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A patent premium perspective on Covid-19 vaccine patents

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What the United States (US) Intellectual Property (IP) waiver announcement tells us about patent values: A patent premium perspective on Covid-19 vaccine patents

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Abstract

Various innovation system actors, including government and policy makers have a long-standing interest in understanding the value of patents. The recent announcement of the US government to support waiving IP rights for Covid-19 vaccines provides a unique opportunity to learn better understanding the value of patents, particularly from a market perspective. With the announcement being specific to IP rights, respectively the patents protecting the Covid-19 vaccines, that announcement can be interpreted as a natural experiment from which we can directly observe patent values. Immediately following that announcement, the stock price values of all four pharmaceutical companies with market-approved Covid-19 vaccines in the US and Europe dropped substantially. Comparing the pre- and post-announcement market capitalisation of the four companies, we can estimate the total value of Covid-19 vaccine patents to be \$37B. Following the patent premium definition that value does not reflect the value of the actual vaccines, which is most likely to be much higher, but only the value of the patents protecting them.

Keywords: Covid-19, vaccines, patent premium, patent value, IP waiver

Introduction

Governments and policy makers as well as companies and various other innovation system actors have a longstanding interest in understanding the value of patents, if not the identification of potentially valuable ones. During the past decades, a large number of studies has investigated patent values (Aristodemou, 2020), with a range of different patent value definitions being proposed, including, for instance, for the economic value of patents, the technological value of patents (Aristodemou, 2018a, 2018b), the strategic value of patents (Granstrand, 1999). Often, it is also argued that the value of patents consists of two parts: (i) the patent value related to the market protection given by the patent, i.e. the value of the patent rights, and (ii) the value of the invention, i.e. the value to the firm without information disclosed within the patent being released (Arora et al., 2008; Arora & Gambardella, 2010; Jensen et al., 2011; Pitkethly, 1997; Thoma, 2016). The patent premium represents the value of a patent related to the market protection. In other words, the patent premium value can be measured as the value of an invention if it can be/is protected by a patent compared to its value without patent protection.

While a huge number of patent value studies has been conducted, the value of a patent is rarely observable, wherefore studies typically use inductive approaches to approximate patent values (Harhoff et al., 2003; Reitzig, 2003). Amongst the few exceptions are studies which use data of prices paid for traded patents or patent portfolios, such as those using patent auction data (Tietze, 2012), even though these studies have their own limitations. We argue that the recent US government announcement presents another opportunity to directly observe patent value, even though only specifically for Covid-19 vaccine patents.

Background

The recent announcement of the Executive Office of the President of the United States¹, respectively the Office of the United States Trade Representative to support a waiver for IP rights for the Covid-19 vaccine patents offers a unique opportunity to directly observe and measure the value of patents, even though we do not know yet any specific details about Covid-19 related patents. While the

¹ Office of the United States Trade Representative (Executive Office of The President), Statement from Ambassador Katherine Tai on the Covid-19 Trips Waiver, URL: <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver>, access date: 6.5.21

statement does not actually is a guarantee that IP rights will be waived, it implies that the US will not veto against a waiver in the World Trade Organisation. More specifically the announcement said: “The Administration believes strongly in intellectual property protections, but in service of ending this pandemic, supports the waiver of those protections for COVID-19 vaccines... the US supports the waiver of IP protections on COVID-19 vaccines to help end the pandemic and we’ll actively participate in @WTO negotiations to make that happen”.

From a research perspective, this announcement can be interpreted as a “natural experiment”, from which we can learn something about the value of patents observing its direct consequences, e.g. similar to studies that observed effects on air traffic from the Eyjafjallajökull volcano eruption in 2010 (Besedeš and Murshid, 2017).

We are still waiting eagerly for Covid-19 related patents in general, but specifically the vaccine patents to be published. Patent filings are only published 18 months after their filing date. While the first Covid-19 cases appeared in December 2019, it seems fair to assume that R&D efforts into Covid-19 vaccines only started afterwards, with first results that would have led to patentable inventions probably not appearing before spring 2020, i.e. a little bit more than 12 months ago. Even without knowing the patents specifically, the events resulting as direct consequence of the US government’s announcement to support waiving IP rights for vaccines allows us to observe the value of Covid-19 vaccine patents, particularly from a market and patent premium point of view.

In Washington, the US government made a public announcement around 3pm (Eastern Daylight Time; GMT-4) on 5th May 2021. Following that announcement, Nasdaq share prices on the New York stock exchange of all major pharmaceutical companies with market-approved vaccines in the US and Europe dropped substantially.

Preliminary Empirical Analysis

The announcement was specifically about IP rights indicating that vaccine patents would potentially be waived, maybe just temporary. Hence, from a patent value perspective, the drop of share prices can be interpreted in a counterfactual manner. Even though the announcement only indicated a potential future without IP rights for Covid-19 vaccines, i.e. the IP rights have not actually been invalidated, one can argue that the post-announcement market capitalisation of the vaccine companies represent their market value without IP rights, or at least indicate what that market value

would potentially be like. Hence, by comparing the pre-announcement market capitalisation of the vaccine companies, with their post-announcement capitalisation gives us some indication of the value of the vaccine patents along the lines of applying a patent premium definition.

Table 1 shows the share price values for the four major pharmaceutical companies with market-approved vaccines by the Food and Drug Administration (FDA) in the US, respectively the European Medical Authority (EMA) in Europe. The data shows that share prices of all four companies have dropped immediately after the announcement by the US government. The highest drop in percentage occurred for BioNTech (-22.7%), followed by Moderna (-18.4%), Pfizer (-6.9%) and AstraZeneca (-0.6%) resulting in an average drop of -12.1%. Multiplying the share price drop of each company with their number of total shares issues gives a total value for the lost market capitalization. Accordingly, from those four companies Pfizer and Moderna both reported a loss of market capitalization of \$13B, followed by BioNTech of \$10B and AstraZeneca of \$1B. Thus, comparing the pre- and post-announcement market capitalisations should reflect the value of Covid-10 vaccine related patents for these four companies, which comes out as a total value of approximately \$37B.

Table 1 Pre- vs. post-announcement share prices of US and EU approved Covid-19 vaccine companies

Company*	Closing price (\$) 5.5.21**	Opening price (\$) 6.5.21**	Absolute difference (\$)	Percentage (%) change	Shares outstanding (B)	Estimated economic value of patents (B \$)
AstraZeneca	53.52	53.22	-0.30	-0.56 %	1.31	0.39
BioNTech	188.92	146.01	-42.91	-22.71 %	0.24	10.30
Moderna	176.38	143.99	-32.39	-18.36 %	0.40	12.96
Pfizer	40.58	38.19	-2.39	-6.89 %	5.58	13.34

Notes: * The table contains only companies with a Covid19 vaccine approved for emergency use by the FDA or the EMA, excluding the Johnson and Johnson vaccine. **The closing share price is record just before the statement from Ambassador Katherine Tai at 3.00pm (GMT-4). The opening share price is recorded at 9.30pm (GMT-4).

Source: Yahoo Finance <https://finance.yahoo.com/>, NYSE, Nasdaq Inc (NASDAQ:NASDAQ GS) – date: 06.05.2021

Discussion and limitations

Obviously, the calculations above need to be interpreted with care and may have limited value to be generalized into other contexts. As we are only day 1 after the announcement it remains to be seen if, how quickly and to what extent the share prices for the vaccine companies will recover. In more general terms, patent premium's determinants include, but are not limited to, the industrial sector,

competition dynamics, regulation impact etc. (Greenhalgh & Rogers, 2006; Harhoff et al., 2003). Accordingly, as also known from various previous studies, patents play a particular role in the pharmaceutical industry, with huge values of rare blockbuster drug patents being by far the exception. On the other hand, given that the announcement was only a forward-looking statement and not an actual invalidation of the Covid-19 vaccine patents, one might argue that the actual value attributed to vaccine patents in this pandemic might even be higher, if not substantially higher than the numbers above suggest. In addition, one should not forget that the value of the vaccines is not only attributed to the patent rights, but a large value results from the large amount of complementary, intangible knowledge, such as production process knowledge. That is one of the reasons why we argue here that the value attributed to Covid-19 vaccine patents approximated above as \$37B should rather be interpreted as a patent premium value.

References

- Aristodemou, L. (2020). Identifying Valuable Patents: A Deep Learning Approach, Doctoral PhD thesis, Department of Engineering, Institute for Manufacturing (IfM), University of Cambridge. <https://doi.org/10.17863/CAM.69403>
- Aristodemou, L. & Tietze, F. (2018a). Citations as a measure of technological impact: A review of forward citation-based measures. *World Patent Information*, 53(April 2017), 39–44, <https://doi.org/10.1016/j.wpi.2018.05.001>
- Aristodemou, L. & Tietze, F. (2018b). The state-of-the-art on Intellectual Property Analytics (IPA): A literature review on artificial intelligence, machine learning and deep learning methods for analysing intellectual property (IP) data. *World Patent Information*, 55(April), 37–51, <https://doi.org/10.1016/j.wpi.2018.07.002>
- Arora, A., Ceccagnoli, M., & Cohen, W. M. (2008). R&D and the patent premium. *International Journal of Industrial Organization*, 26(5), 1153–1179, <https://doi.org/10.1016/j.ijindorg.2007.11.004>
- Arora, A. & Gambardella, A. (2010). Chapter 15 - The Market for Technology. In B. H. Hall & N. Rosenberg (Eds.), *Handbook of The Economics of Innovation*, Vol. 1, volume 1 of *Handbook of the Economics of Innovation* (pp. 641 – 678). North-Holland <http://www.sciencedirect.com/science/article/pii/S0169721810010154>
- Contreras, J. L., Eisen, M., Ganz, A., Lemley M., Molloy, J., Peters, D. M., and Tietze F., (2020). Pledging Intellectual Property for COVID-19. *Nature Biotechnology* 38(10): 1146-1149. <http://dx.doi.org/10.1038/s41587-020-0682-1>
- Greenhalgh, C. & Rogers, M. (2006). The value of innovation: The interaction of competition, R&D and IP. *Research Policy*, 35(4), 562–580, <https://doi.org/10.1016/j.respol.2006.02>
- Granstrand, O. (1999). *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*. E. Elgar, 1999, illustrate edition <https://www.e-elgar.com/shop/gbp/the-economics-and-management-of-intellectual-property-9781840644630.html>

- Harhoff, D., Scherer, F. M., & Vopel, K. (2003). Citations, family size, opposition and the value of patent rights. *Research Policy*, 32, 1343–1363, [https://doi.org/10.1016/S0048-7333\(02\)00124-5](https://doi.org/10.1016/S0048-7333(02)00124-5)
- Jensen, P. H., Thomson, R., & Yong, J. (2011). Estimating the patent premium: Evidence from the Australian Inventor Survey. *Strategic Management Journal*, <https://doi.org/10.1002/smj.925>
- Moerchel, A., Tietze, F., Aristodemou, L. and Vimalnath, P. (2020), Identifying Crisis-Critical Intellectual Property Challenges during the Covid-19 Pandemic: A Scenario Analysis and Conceptual Extrapolation of Innovation Ecosystem Dynamics Using a Visual Mapping Approach, Centre for Technology Management (CTM) Working Paper Series (ISSN 2058-8887), Cambridge, available at: <https://doi.org/10.17863/CAM.58372> .
- Moerchel, A., Tietze, F., Aristodemou, L. and Vimalnath, P., (2021, forthcoming), “Identifying Crisis Critical Intellectual Property Challenges during the Covid-19 Pandemic: a visual mapping approach”, Proceedings of the Eighty-first Annual Meeting of the Academy of Management (ISSN 2151-6561), available at: <https://aom.org/events/annual-meeting/annual-meeting-program/annual-meeting-proceedings>
- Pitkethly, R. (1997). The valuation of patents: A review of patent valuation methods with consideration of option based methods and the potential for further research. *New Developments in Intellectual Property : Law and Economics*, 2(March), 1–32, <https://doi.org/10.5791/0882-2875-2.3.5>
- Reitzig, M. (2003). What determines patent value?: Insights from the semiconductor industry. *Research Policy*, 32(1), 13–26, [https://doi.org/10.1016/S0048-7333\(01\)00193-7](https://doi.org/10.1016/S0048-7333(01)00193-7).
- Thoma, G. (2016). Patent management and valuation: The strategic and geographical dimension. Taylor and Francis.
- Tietze, F. (2012). *Technology Market Transactions - Auctions, Intermediaries and Innovation*. Cheltenham Edgar Elgar Publishing.
- Tietze, F., Vimalnath, P., Aristodemou L., Molloy, J. (2020), Crisis-Critical Intellectual Property: Findings From the COVID-19 Pandemic, *IEEE Transactions on Engineering Management*, <http://dx.doi.org/10.1109/tem.2020.2996982>.