patent_counts_time_series

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2023-03-01

Description of the differences between EPO and PCT (in general and in the REGPAT Database)

PCT is not a proper patenting office, but an international convention that was ratified by many countries around the world, to which inventors can apply if they want to protect their invention internationally without filing an application in each of the foreign countries they want their invention to be legally protected.

Procedure of PCT filing works as follows:

- First the inventor files an application to their national office, under the PCT convention (if they are contracting parties to the PCT)
- The national office works as Receiving Office: it will examine the patenting application (preliminary search) and check its 'patentability'
- This will result in an application to PCT 'at international phase', meaning that the applicant filed an application for her/his invention to be recognised internationally
- This process takes up to 18 months after first filing (i.e. priority date) - then the applicant can then decide to which other regional/national patent office to apply (without going again through the preliminary search procedure).

Here EPO enters the game:

- EPO (European Patenting Office) is just another regional patent office to which inventors can apply. For example, if the applicant has a PCT grant, he can proceed to protect the invention at the EPO regional office.

Back to our database:

We have two regionalised databases, one with EPO applications and one with PCT applications at international phase (e.g. patent application that we approved by PCT and were able to enter the national phase).

What is the relationship between them?

- There is no such thing as an 'International Patent' or a 'PCT-patent', so a patent submitted through the PCT will then also need to be approved by a national/regional patent office, as the EPO.
- **US case:** A US inventor has two avenues to getting an EPO patent: They can directly submit a patent application to the EPO, or they can submit a patent application to the US patent office under the PCT. The US patent office then performs a preliminary search, but essentially the EPO (and all other regional patent offices) themselves receive this as a patent application as well, to decide based on regional law whether the regional patent should be granted or not.

Implications for the data:

- **PCT patents - filtered for US states and Y02E class - represent those inventions that were first filed in the US patenting office under the international PCT procedure**, meaning that the applicant planned to protect such invention also internationally.
- EPO patents can contain the same PCT patents that then proceeded to an application at the EPO after the PCT grant, but also those that we directly filed from US to EPO.

Problem: from which patenting office should I take the data?

- PCT applications will normally also result in EPO applications, but not necessarily vice versa.
- To understand how many PCT US green patents entered the EPO regional phase, I checked the overlap between EPO and PCT application numbers using a correspondance table given by OECD. This gave me the amount of PCT applications already present in the EPO dataset.
- Rule of thumb: if overlap is high, take only PCT patents, if overlap is low, take both.
- Overlap resulted to be around 66% of PCT applications already present in the EPO (18313 over the EPO total = 27577).
- This means that we already have 66% of the total patents that from PCT went into the regional procedure, while the other 44% (9264) consists of direct applications from US inventors to the EPO office.

Solution:

We know that there might be different time horizons between the EPO and PCT application procedures. However, the priority date should be the same no matter which way the application is submitted.

In the EPO procedure the date should be recorded when the patent is filed, and in the PCT procedure the filing data should be the date when it is filed in the US.

- For the patents which have both an EPO and a PCT application, I checked whether the filing date is the same:
- Answer: out of 18313 common patents, 18214 had same priority year (99 = 0,5% of patents had different priority year).
- Two choices:

1. Keep only PCT patents (36313), loosing additional 9264 patents with direct application from US to EPO.
2. Use those 9264 direct EPO patents with the PCT database (not including the EPO applications with different years)

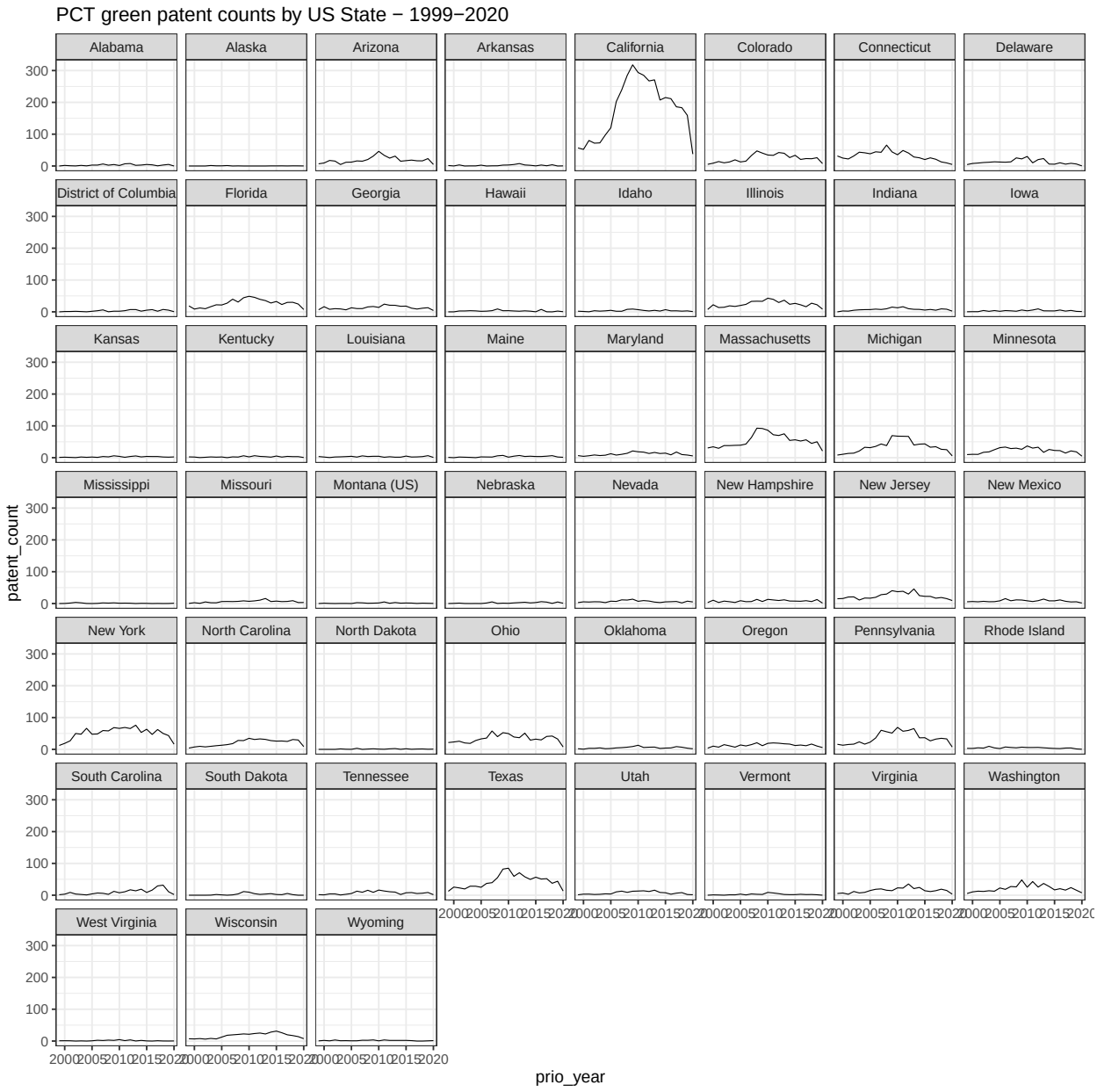
Here an overview of the time series of the two offices, plus the merged direct EPO + PCT one

PCT

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.4.0      v purrr   0.3.5
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.3      v forcats 0.5.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

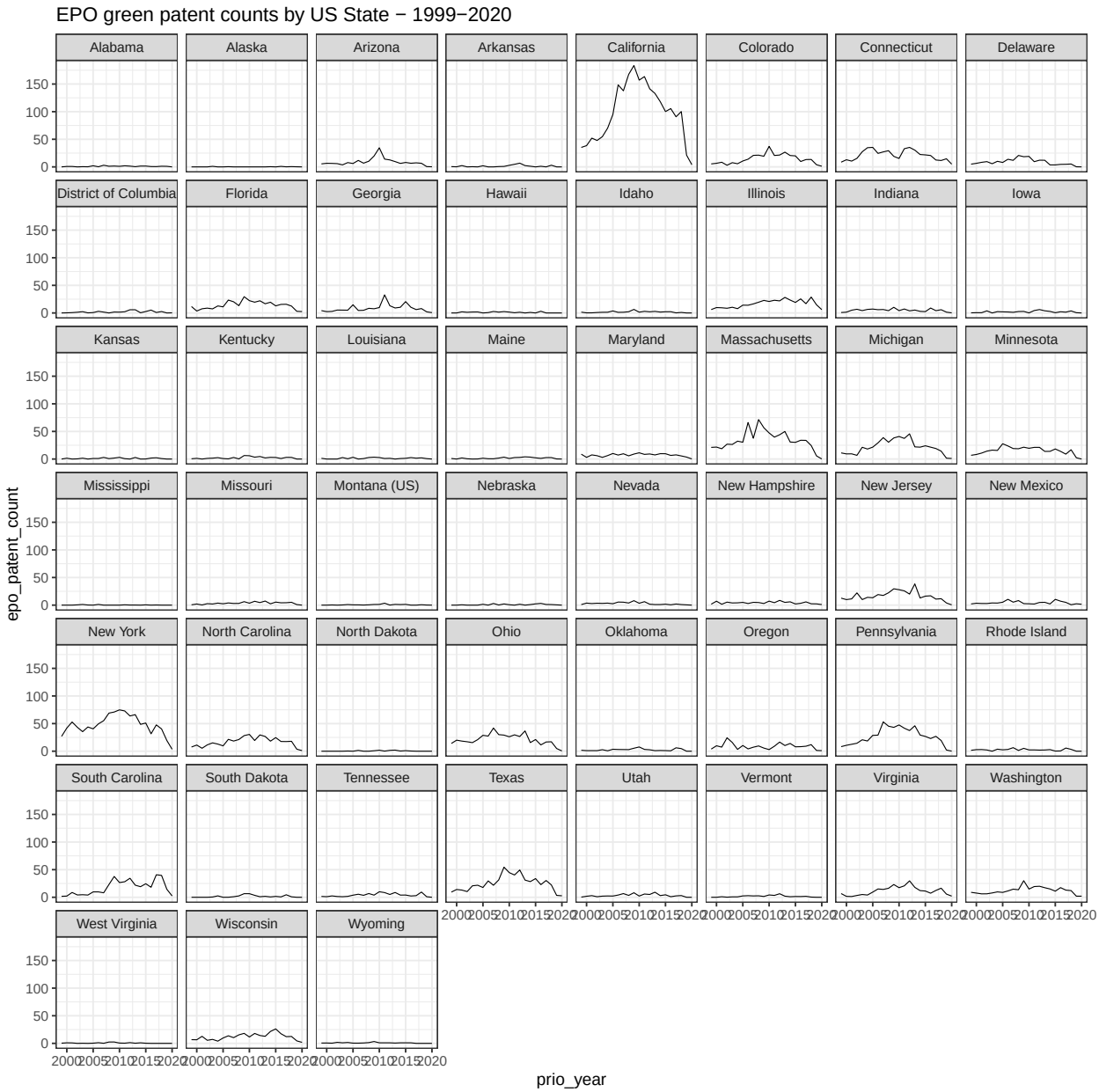
```
## Rows: 2288 Columns: 3
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): region
## dbl (2): prio_year, patent_count
##
## i Use ‘spec()‘ to retrieve the full column specification for this data.
## i Specify the column types or set ‘show_col_types = FALSE‘ to quiet this message.

## Warning: Continuous limits supplied to discrete scale.
## i Did you mean ‘limits = factor(...)‘ or ‘scale_*_continuous()‘?
```



EPO

```
## Rows: 2288 Columns: 3
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): region
## dbl (2): prio_year, epo_patent_count
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```



PCT + DIRECT EPO

```
## Rows: 1144 Columns: 3
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (1): region
## dbl (2): prio_year, patent_count
##
## i Use ‘spec()‘ to retrieve the full column specification for this data.
## i Specify the column types or set ‘show_col_types = FALSE‘ to quiet this message.
```