reform & innovation by firm type, alternate thresholds, interactions

This table estimates the average effect of PBL reform on innovation by legacy (L) firms and non-legacy (NL) firms. The thresholds to differentiate these two groups of firms are 100, 50, and 150 patents in total for 1990-2002, respectively. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively. All regressions also contain the usual controls as well as country-industry and year fixed-effects. Regressions OA13.3, OA13.4, OA13.7 and OA13.8 also include interactions of controls with innovative potential.

Regression	OA13.1	OA13.2	OA13.3	OA13.4	OA13.5	OA13.6	OA13.7	OA13.8
Firm type	NL firms (non-largescale legacy patenters)				L firms (large-scale legacy patenters)			
Explained variable	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents_{i,c,t}$	$cites_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$	$patents^L_{i,c,t}$	$cites^L_{i,c,t}$
Panel A. Established firm defined as having > 100 patents and adding one patent per year								
Post-reform alignment	0.697***	0.665***	0.509***	0.491***	0.016	-0.113**	0.085	0.004
$\delta^{XPBL}_{c,t} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.584)	(0.028)	(0.249)	(0.965)
Trans-reform alignment	0.107	0.145*	0.048	0.081	0.131**	0.100	0.153*	0.146
$\delta^{TPBL}_{c,t} \times pot_{i,t}$	(0.187)	(0.097)	(0.670)	(0.502)	(0.043)	(0.318)	(0.057)	(0.182)
Post-reform indicator	-0.509***	-0.477***	-0.303***	-0.277***	0.028	0.153	-0.042	0.035
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.002)	(0.699)	(0.139)	(0.669)	(0.751)
Trans-reform indicator	-0.019	-0.064	0.039	-0.002	-0.142	-0.106	-0.169*	-0.160
$\delta^{TPBL}_{c,t}$	(0.765)	(0.418)	(0.670)	(0.986)	(0.107)	(0.433)	(0.089)	(0.265)
Observations	14680	14553	14680	14553	7046	6981	7046	6981
Pseudo R^2	0.942	0.961	0.943	0.961	0.984	0.990	0.984	0.990
Panel B. Established firm defined as having > 50 patents and adding one patent per year								
Post-reform alignment	0.702***	0.689***	0.514***	0.512***	0.032	-0.092	0.096	0.022
$\delta^{XPBL}_{c,t} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.468)	(0.388)	(0.138)	(0.809)
Trans-reform alignment	0.062	0.118	0.001	0.051	0.123**	0.064	0.149**	0.127
$\delta^{TPBL}_{c,t} \times pot_{i,t}$	(0.549)	(0.233)	(0.994)	(0.726)	(0.023)	(0.434)	(0.047)	(0.234)
Post-reform indicator	-0.513***	-0.497***	-0.305***	-0.293***	0.016	0.114	-0.047	0.003
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.846)	(0.498)	(0.596)	(0.978)
Trans-reform indicator	0.022	-0.031	0.081	0.033	-0.122	-0.078	-0.154	-0.150
$\delta^{TPBL}_{c,t}$	(0.765)	(0.715)	(0.412)	(0.814)	(0.181)	(0.502)	(0.130)	(0.278)
Observations	14693	14566	14693	14566	7579	7527	7579	7527
Pseudo R^2	0.940	0.959	0.941	0.960	0.983	0.990	0.984	0.991
Panel C. Established firm defined as having > 150 patents and adding one patent per year								
Post-reform alignment	0.694***	0.674***	0.513***	0.505***	0.000	-0.107	0.082	0.030
$\delta^{XPBL}_{c,t} \times pot_{i,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.996)	(0.230)	(0.299)	(0.737)
Trans-reform alignment	0.070	0.111	0.012	0.048	0.123**	0.095	0.145*	0.149
$\delta^{TPBL}_{c,t} \times pot_{i,t}$	(0.480)	(0.259)	(0.927)	(0.737)	(0.039)	(0.413)	(0.095)	(0.293)
Post-reform indicator	-0.495***	-0.480***	-0.298***	-0.284***	0.050	0.147	-0.035	0.003
$\delta^{XPBL}_{c,t}$	(0.000)	(0.000)	(0.000)	(0.000)	(0.579)	(0.326)	(0.733)	(0.982)
Trans-reform indicator	0.016	-0.034	0.072	0.026	-0.126	-0.110	-0.154	-0.172
$\delta^{TPBL}_{c,t}$	(0.817)	(0.660)	(0.488)	(0.836)	(0.202)	(0.503)	(0.203)	(0.348)
Observations	14706	14605	14706	14605	6292	6227	6292	6227
Pseudo R^2	0.944	0.962	0.944	0.962	0.983	0.990	0.983	0.991

Table OA14. Minimum capital requirements, PBL reform, and innovation, robustness

This table estimate the effect of PBL reform on innovation across industries by low and high minimum capital requirement. It repeats regressions in Table 9 by including the interaction terms of other control variables and industry potential. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression Explained variable	OA14.1 $patents_{i,c,t}$	OA14.2 $cites_{i,c,t}$	OA14.3 $d\acute{e}buts_{i,c,t}$	OA14.4 $patents_{i,c,t}$	OA14.5 $cites_{i,c,t}$	OA14.6 $d\acute{e}buts_{i,c,t}$
Post-reform alignment if MCR $\delta_c^{MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$	0.627*** (0.000)	0.507*** (0.000)	0.343*** (0.000)			
Post-reform alignment if no MCR $\delta_c^{NO\ MCR} \times \delta_{c,t}^{XPBL} \times pot_{i,t}$	0.371** (0.022)	0.404** (0.047)	0.414*** (0.000)	-0.219 (0.203)	-0.083 (0.686)	0.096* (0.100)
Post-reform alignment $\delta_{c,t}^{XPBL} \times pot_{i,t}$				0.537*** (0.000)	0.484*** (0.000)	0.273*** (0.000)
Post-reform if MCR $\delta_c^{MCR} \times \delta_{c,t}^{XPBL}$	-0.371*** (0.000)	-0.237** (0.010)	-0.076 (0.322)			
Post-reform if no MCR $\delta_c^{NO\ MCR} \times \delta_{c,t}^{XPBL}$	-0.271** (0.031)	-0.347** (0.039)	-0.138 (0.184)	0.072 (0.676)	-0.117 (0.599)	-0.084 (0.255)
Post-reform $\delta_{c,t}^{XPBL}$				-0.318*** (0.000)	-0.237** (0.022)	-0.038 (0.565)
Alignment to potential if MCR $\delta_c^{MCR} \times pot_{i,t}$	-0.581** (0.023)	-0.283 (0.457)	-0.403*** (0.005)			
Alignment to potential if no MCR $\delta_c^{NO\ MCR} \times pot_{i,t}$	-0.070 (0.695)	0.344 (0.253)	-1.114*** (0.000)	0.208 (0.414)	0.367 (0.140)	-0.863*** (0.001)
Alignment to potential $pot_{i,t}$				-0.838*** (0.000)	0.448 (0.160)	-0.972*** (0.008)
Trans-reform align. to potential $\delta_{c,t}^{TPBL} \times pot_{i,t}$	0.096 (0.494)	0.081 (0.564)	0.154** (0.048)	0.027 (0.832)	0.052 (0.727)	0.109* (0.082)
Trans-reform indicator $\delta_{c,t}^{TPBL}$	-0.004 (0.967)	-0.014 (0.908)	0.097 (0.279)	0.044 (0.649)	0.004 (0.978)	0.124 (0.105)
Creditor rights index change $CRI_{c,t}$	0.183* (0.056)	0.245 (0.175)	0.041 (0.461)	0.137 (0.166)	0.244 (0.215)	0.017 (0.726)
Ind. export intensity $exports_{i,c,t}$	1.105 (0.186)	0.268 (0.775)	-0.539 (0.385)	1.224 (0.148)	0.361 (0.694)	-0.572 (0.378)
Ind. import intensity $imports_{i,c,t}$	-1.275 (0.407)	-4.688** (0.044)	-1.239 (0.294)	-1.489 (0.361)	-4.659** (0.049)	-1.373 (0.252)
Ind. value-added $value\text{-}added_{i,c,t}$	1.314*** (0.000)	1.292 (0.106)	1.765*** (0.000)	0.962*** (0.004)	1.424* (0.069)	1.425*** (0.002)
Country prosperity $\ln(pcGDP_{c,t})$	0.533 (0.514)	0.623 (0.470)	1.463** (0.043)	0.345 (0.677)	0.797 (0.340)	1.245* (0.085)
Country size $\ln(pop_{c,t})$	2.629*** (0.005)	2.602*** (0.007)	2.098*** (0.001)	2.674*** (0.004)	2.640*** (0.006)	2.121*** (0.001)
$CRI_{c,t} \times pot_{i,t}$	-0.406*** (0.000)	-0.461*** (0.001)	-0.186** (0.014)	-0.365*** (0.000)	-0.451*** (0.007)	-0.173** (0.018)
$exports_{i,c,t} \times pot_{i,t}$	-1.397*** (0.003)	-0.473 (0.471)	0.487 (0.195)	-1.510** (0.020)	-0.521 (0.445)	0.496 (0.320)

$imports_{i,c,t} \times pot_{i,t}$	1.973**	4.088***	1.393**	2.107**	4.126***	1.437**
	(0.025)	(0.002)	(0.038)	(0.044)	(0.005)	(0.042)
$value\text{-}added_{i,c,t} \times pot_{i,t}$	-0.983	-1.973	-2.426***	-0.683	-2.147	-2.075***
	(0.317)	(0.245)	(0.001)	(0.409)	(0.176)	(0.004)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$	0.950***	0.776***	0.607***	1.151***	0.574***	0.871***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)
$\ln(pop_{c,t}) \times pot_{i,t}$	-0.046	-0.047	-0.056	0.063	-0.109	0.083
	(0.526)	(0.585)	(0.186)	(0.490)	(0.349)	(0.328)
Observations	14680	14553	13941	14680	14553	13941
Pseudo R^2	0.943	0.962	0.794	0.943	0.961	0.794
Country-industry and year FEs	Yes	Yes	Yes	Yes	Yes	Yes

Table OA15. PBL reform and growth, interaction effects

This table estimates effects of PBL reforms on value-added growth in industries with different innovation potential. Growth rates are standardized as z-values (value minus mean across countries over standard deviation across countries, all by industry-year). The explained variable is a growth spurt indicator, denoted $\delta_{i,c,t}^{z>0.50}$ or $\delta_{i,c,t}^{z>0.45}$, and set to one if standardized growth > 0.50 or 0.45, respectively and to zero otherwise. Regressions are linear probability models. Numbers in parentheses are t-test p-levels, two-way clustering by country and industry, with one, two, or three asterisks indicating significance at 10%, 5%, or 1%, respectively.

Regression	OA15.1	OA 15.2	OA15.3	OA15.4
Growth spurt indicator variable	$\delta_{i,c,t}^{z>0.50}$	$\delta_{i,c,t}^{z>0.50}$	$\delta_{i,c,t}^{z>0.45}$	$\delta_{i,c,t}^{z>0.45}$
Post-reform alignment to potential	0.044	0.060	0.073**	0.096**
$\delta_{c,t}^{XPBL} \times pot_{i,t}$	(0.244)	(0.135)	(0.038)	(0.017)
Trans-reform alignment to potential	0.081**	0.117***	0.123***	0.151***
$\delta_{c,t}^{TPBL} \times pot_{i,t}$	(0.024)	(0.002)	(0.000)	(0.000)
Post-reform indicator	0.295**	0.283**	0.321**	0.304**
$\delta_{c,t}^{XPBL}$	(0.015)	(0.019)	(0.011)	(0.016)
Trans-reform indicator	-0.076	-0.104	-0.123*	-0.144**
$\delta_{c,t}^{TPBL}$	(0.293)	(0.155)	(0.078)	(0.048)
Industry innovation potential	0.018	0.122	-0.008	0.089
$pot_{i,t}$	(0.526)	(0.461)	(0.796)	(0.622)
Lagged LHS variable	-0.068**	-0.089**	-0.064**	-0.072**
$\delta_{c,t}^{z>x}$	(0.038)	(0.022)	(0.043)	(0.040)
Creditor rights index change	-0.041	-0.011	-0.051	-0.041
$CRI_{c,t}$	(0.664)	(0.914)	(0.609)	(0.713)
Ind. export intensity	0.112	0.756*	0.022	0.560
$exports_{i,c,t}$	(0.493)	(0.089)	(0.911)	(0.154)
Ind. import intensity	0.095	-0.545	0.074	-0.866
$imports_{i,c,t}$	(0.521)	(0.249)	(0.610)	(0.133)
Ind. value-added	-1.768**	-1.352	-1.927**	-1.262
$value\text{-}added_{i,c,t}$	(0.029)	(0.227)	(0.022)	(0.196)
Country prosperity	-0.555*	-0.433	-0.544*	-0.419
$\ln(pcGDP_{c,t})$	(0.052)	(0.147)	(0.076)	(0.196)
Country size	-0.876	-0.894	-1.020	-1.037
$\ln(pop_{c,t})$	(0.274)	(0.262)	(0.229)	(0.219)
$\delta_{c,t-1}^{z>x} \times pot_{i,t}$		0.025		0.010
		(0.358)		(0.618)
$CRI_{c,t} \times pot_{i,t}$		-0.038		-0.014
		(0.139)		(0.548)
$exports_{i,c,t} \times pot_{i,t}$		-0.513*		-0.428*
		(0.082)		(0.085)
$imports_{i,c,t} \times pot_{i,t}$		0.565**		0.825**
		(0.041)		(0.018)
$value\text{-}added_{i,c,t} \times pot_{i,t}$		-0.513		-0.790
		(0.401)		(0.171)
$\ln(pcGDP_{c,t}) \times pot_{i,t}$		-0.143*		-0.149*
		(0.099)		(0.093)
$\ln(pop_{c,t}) \times pot_{i,t}$		0.003		0.006
		(0.932)		(0.882)
Observations	12,617	12,617	12,617	12,617
Adjusted R^2	0.146	0.147	0.140	0.141
Country and year FEs	Yes	Yes	Yes	Yes

Table OA16. PBL reform and growth, probit specification

This table estimates the average effect of PBL reform on value added growth rates across industries. We standardize growth rates as z-scores by subtracting country means and dividing this difference by the country standard deviation, all by industry-year. Our explained variables are growth spurt indicators $\delta_{i,c,t}^{z>0.50}$ or $\delta_{i,c,t}^{z>0.50}$, set to one if value-added growth z-score exceeds 0.50 or 0.45, respectively. Regressions are probits. Numbers in parentheses are t-test p-levels, clustering by country, with one, two and three asterisks indicating significance at 10%, 5%, and 1%, respectively.

Regression	OA16.1	OA16.2
Growth spurt indicator variable	$\delta_{i,c,t}^{z>0.50}$	$\delta_{i,c,t}^{z>0.45}$
Post-reform indicator	1.536***	1.589***
$\delta_{c,t}^{XPBL}$	(0.009)	(0.003)
Trans-reform indicator	-0.660**	-0.611**
$\delta_{c,t}^{TPBL}$	(0.038)	(0.024)
Industry innovation potential	0.095	0.010
$pot_{i,t}$	(0.567)	(0.952)
Lagged LHS variable	-0.279**	-0.248**
$\delta_{i,c,t-1}^{SGS}$	(0.013)	(0.015)
CRI change	-0.443	-0.433
	(0.203)	(0.228)
Ind. export intensity	0.452	0.147
$exports_{i,c,t}$	(0.430)	(0.800)
Ind. import intensity	0.422	0.151
$imports_{i,c,t}$	(0.566)	(0.834)
Ind. value-added	-7.980**	-8.349**
$value\text{-}added_{i,c,t}$	(0.020)	(0.014)
Country prosperity	-1.456	-1.450
$\ln(pcGDP_{c,t})$	(0.125)	(0.134)
Country size	-4.868*	-4.970*
$\ln(pop_{c,t})$	(0.082)	(0.074)
Observations	10,842	11,370
Pseudo R^2	0.184	0.181
Country-industry & year FEs	Yes	Yes

Table OA17. Construction of Figure 1

Google n-grams beginning, midpoint (reform), and end years, search term, search language, November 20th 2022 retrieved n-grams data, n-grams data normalized by dividing by country means, and time means of the normalized data used in Figure 1. Search terms are terms in local business languages for "[country] personal bankruptcy law." Local business languages in Belgium and the Netherlands are presumed to be English. Searches in French for Belgium and Canada and in English for Finland yield insufficient results to for Google g-rams to provide raw data. Finnish and Dutch n-grams data are unavailable, so Finland is dropped.

Economy language	**Search term**		**Google n-grams from year t-5 to t+5 x 10^{-9} (top) and as % of mean (bottom)**										
	Mean n-grams	*t*	***t* - 5**	***t* - 4**	***t* - 3**	***t* - 2**	***t* - 1**	***t***	***t* + 1**	***t* + 2**	***t* + 3**	***t* + 4**	***t* + 5**
Austria	*Österreichisches Insolvenzrecht*		0	0	0.183	0.283	1.09	0.987	1.70	0.336	0.271	0.102	0.893
German	0.531 x 10^{-9}	1995	0	0	34.4	53.2	205	186	320	63.2	51.0	19.2	168
Belgium	*Belgian bankruptcy*		0.058	0.026	0.021	0.022	0.195	0.175	0.034	0.069	0.216	0.224	0.135
English	0.107 x 10^{-9}	1998	54.0	24.6	19.9	20.1	183	164	31.5	64.7	202	210.0	127
Canada	*Canadian bankruptcy law*		0.046	0.048	0.037	0.053	0.033	0.079	0.175	0.147	0.162	0.041	0.098
English	0.0836 x 10^{-9}	1993	54.5	57.8	44.8	63.8	39.0	94.7	209	176	194	49.0	118
Germany	*Deutsches Insolvenzrecht*		0	0	0.057	0.168	0.325	0.000	0.094	0.183	0.129	0.079	0.074
German	0.101 x 10^{-9}	1999	0	0	56.2	167	323	0	93.3	181	128	78.4	72.9
Hong Kong	*个人破产法*		0.909	0	0.447	0	0.096	0.271	1.38	2.56	2.39	1.20	1.66
Chinese	0.992 x 10^{-9}	2000	91.6	0	45.1	0	9.6	27.4	139	258	241	121	167
Israel	פְּשִׁיטַת רֶגֶל		83.4	107	97.9	89.9	110	113	73.3	119.0	142.0	172.0	160.0
Hebrew	115 x 10^{-9}	1995	72.4	93.1	85.0	78.1	95.5	97.7	63.7	103	123	149	139
Netherlands	*Netherlands bankruptcy*		0.004	0.017	0.022	0.013	0.026	0.008	0.019	0.012	0.025	0.014	0.037
English	0.0179 x 10^{-9}	1999	24.5	94.8	120	72.7	143	47.0	107	64.6	141	77.4	208
% of mean			42.4	38.6	57.9	64.9	142.6	88.0	138	130	154	101	143

Table OA18. SIC-Sequence-Number to SIC-Code Concordance Table

We carefully match the SIC sequence numbers with the SIC codes. First, for seven SIC codes that cannot be matched to any SIC sequence number, we put a * in the column "SIC Sequence Number" in the Internet Appendix. These SIC codes are 21, 23-27 and 31. We record these seven industries in the format of 1*, 2*…7* in a separate column "Industrial Classification." These industries do not have patents recorded with the USPTO. However, we still need to keep these industries for our analysis because firms may enter or exit these industries. Second, when we count the number of unique industries, to avoid double counting, we skip redundant SIC sequence numbers, i.e., those matched with the same SIC codes as other SIC sequence numbers. For example, we skip SIC sequence numbers 3, 4, 5 and 10 because SIC sequence numbers 6, 7, 8, 9, 11, 12 and 13 are matched with the same SIC codes as theirs. After skipping redundant SIC sequence numbers, we renumber the SIC sequence numbers in the column "Industrial Classification." We also skip SIC sequence number 56 and SIC code 39 because they do not refer to any specific industries. This matching process results in 48 unique industries, including 42 industries with patents and 7 industries without patents. The original data source is the 2008 OTAF Concordance Table available at:
http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/sic_conc/2008_diskette/.

SSN	Industrial Classification	Product Field Title	SIC Code
1	1	FOOD AND KINDRED PRODUCTS	20
*	1*	TOBACCO MANUFACTURES	21
2	2	TEXTILE MILL PRODUCTS	22
*	2*	APPAREL AND OTHER TEXTILE PRODUCTS	23
*	3*	LUMBER AND WOOD PRODUCTS	24
*	4*	FURNITURE AND FIXTURES	25
*	5*	PAPER AND ALLIED PRODUCTS	26
*	6*	PRINTING AND PUBLISHING	27
3		CHEMICALS AND ALLIED PRODUCTS	28
4		Chemicals, except drugs and medicines	281,282,284-289
5		Basic industrial inorganic and organic chemistry	281,286
6	3	Industrial inorganic chemistry	281
7	4	Industrial organic chemistry	286
8	5	Plastics materials and synthetic resins	282
9	6	Agricultural chemicals	287
10		All other chemicals	284,285,289
11	7	Soaps, detergents, cleaners, perfumes, cosmetics and toiletries	284
12	8	Paints, varnishes, lacquers, enamels, and allied products	285
13	9	Miscellaneous chemical products	289
14	10	Drugs and medicines	283
15	11	PETROLEUM AND NATURAL GAS EXTRACTION AND REFINING	13,29
16	12	RUBBER AND MISCELLANEOUS PLASTICS PRODUCTS	30
*	7*	LEATHER AND LEATHER PRODUCTS	31
17	13	STONE, CLAY, GLASS AND CONCRETE PRODUCTS	32
18		PRIMARY METALS	33,3462,3463
19	14	Primary ferrous products	331,332,3399,3462
20	15	Primary and secondary non-ferrous metals	333-
21	16	FABRICATED METAL PRODUCTS	34(except 3462,3463,348)
22		MACHINERY, EXCEPT ELECTRICAL	35
23	17	Engines and turbines	351
24	18	Farm and garden machinery and equipment	352

25	19	Construction, mining and material handling machinery and equipment	353
26	20	Metal working machinery and equipment	354
27	21	Office computing and accounting machines	357
28		Other machinery, except electrical	355,356,358,359
29	22	Special industry machinery, except metal working	355
30	23	General industrial machinery and equipment	356
31	24	Refrigeration and service industry machinery	358
32	25	Miscellaneous machinery, except electrical	359
33		ELECTRICAL AND ELECTRONIC MACHINERY, EQUIPMENT AND SUPPLIES	36,3825
34		Electrical equipment, except communications equipment	361-364,369,3825
35	26	Electrical transmission and distribution equipment	361,3825
36	27	Electrical industrial apparatus	362
37		Other electrical machinery, equipment and supplies	363,364,369
38	28	Household appliances	363
39	29	Electrical lighting and wiring equipment	364
40	30	Miscellaneous electrical machinery, equipment and supplies	369
41		Communications equipment and electronic components	365-367
42	31	Radio and television receiving equipment except communication types	365
43	32	Electronic components and accessories and communications equipment	366-367
44		TRANSPORTATION EQUIPMENT	37,348
45		Motor vehicles and other transportation equipment, except aircraft	348,371,373-376,379
46	33	Motor vehicles and other motor vehicle equipment	371
47	34	Guided missiles and space vehicles and parts	376
48		Other transportation equipment	373-375,379(except 3795)
49	35	Ship and boat building and repairing	373
50	36	Railroad equipment	374
51	37	Motorcycles, bicycles, and parts	375
52	38	Miscellaneous transportation equipment	379(except 3795)
53	39	Ordinance except missiles	348,3795
54	40	Aircraft and parts	372
55	41	PROFESSIONAL AND SCIENTIFIC INSTRUMENTS	38(except 3825)
*		MISCELLANEOUS MANUFACTURING INDUSTRIES	39
56	42	ALL OTHER SICs	99