

# Are Chinese Patent Applications Politically Driven?

## Evidence from China's Domestic Patent Applications

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Quantity and Quality of the End-of-year Applications

Quantity surge confirmed by regression

Where do they come from?

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# Summary

- ▶ We study the seasonality of monthly patent filings in China from 1986 to 2007.
- ▶ We compare domestic filings with foreign filings at China's State Intellectual Property Office, and find a much stronger peak in December for domestic filings after 2001.
- ▶ The surge in December filings seems to begin after 2001, when China started to encourage innovation and patenting.
- ▶ Based on the grant rate and the number of forward citations, domestic firm filings made in December after 2001 seem to be of lower validity and lower value.

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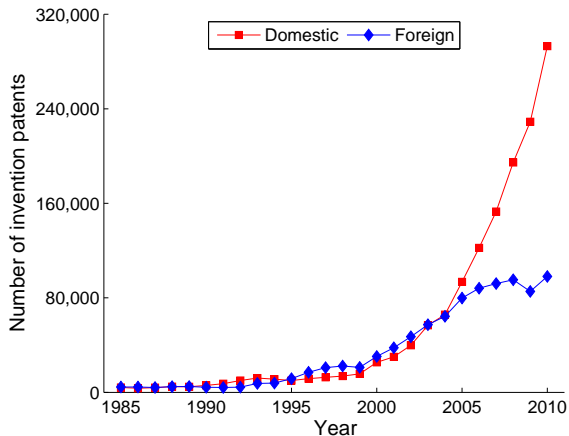
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# Patent application growth at SIPO

Applications for invention patents: 1985-2010



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## Increased focus on patenting since 1999-2000 by both central and local governments

- ▶ In 1999, the “Decision of the CPC Central Committee and State Council on strengthening technological innovation, developing high-tech and achieving industrialization” was issued.
- ▶ In 2000, the “10th five-year plan (2001-2005) on patenting” started at provincial level.
- ▶ Many parts of the plan were announced by the end of the previous “five-year plan”.
- ▶ Shanghai implemented China’s first patent subsidy policy in 1999. Almost all provinces have had some subsidy policies in place since around 2003.

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## Some policies of the local governments

Most local governments do not have an online archive of their past policies so we cannot get many examples from the early years after 2001. But there is a lot of anecdotal evidence of local government pressure on patent filings in recent years.

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## Some policy examples of the local governments

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- ▶ Beijing included “the number of patent applications” as an assessment criterion for leaders of enterprises since at least 2003.
- ▶ Anhui province’s patent application requirement for its cities in 2012 asked for an yearly increase between 20% and 40% for different cities.

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## With-in year policy responses to applications

- ▶ Shanxi province issued its “Assessment of patent applications 2011” to the local city governments in April 2011.
- ▶ In September 2009, Dali city of Yunnan province reported that it had accomplished the 2010 quota for patent applications during the first half of the year, ahead of time. The quota were set by the province government and consisted of total patent application and invention patent application.
- ▶ On November 25th 2011, Guangxi Province issued its “Assessment scheme of patent application growth 2011” to all cities in the province. It says an assessment will be conducted in Jan 2012 to evaluate the patent application performance of all cities during 2011. The announcement was intended to encourage cities in Guangxi to come up with more applications before the year ended.

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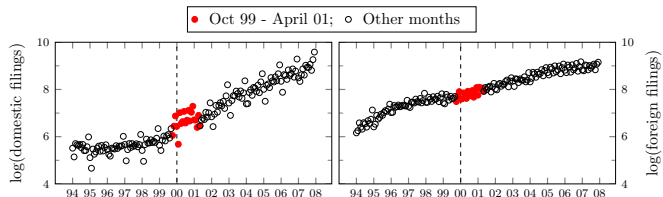
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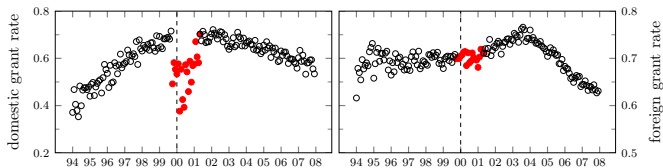


# Turbulent patent filings by Chinese firms around 2000

Oct 1998 - April 2001 stand out as anomalies for domestic firms



(a) monthly number of patent filings



(b) monthly average grant rate

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# Early response of domestic firms to the planning and policy announcement

- ▶ Roughly from the end of 1998 until early 2001 (the early period when the policy change was expected or announced), domestic firms made more filings and had more of them rejected.
- ▶ During this time interval, there was considerable uncertainty or confusion over how to respond to the new policies.

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# A seasonal-trend decomposition of log monthly domestic application

- ▶ We illustrate the seasonal characteristics of log monthly application data using a seasonal-trend decomposition procedure based on loess (STL).
- ▶ STL is a filtering procedure for decomposing a time series into three components: trend, seasonal, and remainder, using the loess smoother (Cleveland et al., 1990).
- ▶ The decomposition suggests that there is a yearly seasonal component for domestic patent applications, with a large peak in December.

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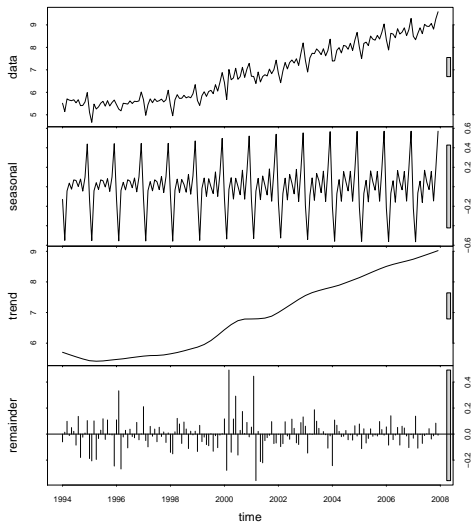
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# An seasonal-trend decomposition of log monthly domestic application by firms



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# Comparison between domestic and foreign firm patent filings (1)

- ▶ Firms may file more of their patent applications during the last month of the year to clear up the stock of innovations before the end of the year and the holidays (for both SIPO and the applicants).
- ▶ Nonetheless, the upward deviation for domestic applications is much larger than that of their foreign counterpart.

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## Comparison between domestic and foreign firm patent filings (2)

- ▶ Domestic patent applications may be politically driven—many local governments set goals for patent applications each year.
- ▶ If as December approaches it appears that the goals will not be met, local governments may use political or financial incentives to motivate firms in their locality to increase their applications.

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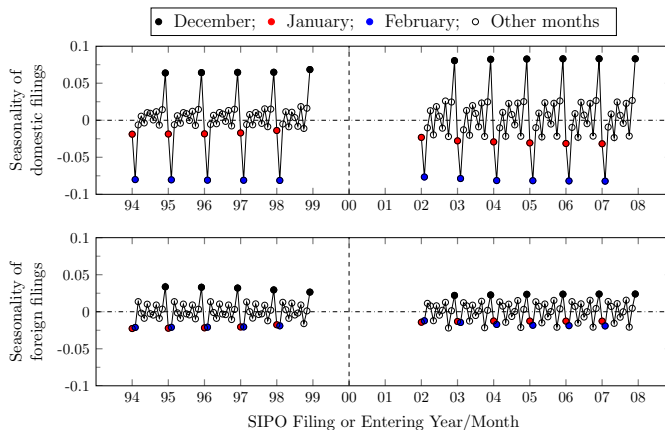
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# Comparison between domestic and foreign firm patent filings (3)

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# Comparison between firms and individuals for domestic patent filings (1)

- ▶ Both should be responsive to financial incentives (mainly patent subsidies and rewards).
- ▶ Individuals should be less likely to respond to political/administrative pressure than firms.
- ▶ Findings: before 2000, the December application peak only exists for firm applicants. After around 2000, both types of applications show strong December peaks.

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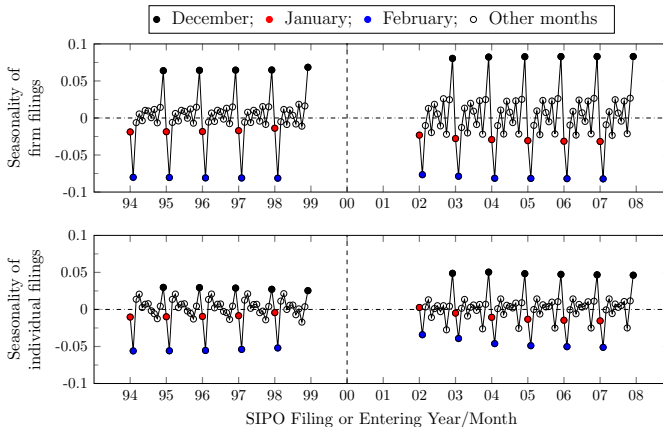
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# Comparison between firms and individuals for domestic patent filings (2)

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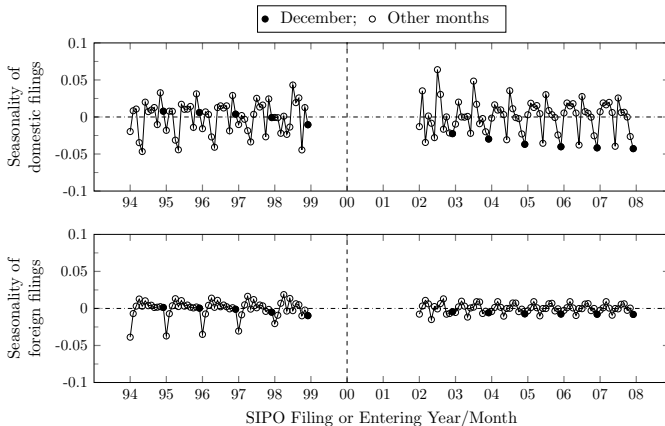
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# Quality comparison between domestic and foreign firm patent filings: the grant rates

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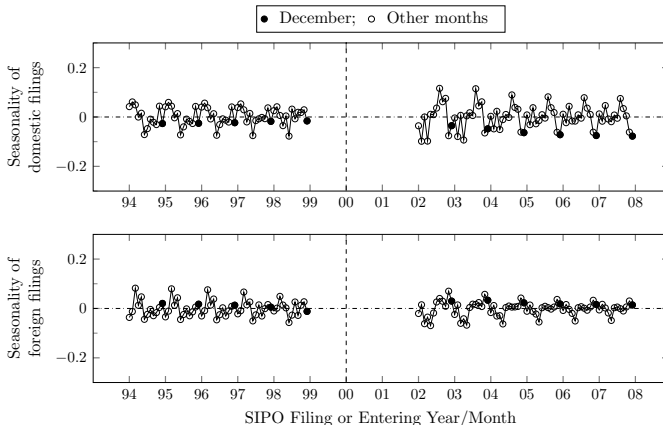
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# Quality comparison between domestic and foreign firm patent filings: the number of forward citations

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# The surge in patenting in December began since around 2000 –when China began to pay attention to its IP strategy

- ▶ We generate a balanced panel of monthly applications (logarithm) by region (provinces in China and foreign countries) and test whether the end-of-year filings becomes more significant after 2000.
- ▶ We use July as the base month for comparison in a DID model. Foreign filings are used as an extra control in a triple-difference model.
- ▶ We control for the 31 technology fields (IPCs) and cluster standard errors by the IPCs.
- ▶ We remove data in the three years (1999, 2000, 2001) as outliers.

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## Estimates of the number of monthly applications (1)

Month	DID	Triple-difference
Jan	-0.276 (0.0652)***	-0.307 (0.0695)***
Feb	-0.228 (0.0648)***	-0.178 (0.0701)**
Mar	0.00208 (0.0516)	0.00499 (0.0557)
Apr	-0.0375 (0.0612)	-0.0939 (0.0658)
May	-0.124 (0.0679)*	-0.121 (0.0706)*
Jun	0.0365 (0.0680)	0.00915 (0.0719)
Aug	-0.0167 (0.0542)	-0.0447 (0.0598)
Sep	0.0816 (0.0671)	0.0595 (0.0712)
Oct	-0.0742 (0.0656)	-0.0270 (0.0692)
Nov	0.138 (0.0627)**	0.115 (0.0686)*
Dec	0.262 (0.0578)***	0.223 (0.0628)***
<i>N</i>	4092	18348

Standard errors clustered at region level are in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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## Estimates of the number of monthly applications (2)

- ▶ Both models confirm that there is a significant increase in the end-of-year (November and December) filings from domestic firms after 2001.
- ▶ Domestic firms also experienced a significant decrease in early next year (January and February) filings.

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# Where do these extra applications in December come from?

## Some conjectures

- ▶ Under financial incentives, firms and individuals file more low quality applications to claim the subsidy and rewards.
- ▶ Political pressure may cause an inter-temporal shift in patent filings from the following year to previous year.
- ▶ Therefore patents filed in the end of year could on average have declined validity and value.
- ▶ Validity and value are measured by grant rate and number of forward citations to the granted patents respectively.

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## Estimates of grant rates and forward citations

month	Grant rate (applications)		Forward citations (granted patents)	
	DID	Triple Difference	DID	Triple Difference
Jan	0.043(0.017)**	0.009(0.023)	-0.003(0.005)	-0.009(0.006)
Feb	0.021(0.022)	0.009(0.024)	-0.007(0.010)	-0.015(0.010)
Mar	0.0095(0.019)	-0.001(0.022)	0.002(0.009)	-0.000(0.010)
Apr	0.041(0.023)*	0.035(0.026)	0.004(0.008)	0.001(0.007)
May	0.036(0.018)*	0.035(0.023)	0.001(0.005)	0.003(0.006)
Jun	-0.028(0.024)	-0.026(0.024)	0.005(0.006)	0.004(0.005)
Aug	-0.016(0.019)	-0.014(0.022)	0.000(0.008)	0.003(0.009)
Sep	-0.014(0.021)	-0.014(0.022)	-0.005(0.006)	-0.000(0.006)
Oct	-0.029(0.019)	-0.030(0.021)	-0.010(0.006)*	-0.006(0.007)
Nov	-0.069(0.022)***	-0.068(0.025)**	-0.022(0.005)***	-0.017(0.005)***
Dec	-0.071(0.023)***	-0.065(0.024)**	-0.020(0.008)**	-0.013(0.006)**
<i>N</i>	313189	835683	191186	553864

Standard errors clustered at IPC level are in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



- ▶ One plausible explanation of the surge in domestic patenting in December is that applications are made under political pressure to meet yearly quotas set by the local governments. These quotas are important assessment criteria for some local officials.
- ▶ Firms under political pressure may file some applications they consider worthless, or shift applications from later months to meet temporary pressure from government.
- ▶ Political pressure may lead to a waste of administrative resource for both the patentees and the SIPO.
- ▶ In China, contracting on the quantity of patents reduces the benefit of decentralization inherent in the patent system.

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