

Are Chinese Patent Applications Politically Driven?

Evidence from China's Domestic Patent Applications

Zhen Lei¹ Zhen Sun² Brian Wright²

¹Department of Energy and Mineral Engineering and the EMS Energy Institute
Penn State University

²Department of Agricultural and Resource Economics
University of California, Berkeley

Patent Statistics for Decision Makers
OECD Paris, Nov 28th-29th, 2012

Outline

- 1 The Central Government Policy Change in 2000
 - The policy and induced local responses
 - Evidence from the data
- 2 An Illustrative Decomposition
 - Seasonal effects on patenting
 - Domestic vs foreign
 - Domestic firms vs domestic individuals
- 3 Where do the Extra Applications Come from?
 - Timing of the patenting surge
 - Where do they come from?
 - Quality and validity effects
- 4 Implications

Outline

- 1 The Central Government Policy Change in 2000
 - The policy and induced local responses
 - Evidence from the data
- 2 An Illustrative Decomposition
 - Seasonal effects on patenting
 - Domestic vs foreign
 - Domestic firms vs domestic individuals
- 3 Where do the Extra Applications Come from?
 - Timing of the patenting surge
 - Where do they come from?
 - Quality and validity effects
- 4 Implications

Outline

- 1 The Central Government Policy Change in 2000
 - The policy and induced local responses
 - Evidence from the data
- 2 An Illustrative Decomposition
 - Seasonal effects on patenting
 - Domestic vs foreign
 - Domestic firms vs domestic individuals
- 3 Where do the Extra Applications Come from?
 - Timing of the patenting surge
 - Where do they come from?
 - Quality and validity effects
- 4 Implications

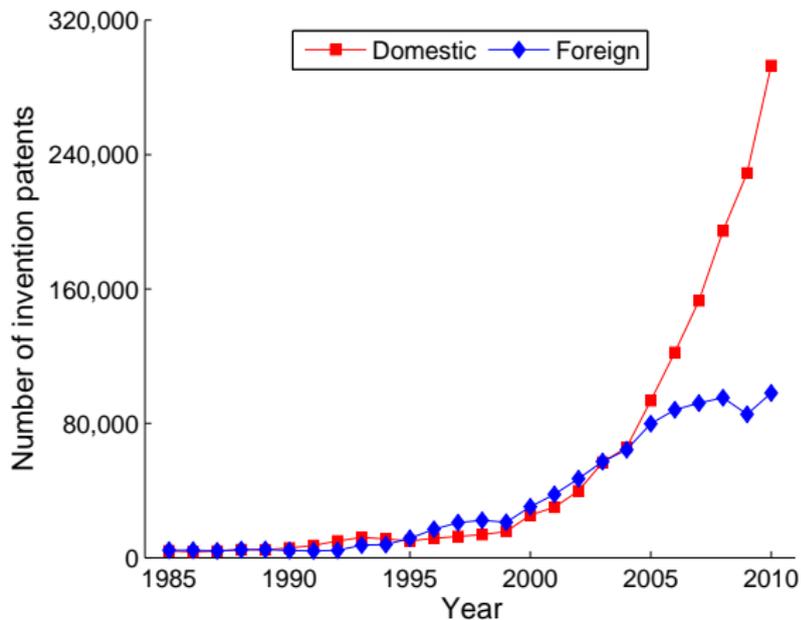
Outline

- 1 The Central Government Policy Change in 2000
 - The policy and induced local responses
 - Evidence from the data
- 2 An Illustrative Decomposition
 - Seasonal effects on patenting
 - Domestic vs foreign
 - Domestic firms vs domestic individuals
- 3 Where do the Extra Applications Come from?
 - Timing of the patenting surge
 - Where do they come from?
 - Quality and validity effects
- 4 Implications

- 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 first year renewal rate, domestic firm filings made in December after 2001 seem to be of lower validity and lower value.

Patent application growth at SIPO

Applications for invention patents: 1985-2010



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.

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.

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.

Some policy examples of the local governments

- Liaoning province included “meeting the patent application quota” as one of the criteria in its yearly “Assessment rules for city governments” since at least 2002.
- 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.

Some policy examples of the local governments

- Liaoning province included “meeting the patent application quota” as one of the criteria in its yearly “Assessment rules for city governments” since at least 2002.
- 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.

Some policy examples of the local governments

- Liaoning province included “meeting the patent application quota” as one of the criteria in its yearly “Assessment rules for city governments” since at least 2002.
- 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.

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.

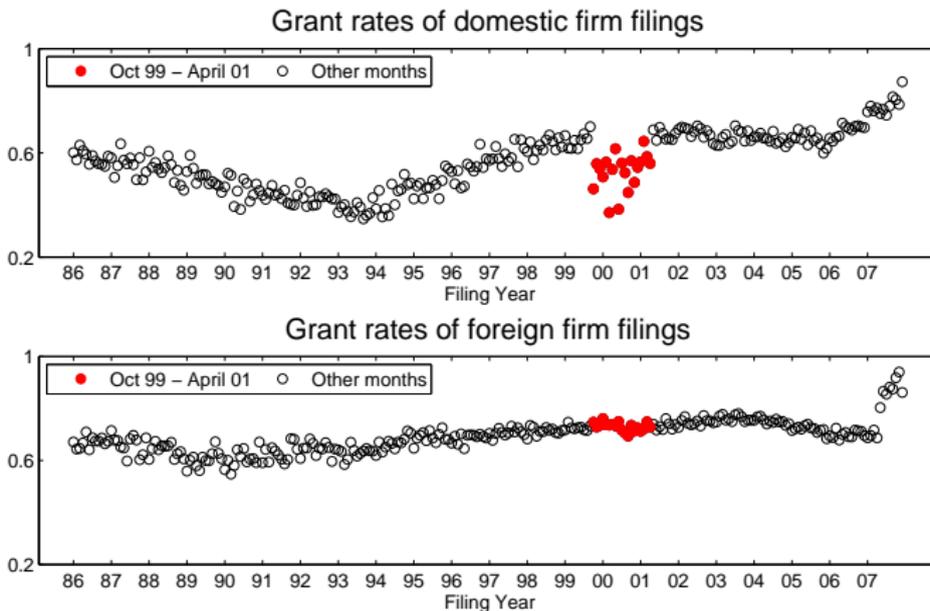
With-in year policy responses to applications

- 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.

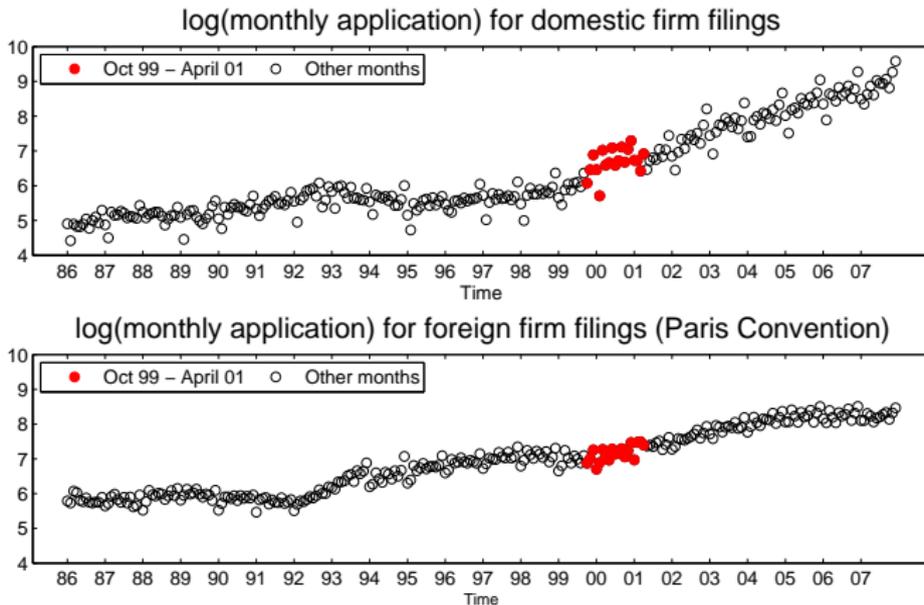
With-in year policy responses to applications

- 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.

Monthly grant rate for domestic firms and foreign firms Oct 1998 - April 2001 stand out as anomalies for domestic firms



log(monthly application) for domestic firms and foreign firms



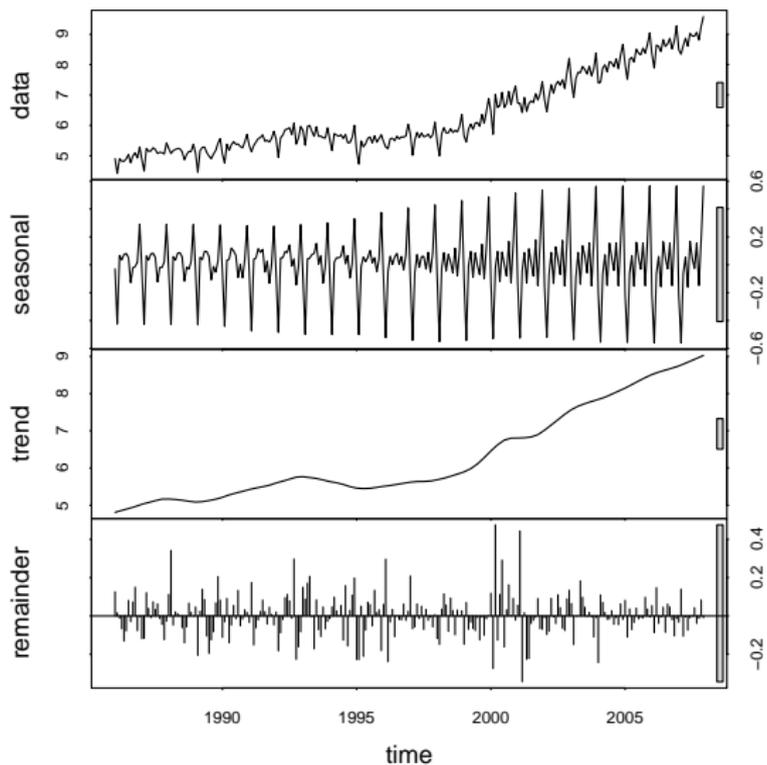
Early response of domestic firms to the planning and policy announcement

- 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.

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.

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



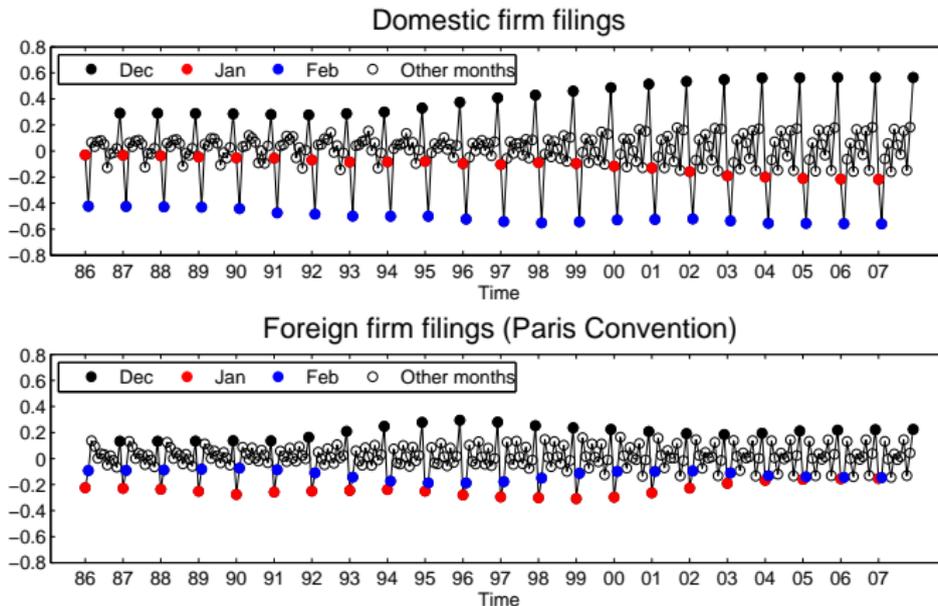
Comparison between domestic and foreign firm patent filings (1)

- 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.

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.

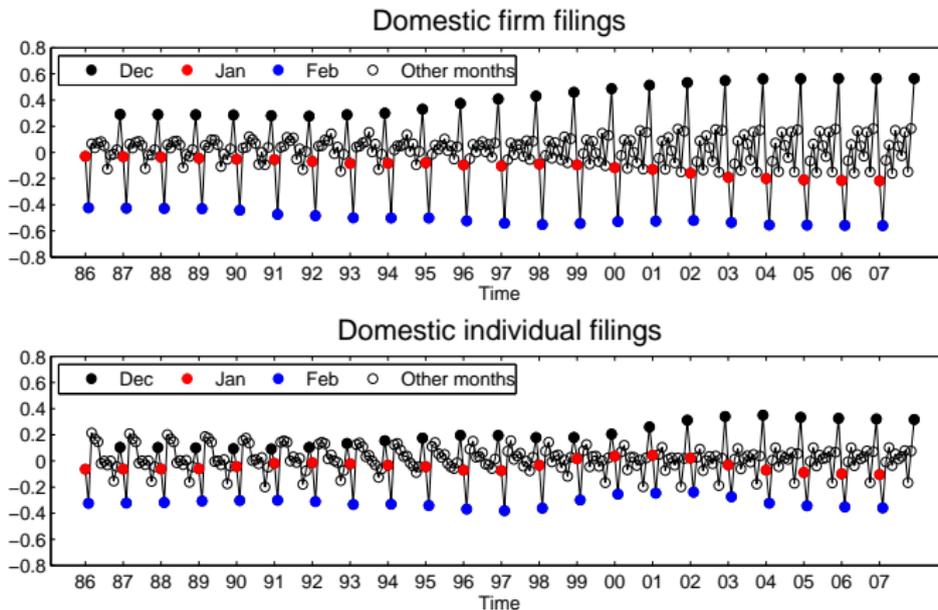
Comparison between domestic and foreign firm patent filings (3)



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.

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



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

- We address the surge in firm filings in December (relative to other months and to foreign filings) that started around 2000.
- We use March to October as the base months for comparison. From the above seasonality analysis, these months do not show abnormal seasonal behaviors.
- We control for the 31 technology fields (IPCs) and cluster standard errors by the IPCs.
- We remove the three years (1999, 2000, 2001) with outliers.

Triple-diffs estimates for the change in the number of domestic applications Before 1999 and after 2001

- Use applications by foreign firms and applications in base months as controls.
- There is a significant increase in Dec domestic filings after 2001.
- Domestic firms also experienced a significant decrease in Jan and Feb filings.

Month	Domestic firms		Domestic individuals	
	estimates	t-statistics	estimates	t-statistics
Jan	-0.3557***	-5.81	-0.0921	-1.51
Feb	-0.3200***	-7.20	-0.0481	-1.02
Nov	0.2145***	4.48	0.0700	1.54
Dec	0.3593***	7.36	0.1626***	3.36

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

The number of domestic firm vs individual applications

- Use applications by domestic individuals as controls for domestic firms.
- The increase in Nov and Dec, and the decrease in Jan and Feb are significant.

Month	Domestic firms	
	estimates	t-statistics
Jan	-0.2625***	-4.66
Feb	-0.2470***	-5.07
Nov	0.1258***	2.99
Dec	0.1930***	3.79

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

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 December.
- The grant rate and first year renewal rate may indicate induced decline in validity and value.

Triple-diffs estimates

- Difference between filings from domestic firms/individuals and foreign firms.
- Difference between filings before 1999 and after 2001.
- Difference between filings from Jan, Feb, Nov, Dec and base months (Mar-Oct).

Triple-diffs estimates for the change in grant rate of domestic applications Before 1999 and after 2001

- Grant rate is a good indicator of the validity of the application.
- There is a significant decrease in grant rate for late year filings by domestic firms after 2001; and a moderate decrease by domestic individuals.

Month	Domestic firms		Domestic individuals	
	estimates	t-statistics	estimates	t-statistics
Jan	-0.0166	-1.18	-0.0109	-0.69
Feb	-0.0008	-0.06	-0.0097	-0.56
Nov	-0.0327**	-2.18	-0.0320***	-2.85
Dec	-0.0282**	-2.22	-0.0164	-1.23

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Triple-diffs estimates for the first year renewal rate of domestic applications Before 1999 and after 2001

- First year renewal is a good indicator of whether the applicant considers the patent to have positive net expected value.
- Both groups experienced a significant decrease in the first year renewal rate for late year filings. Domestic firms also had a decrease for Jan and Feb filings.

Month	Domestic firms		Domestic individuals	
	estimates	t-statistics	estimates	t-statistics
Jan	-0.0298***	-4.94	-0.0310	-0.41
Feb	-0.0295**	-2.56	-0.0081	-0.91
Nov	-0.0171*	-1.85	-0.0114*	-1.77
Dec	-0.0468***	-6.99	-0.0188***	-3.53

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Implications

- 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 patent applications reduces the benefit of decentralization inherent in the patent system.

Implications

- 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 patent applications reduces the benefit of decentralization inherent in the patent system.

Implications

- 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 patent applications reduces the benefit of decentralization inherent in the patent system.

Implications

- 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 patent applications reduces the benefit of decentralization inherent in the patent system.**

Implications

- 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 patent applications reduces the benefit of decentralization inherent in the patent system.