Constructing the Soviet Patent Dataset

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Abstract

We construct a dataset on both the creation and adoption of inventions in the Soviet Union and Russia. Our invention data cover the period 1924–2025, and the adoption data cover 1961–1996. We identify invention records that were marked as classified in the official documents and report descriptive statistics.

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1 Introduction

This paper describes the construction of a new dataset on Soviet-era inventor certificates, the regime's alternative to patents for domestic inventors. We draw on the records of the State Committee on Inventions and Discoveries, available through U.S. libraries and archives of the former Soviet Union. Using modern tools of patent analysis, we examine both the quality of these certificates and the relative standing of Soviet inventors compared to their counterparts in the United States.

Invention in the Soviet Union is an important and relevant topic for two reasons. First, by the late 1950s there was a widespread perception that the Soviet Union had come close to parity with, or even surpassed, the United States in technological innovation. This perception was reinforced by Soviet achievements in space exploration, nuclear weapons development, and the per capita production of scientists and engineers. As Chan (2015) summarizes, "the Soviets were, by most measures of technological capability of the time, in real competition with the United States."

Yet by the 1980s, the Soviets were perceived to have lagged far behind the U.S. on measures of technological and scientific progress. These claims were supported by the USSR's own official statistics on total factor productivity and by industry-level evidence (e.g., see, for instance, Amann and Cooper (1986) data on the diffusion of computers and numerically controlled machine tools). General Secretary Gorbachev himself stated in June 1985 that "The party vowed the acceleration of scientific and technological progress as the main direction of its economic strategy... The tasks are so pressing that action has to be taken without losing any time."[1]

These facts pose an important question: How did the Soviet Union fall behind in the innovation race with the United States? Understanding these dynamics is particularly relevant today, given the ongoing "technology race" between the United States and China. Indeed, Chinese leader Xi Jinping is widely believed to have studied the Soviet–U.S. Cold War for lessons applicable to China's current strategy (Wei, 2025).

A second reason relates to the incentives offered as part of the Soviet system. There was a great deal of experimentation in incentive schemes to encourage research, which makes for a fertile area for research.

Despite these interesting aspects, the Soviet intellectual property system has received little scrutiny. Much of the published work in the economics literature on Soviet innovation consists of older case-style studies (e.g., Granick, 1957, 1959; Grossman, 1966). Exceptions include cook2011 on licensing agreements between Soviet and Western firms, Giorcelli and Li (2024)

[1] https://www.marxists.org/archive/gorbachev/1987/selected-speeches-and-articles-1985-1986.pdf, p. 99

on technology transfer from the USSR to China, Kantor and Whalley (2025) on the impact of the USSR–U.S. space race on American innovation, and Schweiger et al. (2022) on the regional impact of Soviet science cities. Much of the published work has been more descriptive in nature, building off traditions in the history of technology, international relations, and economic sociology (e.g., Amann and Cooper, 1986; Berliner, 1976; Graham, 2013; Kogut and Zander, 2000). Zhuravskaya et al. (2024), after reviewing the literature, note that "Beyond case studies, there is no systematic evidence on the performance of Soviet R&D, especially in the postwar period."

It is our hope to create a publicly accessible version of this dataset once the initial draft of the companion paper to this one is complete.

The plan of this paper is as follows. Section 2 provides a brief history of the Soviet intellectual property system. Section 3 describes the primary data sources we use. Section 4 presents some summary statistics on the Soviet data, as well as comparisons with activity in the U.S. The last section concludes the paper.

2 History of the Soviet Patent System

The Russian patent system dates to Czar Alexander I in 1812, though some analysts trace its origins back to the mid-eighteenth century, when royal charter grants reminiscent of those in Elizabethan England were issued. After the October Revolution of 1917, the patent system was swiftly abolished, following ideological attacks from critics who emphasized its allegedly capitalist features.

In 1919, the Soviet government introduced Inventors' Certificates as an alternative to patents. Promulgated in June 1919 by Vladimir Lenin, the Decree on Inventing nationalized all inventions—or more precisely, declared that any invention deemed useful by the newly established Committee for Inventing could be made state property. While inventions were legally owned by the state, inventors could still receive recognition and monetary compensation. Unlike traditional patents, Inventors' Certificates did not grant the right to exclude others from using the invention. Instead, inventors were compensated for its use according to formulas that varied over time (see Berliner (1976) for a discussion).

Soviet patents were restored in 1924. While the law afforded equal rights for Soviet citizens and foreign inventors to obtain patents and provided an exclusive right for patent holders for a period of 15 years, in practice it was used exclusively for foreign patent holders, largely because of fee schedules and social pressures. The inventors' certificate system remained the dominant institution until the collapse of the Soviet Union in 1991, although certificates continued to be issued for several years thereafter.

Periodic efforts sought to promote the filing of inventor's certificates. For example, shortly after the first Five-Year Plan, the USSR promulgated the 1931 Decree on Inventions and Technical Improvements, which declared: "In spite of the enormous importance of mass inventions to the cause of the struggle for the speed-up of industrialization, the exploitation of inventions and the exchange of technical experience are most unsatisfactory." Nonetheless, these efforts were hampered by, among other considerations, a series of purges of the membership of the Committee on Inventions (Bosse & Dahlin, 2023).

Soon after the death of Stalin in 1953, encouraging innovation became a renewed focus of attention on the part of the Soviet leadership. Steps included creating the Committee for Inventions and Discoveries in 1955, which, as Martens (2010) noted, "quickly rose in prominence and received generous state support." Other steps included invention promotion campaigns, increased incentives for inventors, and changing institutional infrastructure (such as the publications publicizing the creation and diffusion of inventions that we employ).

The process by which inventor's certificates were reviewed and evaluated, at least in the 1950s and onward, appears to emulate those employed in major patent offices worldwide (see, for instance, Blair, 1973; Federico, 1961). Among the key criteria were novelty relative to the prior art in both the Soviet Union and publicly available patents and articles from elsewhere, the usefulness of the invention, and the concept akin to "reduction to practice" in U.S. patent law, which required that the protected discovery be capable of being used in the Soviet economy.

One distinctive feature of the Soviet invention system was its heavy reliance on secrecy. In the U.S., many of the secret patents during World War II were declassified in the years thereafter (Gross, 2022). The use of secret patents diminished sharply in the U.S. after the war; USPTO disclosures suggest there were only 6,471 active secrecy orders at the end of fiscal year 2024.

By contrast, in Russia, 491,617 inventor certificates remain classified today according to our calculations. Two agencies handled secret inventions: the Ministry of Defense and the State Committee for Inventions and Discoveries. Section VII of Decree No. 435 (1959) describes the procedures regarding secret inventions. Items 59 and 60 state that secret and most top-secret inventions were examined by the Committee for Inventions and Discoveries, while top-secret inventions relating to armaments and military equipment were examined by the Ministry of Defense.

> 59. Applications for secret and top-secret discoveries and inventions — with the exception of top-secret ones relating to new types of armaments, military equipment, and their tactical use — shall be accepted and examined by the Committee for Inventions and Discoveries under the Council of Ministers of the USSR.
>
> 60. Applications for top-secret inventions relating to new types of armaments, military equipment, and their tactical use shall be accepted and examined by the Ministry of Defense of the USSR, which is also entrusted with considering inventors' appeals on matters concerning the issuance of inventor's certificates for such inventions, the use of such inventions, and the payment of remuneration for them.

In other words, secret inventions were divided into "secret" and "top secret," with the latter reviewed by the Ministry of Defense.

As we explain below, however, we can deduce a considerable amount about secret Soviet patents from published resources.

3 Key Data Sources

Data on the Soviet patent system was compiled primarily from three sources, which we describe below. We also discuss two sources of complementary information that we use in the analysis.

3.1 FIPS

The Federal Service for Intellectual Property (Федеральная служба по интеллектуальной собственности, also known as FIPS or Rospatent (Роспатент)) is the Russian governmental agency in charge of intellectual property.

From the official website, we downloaded 2,838,508 inventors' certificates and patents covering the period from September 1924 to April 2025. About 1.4 million of these—representing the majority of Soviet-era certificates—were available as images, which we digitized. Across all years, the records include application and issue dates, application numbers, inventor names, the original assigned classes and their modern IPC equivalents, and the text of the invention description.

There are some differences with the U.S. patent data that many researchers are familiar with. First, all patents downloaded from the FIPS site are classified using the International Patent Classification (IPC) scheme, which resembles (but is not identical to) the Combined

Patent Classification (CPC) codes used in the U.S.[2] Prior to the acceding of the Soviet Union acceded to the Strasbourg Agreement in 1965, at which point it formally adopted the IPC as its national classification system, the USSR had used a Soviet-specific (SU) patent classification. Older patents were reclassified using the IPC in 2001, and subsequent awards were only made using the IPC system. Nonetheless, we use the older SU scheme as described below.

Another difference with the U.S. patent classification is the absence of citations to earlier works. (The U.S. had begun including patent citations on the front page of patents in February 1947, but the Soviet Union never followed suit.) The absence of assignees, as well as the fact that the sponsoring agencies and firms were not publicly traded, means that event study style approaches a la Kogan (2017) are not possible. To assess patent importance, we will rely (in future versions of this work) on the textual approach employed in Kelly et al. (2021, henceforth KPST), as well as the cross-national KPST/XN scores introduced in Lerner et al. (2025) to compare U.S. and Soviet patents in given technologies.

Third, for much of the history of the Soviet Union, inventor certificates only listed the individual's name, not the organization for which he worked (in the U.S. context, typically the organization to which the patent was assigned.) Beginning in the 1960s, Soviet officials also began listing the filing organization, and later added citations to prior art, correspondence addresses, and other details. In future versions, we will use biographical information on Soviet scientists and engineers to match at least some patents to organizations.

The treatment of secret patents was also different. In the U.S., patent applications that were deemed to contain sensitive information were not issued. As a result, these classified applications left no discernible identifier until the application was declassified (and then only if the applicant chooses to pursue the patent at that point). Once-classified patents that ultimately issue can be discerned through lists disclosed by the USPTO in response to Freedom of Information Act requests for much of the post-War period, as well as from the long gaps between application and award dates that often ensued.

In the Soviet Union, inventor certificates were issued for both classified and non-classified discoveries. The classified ones were unsurprisingly not published in the Bulletin of Inventions. As we describe below, though, information in the Bulletins allows one to infer the publication years and, in many cases, even the detailed technological classes of many secret patents.

3.2 Bulletin of Inventions

The certificates and patents were publicized in the journal Bulletin of Inventions. Published two to four times per month, this journal contained abstracts of each Soviet inventors' certificate

[2]The FIPS has reclassified its older patents using IPC schemes of 2001 and 2006.

and patent, along with announcements and other information on the patent system.

This volume was widely distributed and collected in several major libraries in the United States, including the New York Public Library and the Universities of Illinois and Nebraska. We collected a complete set of these volumes through Inter-Library Loan (ILL). While most libraries seemingly had incomplete collections, we were able to obtain a complete collection through repeated ILL queries. In total, we scanned and digitized information from approximately 1,200 physical issues of the Bulletin of Inventions.

These volumes also provide valuable clues about secret patents. Beginning in 1959, the Bulletin included entries marked "not publishable" or "not subject to publication" (i.e., all but the top-secret certificates granted by the Ministry of Defense). Such entries listed the certificate number without the description; if the patent was later declassified, its description would then be published.

However, even the dummy entries for the unpublished patents contain valuable information. Starting from 1959, certificates were listed in alphabetical order of technological classes, which means the class of a secret patent can often be inferred by examining the adjacent entries. For example, Certificate 124377 in volume 23 (1959) remains classified. It is listed between Certificates 124376 and 124378, which are assigned to SU classes 1a,8 and 1c,8_{01}. Therefore 124377 belongs to a class somewhere between these two. We can determine the IPC of the classified patent using the SU and IFC classification systems (the current IPC classes that FIPS assignees to the adjacent certificates: B03B 5/44 and B03D 1/01).[3]

The Soviet military reserved special application numbers for them. This means we can identify top-secret certificates handled by the Ministry of Defense that were later declassified. We are unable to infer their technological classes.

3.3 Implemented Inventions

One unique aspect of the Soviet system was the publication of Implemented Inventions, which recorded whether and where Soviet inventions were used. These publications also reported the cost savings generated by each invention, which formed the basis for a reward scheme for inventors. To our knowledge, no other patent system engaged in comparable tracking.

Soviet officials began listing implemented inventions in 1961 in the Bulletins of Inventions. From 1963 to 1965, they were published in the journal Information on Inventions (Информация по Изобретательству), and from 1968 to 1996 in the journal Implemented Inventions (Внедренные Изобретения).

[3]In some cases, however, the ordering of the two schemes is not exactly parallel, so we must rely on a concordance between the two systems that we develop.

It was seemingly not circulated outside the Soviet Union. Even within the Commonwealth of Independent States, the volumes were difficult to locate: in many cases, the Soviet-era patent collections had been scattered, often being passed onto one or more libraries. We recruited teams of students and faculty in CIS nations to attempt to find these volumes. We were ultimately able to obtain copies from several libraries in the former Soviet Union, including the Belarus Patent Office in Minsk, the Scientific and Technical Library of the National Polytechnical University of Armenia in Yerevan, and the Republican Scientific and Technical Library in Almaty, Kazakhstan.

3.4 Comparable U.S. Data

The USPTO has fully digitized patent data beginning with patents awarded in 1976, which are available through the PatentsView platform. For earlier years, we use the Comprehensive Universe of U.S. Patents (CUSP) dataset, which, as described in (Berkes, 2018), covers U.S. patents issued from 1836 to 2015. We also use inventor-level data from (Kantor & Whalley, 2025).

As noted above, the extensive information on implemented inventions appears to be unique to the USSR. For the United States, we plan to examine the utilization of national defense–related patents using the (Gross & Sampat, 2024) database of patents with government interests, together with government reports on the use of firms as contractors and subcontractors, following the approaches outlined in (Kuziemko, 2025).

4 Summary Statistics

In this section, we provide an initial overview of Inventors' Certificates in the USSR, together with a comparison to contemporaneous U.S. patents.

Figure 1 reports the number of patents and inventors' certificates by application year. The Soviet Union lagged behind the United States but made substantial gains from the early 1960s through the 1980s.

Figure 2 compares the distribution of technological classes across the two countries. We use the IPC scheme, translating CPC classifications into the IPC one.[4] The Soviet composition was more stable than that of the United States. For example, Figure 3 shows that the U.S. experienced a steady decline in the share of patents in Section B (Performing Operations; Transporting), while the Soviet share in this category remained stable. Figure 3 also illustrates

[4]This exercise primarily involves reclassifying patents assigned to CPC class Y (which is unique in the CPC system), using the modal (or if unavailable, the first) listed non-Y class.

Table 1: Inventors: USA vs Soviet Union

	(1) N inventors per patent	(2) N patents per inventor	(3) Log N patents per inventor	(4) Time range
U.S.	-1.569***	0.740**	0.199***	2.159***
	(0.184)	(0.283)	(0.056)	(0.542)
Constant	2.963***	1.905***	0.314***	9.060***
	(0.114)	(0.083)	(0.017)	(0.241)
Observations	3,940,575	3,672,413	3,672,413	613,201
Fixed effects	Section, Year	Section, Year	Section, Year	Section, Year

Robust standard errors clustered at the section and application year level in column (1), and at modal section and first application year levels in columns (2)–(4). The variable U.S. equals 1 if the country is the United States, and 0 otherwise. In column (1), the observation is a patent or an inventors' certificate, and the dependent variable is the number of inventors. In columns (2)–(3), the observation is an inventor; the dependent variables are the number of patents and the logarithm of the number of patents. In column (4), the observation is an inventor; the sample is restricted to inventors with three or more patents or inventors' certificates, and the dependent variable is the difference between the application year of the first and last patents or inventors' certificates.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

that the Soviet Union consistently had a higher share of inventions in physics, though the two countries converged by the late 1980s.

Figure 4 compares team size across the two systems. Soviet certificates involved a larger number of inventors per certificate than U.S. patents. Both countries saw an increase in team size over time, but the growth was much faster in the Soviet Union. Regression results in Table 1 confirm that, on average, Soviet certificates listed more inventors per invention, conditional on time and technological class. However, U.S. inventors, on average, produced more patents per inventor (columns 2 and 3). Moreover, conditional on filing more than two patents or certificates, U.S. inventors remained active for a longer period.

Figure 5 shows the adoption rate by years — the share of implemented certificates among all certificates in publication years from 1955 to 1962. The high rate observed for 1960 reflects both the absence of implementation records for certificates issued before 1960 that were implemented prior to 1961, and the fact that certificates issued after 1960 could have been implemented later (a point we will be able to update once later records are digitized). Figure 6 shows the share of implemented certificates for publication years 1959 and 1960 by technological class. The highest implementation rates were in Fixed Constructions (IPC Section E) and Performing Operations and Transporting (IPC Section B).

Figure 7 shows the share of certificates that were classified in each publication year from 1959 to 1991. Some of these certificates have since been declassified, while others remain secret. Figure 8 reports the distribution of the still-secret certificates by their imputed IPC class.

5 Conclusion

This paper described our progress to date in constructing the Soviet patent dataset. While we still have additional clean-up to undertake, we hope to soon begin exploring some of the important questions discussed in the introduction.

Figures

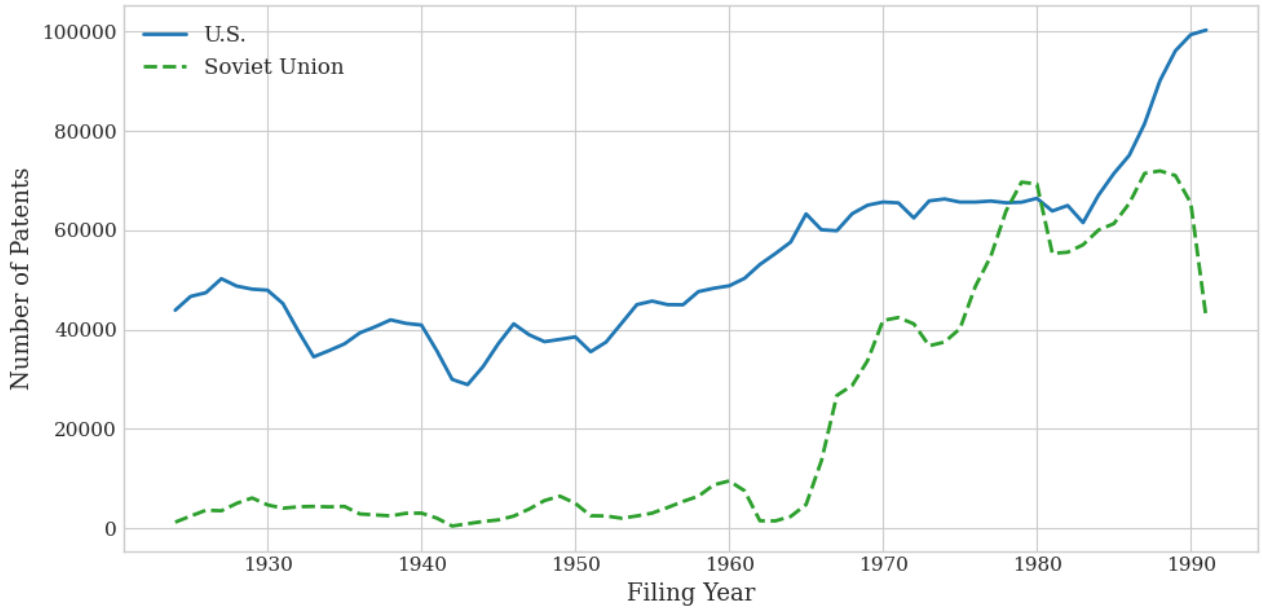

Figure 1: Number of Patents and Certificates by Application Years: USA vs SU

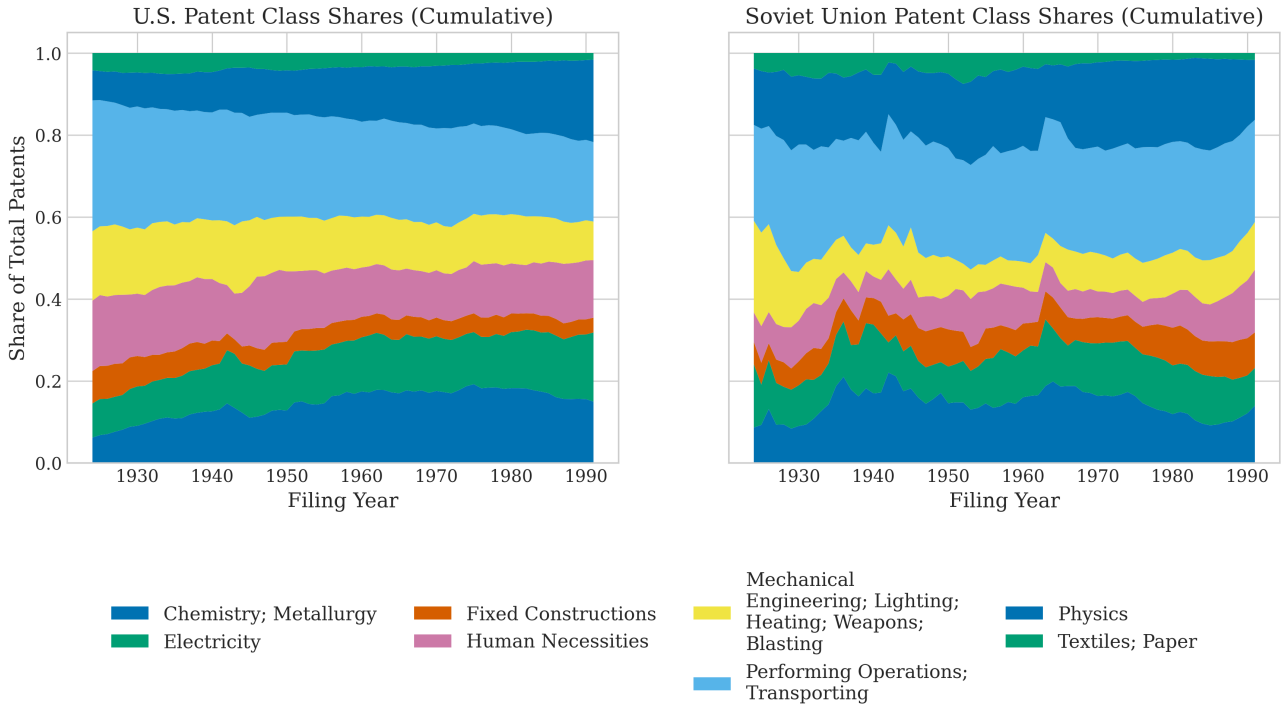

Figure 2: Composition of Technological Classes: USA vs SU

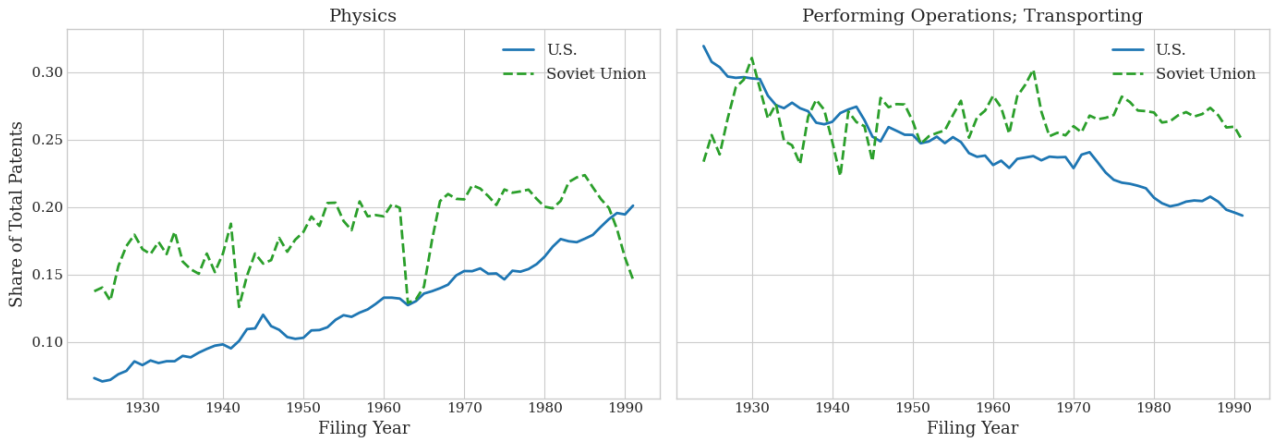

Figure 3: Shares of US vs Soviet patents in Physics and Performing Operations \Transportation

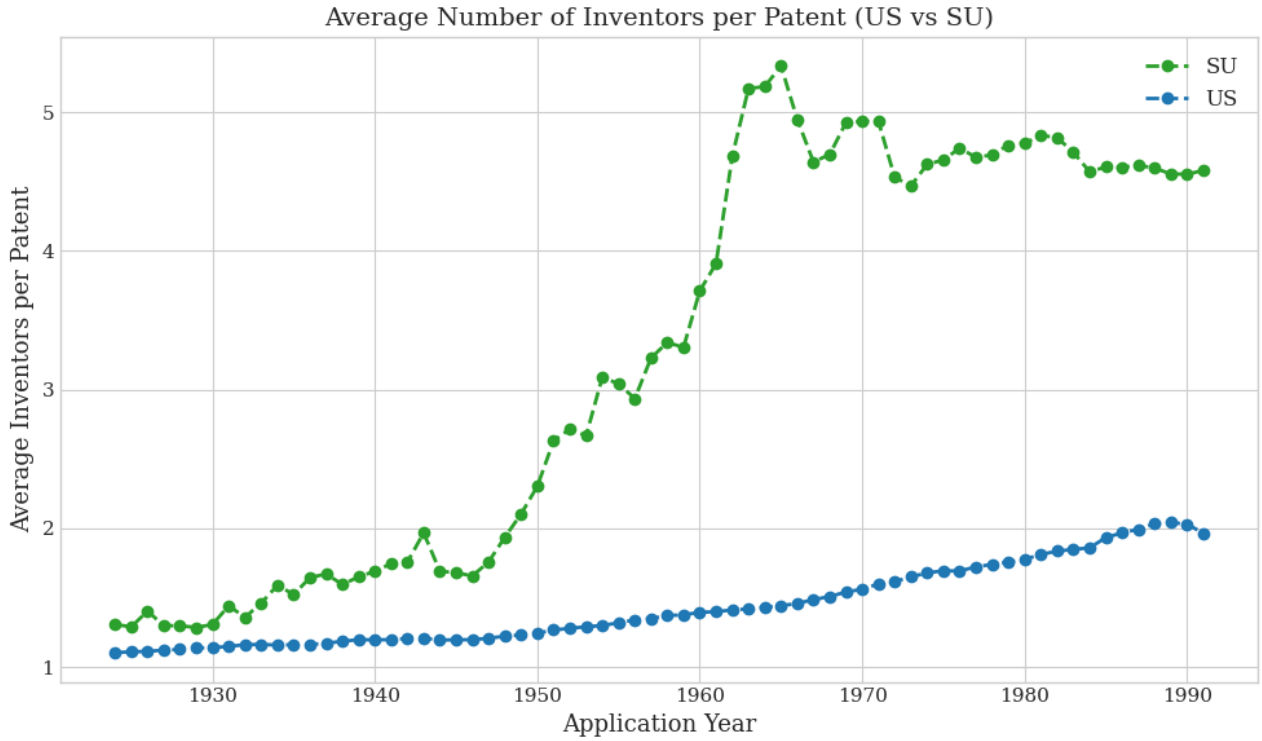

Figure 4: Average Number of Inventors per Patent and Certificate: USA vs SU

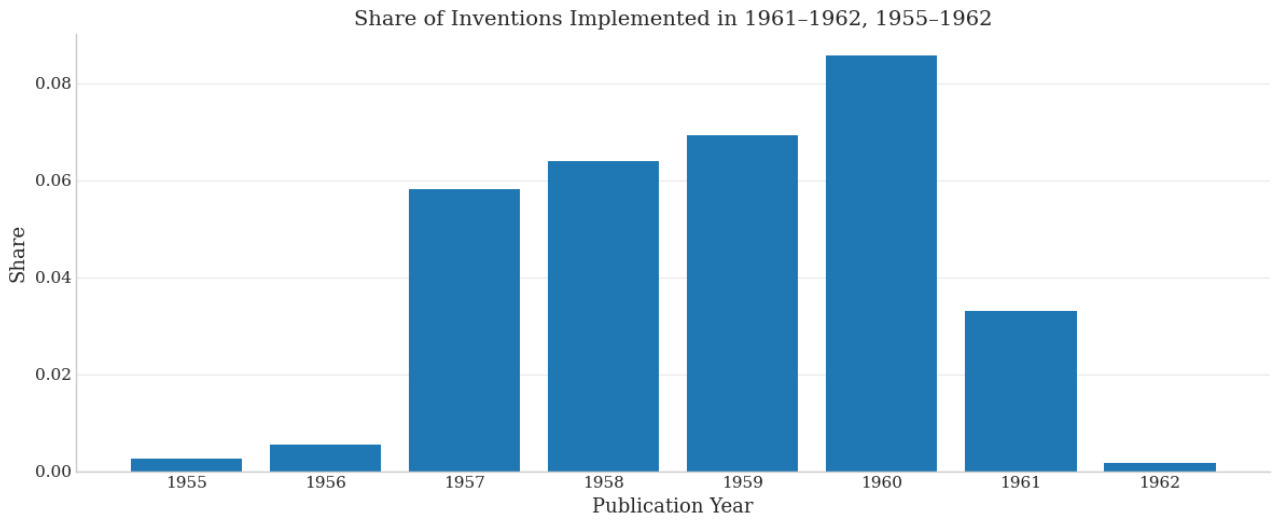

Figure 5: Share of Implemented Certifications by their Publication Years

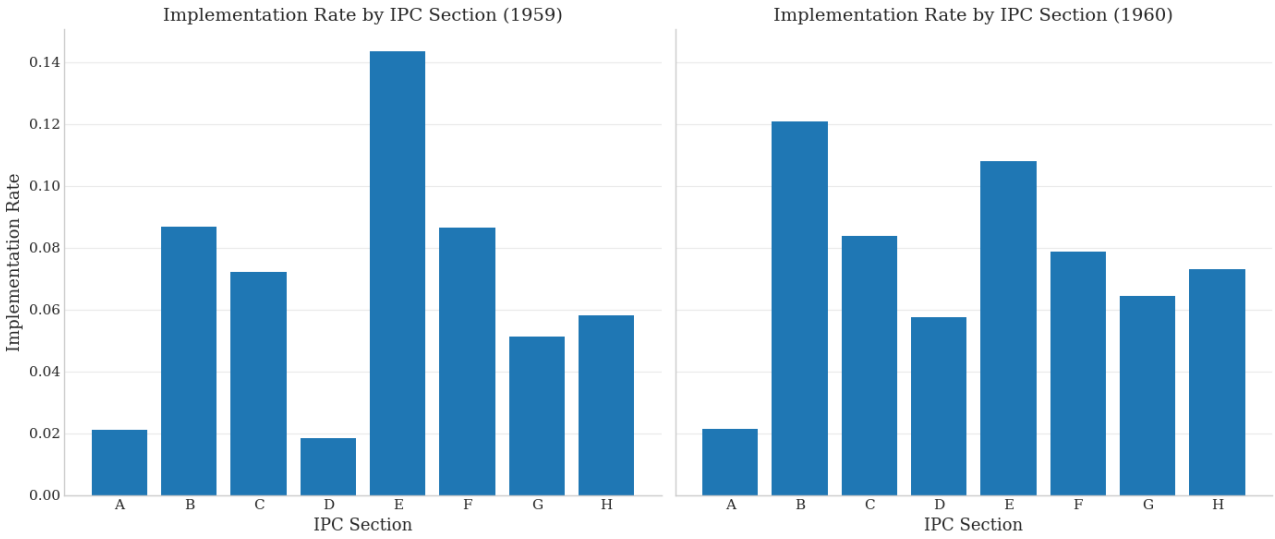

Figure 6: Implementation Rate by Technological Classes and Publication Years

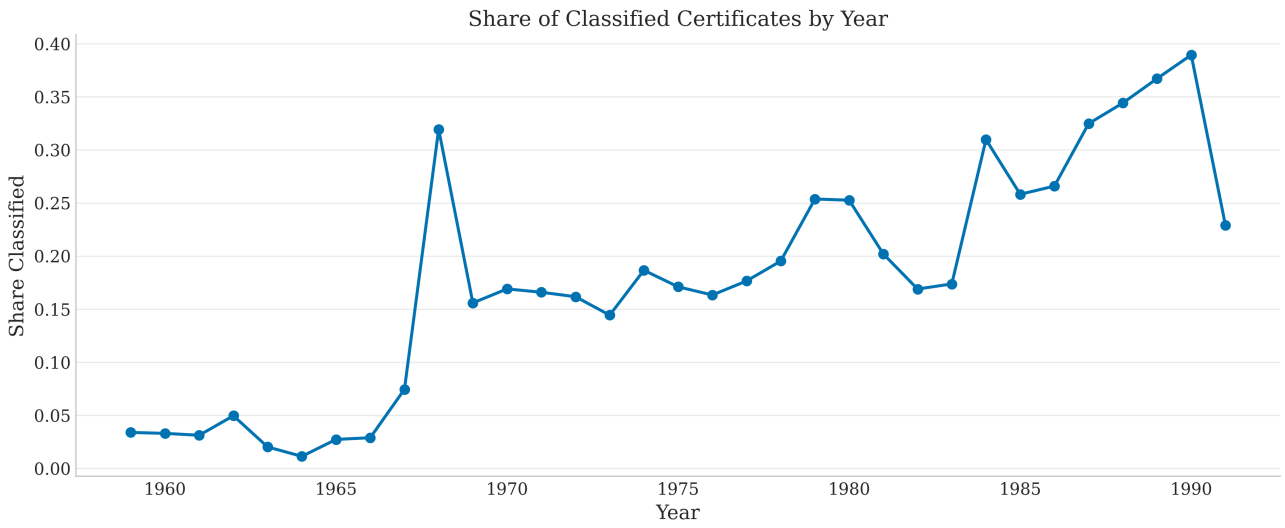

Figure 7: Share of Secret Certificates per Year

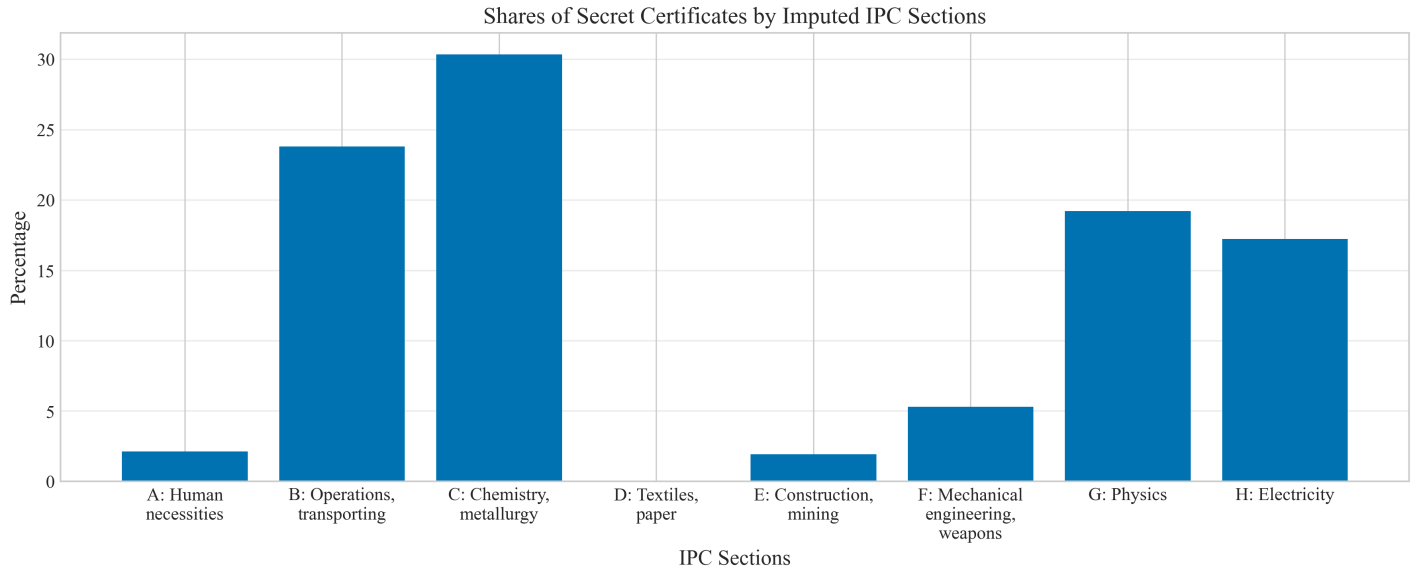

Figure 8: Distribution of Imputed IPC classes for Classified Certificates

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