Journal of Monetary Economics 109 (2020) 104–106

Contents lists available at ScienceDirect

Journal of Monetary Economics

journal homepage: www.elsevier.com/locate/jmoneco

Discussion

Comments on Mandelman and Waddle's "Intellectual property, tariffs, and international trade dynamics" ☆

Wolfgang Keller

University of Colorado, CESifo, NBER, and CEPR, United States

ARTICLE INFO

Article history:
Received 29 October 2019
Accepted 29 October 2019
Available online 15 November 2019

In their paper, Federico Mandelman and Andrea Waddle are interested in the relation of trade and the protection of intellectual property rights (IPR) policies. This is against the back drop of the so-called US-China Trade War, which is underpinned by claims of forced technology transfer from the US to China.[1]

In such a situation, might it be possible to use trade policy tools, specifically tariffs, to improve IPR protection? To address this question, in terms of positive economics the paper seeks a better understanding on how IPR enforcement and trade policies interact. Furthermore, the authors evaluate the effect of such policies on the welfare of agents in both countries. Mandelstam and Waddle tackle these issues in a dynamic, general equilibrium framework combing elements of (Ghironi-Melitz, 2005) and (Holmes et al., 2015). The authors argue that there might be room for cooperation between countries, as higher tariffs are found to be an effective deterrent for weak IPR protection just as weakening IPR enforcement may be a credible threat to prevent tariff increases.

1. Technology transactions and technology transfer: what do we know?

Taking a step back, what do we know about countries acquiring foreign technology, and more specifically, what are the basic patterns in the international trade in intellectual property? In Mandelstam and Waddle's analysis, advanced domestic firms license their technology to foreign firms at some price. Table 1 presents cross-country evidence on US technology exports by showing charges for the use of intellectual property for the years 2006, 2011, and 2017 (source: Bureau of Economic Analysis, www.bea.gov). In the year 2006, for example, US firms charged close to $ 84 billion to overseas firms, which rose to about $ 128 billion by the year 2017.

Further, in 2006 US technology exports to China were $ 1.55 billion (Table 1), which compares to $ 54 billion of goods exports (US Census Foreign Trade Statistics; not shown in Table 1). That goods exports were much larger than technology exports could potentially be due to a relatively narrow definition of technology.[2]

At the same time, China's technology purchases from the US remain relatively small when we compare it to technology purchases of other buyers. In 2006, China is the 15th largest destination of US technology exports, while by comparison, in

☆ Thanks to Keith Maskus for discussions and the Carnegie-Rochester-NYU Conference on Public Policy participants for feedback.
E-mail address: Keller@colorado.edu

[1] See, e.g., USTR Section 301 fact sheet, https://ustr.gov/about-us/policy-offices/press-office/fact-sheets/2018/march/section-301-fact-sheet

[2] BEA defines these services as charges for intellectual property "not included elsewhere", i.e., the charges for a certain piece of machinery, e.g., could have an embodied-technology component.

https://doi.org/10.1016/j.jmoneco.2019.10.011

Table 1
US technology exports.

		Total charge for intellectual property			Share affiliated firms		
	Year	2006	2011	2017	2006	2011	2017
	World	83,549	123,333	128,364	0.66	0.64	0.63
Rank	Country						
1	United Kingdom	10,654	8563	9865	0.65	0.66	0.70
2	Japan	9973	11,106	7042	0.39	0.42	0.43
3	Ireland	7448	14,692	18,492	0.98	0.98	0.98
4	Canada	7280	10,170	8409	0.65	0.48	0.54
5	Switzerland	6559	8715	12,367	0.86	0.87	0.91
6	Germany	5910	7231	6330	0.78	0.75	0.66
7	France	3593	3655	2846	0.73	0.67	0.57
8	Singapore	2663	4450	2872	0.91	0.53	0.90
9	Korea, Republic of	2602	4529	6130	0.30	0.19	0.23
10	Australia	2035	3531	2296	0.64	0.64	0.49
11	Italy	2024	1756	1402	0.62	0.60	0.57
12	Mexico	2011	3052	3643	0.67	0.63	0.66
13	Netherlands	1780	5367	4740	0.76	0.91	0.87
14	Spain	1626	1656	1165	0.61	0.66	0.50
15	China	1551	4127	8762	0.63	0.66	0.38

Notes: In Millions of Dollars. World excludes the United States of America. Source is BEA International Services database.

the same year China was the fourth largest destination of all US exports in goods (US Census Foreign Trade Statistics). There are eight European countries alone in 2006 to which US firms sell more technology than to China.

2. The market for technology

Two issues matter here. First, based on Table 1, which gives one of best measures there is, the overall size of technology exports is surprisingly small. This reflects the fact that technology is relatively difficult to buy and sell due to asymmetric information problems. In particular, once the seller has precisely described the nature of her technology the potential buyer may have fully understood–but will not spend the resources for the purchase anymore. Failure in the market for technology is thus relatively common. The second point is that US technology exports to China are lower than what one might have expected based on standard determinants of bilateral transactions such as size and geographic distance.

A closer look at the figures in Table 1 gives additional clues. On the right side, we see that about two thirds of all US technology exports worldwide are to affiliated parties. The large majority of these are exports from US-headquartered multinational firms to their foreign affiliates. This is in line with the previous point because firms become multinational in order to internalize the difficulties of transacting in the market for technology. To be sure, this is not the only factor. Consider Ireland, which in 2017 buys more than twice as much technology from the US as China, while in 2006 it was four times as much. Ireland is attractive to US multinationals because they pay relatively low taxes; a whopping 98% of all US technology exports are to affiliated parties. The prices charged by these multinationals are internal prices, and while the law requires that they approximate market prices transfer pricing on the part of the multinational to minimize the global tax burden is a natural concern.

Thus, the majority of international technology transactions does not take place at arm's length but between multinational parents and their affiliates. This is one reason why it is useful to incorporate multinational firms into the analysis. Another is that the firm's decision to make or buy is systematically related, for example, to the severity of the hold-up problem between an intermediate good supplier and the owner of the technology, or to the IPR regime of the country.[3]

As a consequence, the set of technology transactions between unaffiliated parties that are observed is endogenously determined by some of the forces that are of interest in this paper to begin with. Mandelstam and Waddle generalize their model to allow for foreign ownership of firms, however, the internalization motive as a response to difficulties in the market for technology–or other reasons for the existence of multinationals, such as local market access–play no role.

3. Externalities versus internal effects

Another important feature of technology on which there is general agreement is that transactions when there are no prices–arms' length market prices or internal multinational prices–are much more common than transactions when such prices exist. Put differently, much international transfer of technological knowledge is through external rather than internal

[3] See Antras and Yeaple (2014) for a broader discussion.

channels (see Keller, 2004, 2010). One important channel is through face-to-face interactions. As Robert E. Lucas, Jr. has noted, "*Most of what we know we learn from other people (…) most of it we get for free.*"[4]

The prominence of external effects raises a number of questions. For example, if at the local Starbucks in Shanghai's trendy *Xintiandi* district a worker of an US-owned multinational affiliate 'talks shop' with a worker employed by another firm, followed by dessert at the near-by Haagen-Dazs because the two of them get really into it–would that be a case of technology stealing? Furthermore, how does one measure the size of externalities? Thanks to their very nature, providing evidence on externalities is challenging. At the same time, we know that empirically, technological externalities can be very important. In the case of China, in particular, FDI technology learning externalities through both international joint ventures and foreign-owned firms have recently had a sizable impact on the productivity and innovation rates of other Chinese firms (Jiang et al., 2019). In their future work on the interaction of trade and IPR it is important that Mandelstam and Waddle find a way to cover external effects.

4. International institutional setting

As the paper is partly motivated by policy, namely the current China-US trade negotiations, the authors are to be applauded for studying policy linkage questions even if by considering exogenous policy changes the authors stop short of treating this as an optimal policy design problem. Given that policy looms large in this project, it is important to place the analysis squarely into the institutional setting of the World Trade Organization. The benefit of that is a closer connection between the formal framework and the current policy setting.

In particular, as members of the World Trade Organization (WTO), countries commit to not requiring the transfer of technology in order to gain market access (*quid pro quo*). But the latter is, following (Holmes et al., 2015), the premise of the present paper. As a member of the WTO China would be bound by these rules. Of course, one may take the view that China is blatantly in violation of these WTO commitments, in which case the assumption of *quid pro quo* may be reasonable. At the same time, whether China indeed requires technology transfer for giving market access is at the center of the public policy discussion today.

One issue that most observers agree on is that WTO entry has changed trade, FDI, and IPR policies in China. In particular, there is little doubt that upon entry into the WTO China has significantly liberalized its trade and FDI regimes (e.g., Lu et al., 2017).[5].

China has also strengthened its IPR protection since the year 2002. This suggests that the comparative static of China strengthening its IPR protection at the same time when it liberalizes its openness regime is important.

5. Summary

Existing theoretical work on the dynamics of IPR protection typically employ North-South quality ladder general equilibrium models (Helpman, 1993; He and Maskus, 2011). The link between IPR and trade policies is typically analyzed in a partial equilibrium imperfect competition framework (see Saggi, 2016). Empirical work on the link between trade and IPR protection typically shows a positive relationship, e.g. (Maskus and Penubarti, 1995) and (Ivus, 2010). Empirical work in a fully-specified, dynamic general equilibrium model is an important addition to the tool box of policy makers. These comments have suggested some dimensions that would strengthen the impact of the research.

References

Antras, P., Yeaple, S., 2014. Multinational Firms and the Structure of International Trade. Handbook of International Economics, North-Holland Volume 4.
Ghironi, F., Melitz, M., 2005. International trade and macroeconomic dynamics with heterogeneous firms. Q. J. Econ..
He, Y.in, Maskus, K.eith, 2011. Southern innovation and reverse knowledge spillovers: a dynamic FDI model. Int. Econ. Rev..
Helpman, E., 1993. Innovation, imitation, and intellectual property rights. Econometrica 61 (6), 1247–1280.
Holmes, T., McGrattan, E., Prescott, E., 2015. Quid pro quo: technology capital transfers for market access in China. Rev. Econ. Stud. 82 (3), 1154–1193.
Ivus, O., 2010. Do stronger patent rights raise high-tech exports to the developing world? J. Int. Econ. 81 (1), 38–47.
Jiang, K., Keller, W., Qiu, L., Ridley, W., 2019. International Joint Ventures and Internal vs. External Technology Transfer: Evidence from China October 2019, University of Colorado-Boulder; also NBER # 24455.
Keller, W., 2004. International technology diffusion. J. Econ. Lit. 42 (3), 752–782.
Keller, W., 2010. In: Hall, B., Rosenberg, N. (Eds.). International Trade, Foreign Direct Investment, and Technology Spillovers, 2. Handbook of the Economics of Innovation, North-Holland.
Lu, Y., Tao, Z., Zhu, L., 2017. Identifying FDI spillovers. J. Int. Econ. 107, 75–90.
Maskus, K.eith, Penubarti, M.ohan, 1995. How trade-related are intellectual property rights? J. Int. Econ. 39, 227–248 no. 3/4, November 1995.
Rossi-Hansberg, E., Sarte, P., Schwartzman, F., 2019. Cognitive Hubs and Spatial Redistribution. Princeton University September.
Saggi, Kamal, 2016. In: Bagwell, K., Staiger, R. (Eds.), Trade, Intellectual Property Rights, and the World Trade Organization. Chapter 8 in Vol. 1B, Elsevier. Handbook of Commercial Policy, North-Holland.

[4] See Rossi-Hansberg, Sarte, and Schwartzman (2019).

[5] Also arms' length technology licensing has been deregulated. Consistent with that, by 2017 the share of technology exports to unaffiliated parties in China is similar to that of Japan, see Table 1, right side.