



The Costs of Quid Pro Quo

China requires technology transfer for market access, imposing short-term costs on firms and long-term costs on global technology investment

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Executive Summary

To gain access to its markets, the Chinese government sometimes requires high-technology foreign firms to transfer partial property rights to their technology. Because the Chinese market is large and potentially lucrative, major multinationals typically agree to this quid pro quo policy, often through joint ventures with Chinese firms.

We use a quantitative macroeconomic model to analyze the effects of this policy on firm investment incentives, Chinese technology goals, and overall international technology and investment flows.

We find that:

- China has a very strong incentive to use the policy and would continue to use it even if advanced countries imposed identical policy restrictions on access to *their* domestic markets.
- The policy discourages innovation investment by foreign firms. We estimate that, by 2010, China's quid pro quo had reduced advanced country stocks of knowledge by about 5 percent relative to what they would have been had China not imposed the policy. China's economy is thus big enough that its policies have global consequences for investment and growth.
- Despite this disincentive, direct investment into China by advanced country firms does take place, and the resulting technology transfers accumulate in China. We estimate that as of 2010, *more than half* of all technology owned by Chinese firms was obtained from foreign firms.

At this point, U.S. policy options on China's quid pro quo requirement are limited and possibly counterproductive. Nonetheless, as China's technology advances, the incentives underlying its policy may change and it will have greater motivation to protect its own technology property rights, and respect others'.

Introduction

The Chinese market is huge. If a foreign company can break into it, there is potential for large sales volume and profit. Take General Motors, for example. Over 3 million vehicles with a GM nameplate were sold in China in 2014, about twice as many as in Europe. While the Chinese market may be lucrative, it comes at substantial cost. With few exceptions, businesses that use advanced technology (and the auto industry is certainly one of them) can gain access to the Chinese market only if they transfer some of that technology to a local partner. In other words, technology is *quid pro quo* for the access.

This technology transfer often is accomplished through forced joint ventures. GM has 50-50 joint venture deals with several Chinese partners. In fact, all of the world's major automobile manufacturers have operations in China, all through 50-50 joint ventures. Quid pro quo is a long-standing policy in China, and that China should possess significant technology itself, rather than the West owning it all, is a regularly articulated Chinese policy goal. When former Chinese leader Deng Xiaoping opened up China to foreign direct investment (FDI) in the 1980s, technology transfer was explicitly part of the deal offered foreign firms.

In more recent years, requirements have become more implicit and informal, because explicit quid pro quo runs afoul of trade agreements signed by China. Nevertheless, it is common knowledge that if a foreign firm has advanced technology that China wants, whether it be in aerospace, electric cars or some other prized technology, that firm can gain access to the Chinese market only if it shares that technology.

Exchanging market access for technology transfer is not new, nor exclusive to China. In fact, in the 1960s and 1970s, many developing countries began imposing such policies. But China's economy is huge, dwarfing those that have used quid pro quo in the past, and that has significant implications for global investment decisions.

When a small country uses quid pro quo policy and thereby expropriates technology from a multinational firm, the firm's profits from using the technology in that country are obviously diminished. But that reduction in returns doesn't have much of an effect on the multinational's *global* investment decisions in new technology. Small markets represent only a minor share of potential profits from new technology, so whatever transfer takes place makes little difference to the global picture.

But the Chinese economy is now the second largest in the world, on its way to 20 percent of world GDP. For GM, China represents more than 30 percent of global sales by unit volume. China is so big that the returns a multinational firm can potentially obtain there can now affect that firm's overall investment decisions.

In recent research, we examine the economic effects of China's quid pro quo policy using a quantitative macroeconomic model of the world economy.¹ A key ingredient of the model is *technology capital*. Technology capital includes new ideas, inventions and products. An example is a particular design for a new automobile model. The same automobile design can be used in multiple countries, so when a multinational firm invests in designing a new car, it needs to consider the size and other characteristics of markets it might bring the new model to and, crucially, whether a particular nation will require transfer of technology capital as a precondition for market access.

In our model, quid pro quo policies are closely linked to FDI flows, and we use data on actual flows to "reverse engineer" what quid pro quo policy requirements must have been in place for such flows to occur. That is, in order for the model to generate results consistent with the data, what tech transfer was required to obtain a given level of market access?

With the estimated policy requirements in hand, and with the remaining model parameters obtained through standard approaches, we then use the model to simulate the dynamic effects of China's quid pro quo policy. We thus gain an understanding of the policy's impact on firm investment incentives, Chinese technology goals, and overall international technology and investment flows.

¹ Holmes, Thomas J., Ellen R. McGrattan and Edward C. Prescott. 2014. "Quid Pro Quo: Technology Capital Transfers for Market Access in China." Staff Report 486. Federal Reserve Bank of Minneapolis. minneapolisfed.org/research/staff-reports/quid-pro-quo-technology-capital-transfers-for-market-access-in-china

Here, we highlight three results:

First, we find that China has a very strong incentive to use quid pro quo policy. In fact, it would continue to use it even if advanced countries retaliated by imposing quid pro quo policies on China's access to their home markets.

Second, because of China's quid pro quo policy, firms in advanced countries have less incentive to innovate and have therefore invested less in innovation than they would have had it not been applied. We estimate that, by 2010, advanced country stocks of knowledge in the model economy were approximately 5 percent less under quid pro quo relative to what they would have been had China not imposed the policy. In other words, China's economy is big enough that its policies have significant global consequences for investment and growth.

Third, even though China's policy thereby discourages direct investment by firms from advanced countries, some FDI does take place, and the transfers that occur to obtain market access *accumulate* over time. The model estimates that as of 2010, *more than half* of all technology owned by Chinese firms was obtained from foreign firms.

Selected details

In this section, we highlight two other features of the nation-firm relationship revealed by our model: First, imposing limits on the market in which the host nation can profit from a technology encourages outside firms to invest in that nation's market and, second, a nation's relative level of technological development strongly influences its incentive to impose quid pro quo policy.

Market limits on property rights shape firm investment incentives

A detail that plays a big role in the analysis is that quid pro quo deals offered to foreign firms generally trade market access in China for property rights on technology in China only, *not* in other markets. For example, the joint venture Shanghai General Motors owns property rights to make various car models in China, and the Chinese firm SAIC has a share of these rights. However, SAIC cannot use shared ownership rights in China to start selling the same models in the United States.

One of the contributions of our paper is a detailed analysis of Chinese patent data. Our analysis provides evidence that quid pro quo deals do indeed limit transferred property rights to China. It is possible to apply for the same patent in multiple countries and to link these patents in the data. A striking pattern emerges when we look at patents in China that are jointly owned by a Chinese firm and a foreign partner. In virtually all such cases, either (1) the Chinese patent does not link to another patent in a foreign country or (2) if it does link, the Chinese firm's name is left off the patent in the foreign country, and the foreign partner's name is the only one on the patent outside China.²

This is in contrast to Chinese patents that are wholly owned by Chinese firms that aren't joint ventures. These patents sometimes *do* go outside China, and when this happens, the name of the Chinese firm remains on the patent filed in the other country. It is clear that foreign multinational firms have drawn a bright line on technology ownership at the Chinese border.

² For a summary description and results of this analysis, see "Quid Pro Quo: Technology Capital Transfers for Market Access in China," 8 November 2013, voxeu.org/article/technology-transfer-chinese-markets.

Stopping transferred ownership at the border strongly increases the incentive for foreign firms to accept the deal. Obviously, GM would have little incentive to transfer technology to SAIC if SAIC could sell the same cars in the United States, undermining GM in its own backyard! This explains why it is rational for the model's foreign firms to transfer so much technology capital to China. (To repeat the figure from above, the model estimates that by 2010, foreign firms had transferred more than half of what they own in China to Chinese firms.)

While our analysis abstracts from the possibility that transferred technology might “jump the border,” in practice there will of course be some leakage. A particular Chinese company might be able to take some of the transferred technology to nations like Brazil or India that have looser standards for intellectual property rights than the United States and Europe.

Leakage into advanced countries is harder, however, since multinational firms use their patent portfolios to protect themselves in such markets. The data indeed show that Chinese firms do very little FDI in the United States and other advanced nations, consistent with our model (which specifies that Chinese firms are, by contract, forbidden from bringing transferred technology abroad). Thus, the data confirm that Chinese firms don't—by and large—transfer acquired technology beyond China's borders. In the future, a precondition for China doing FDI in the United States by, for example, building an automobile factory, might therefore be that Chinese firms not use transferred capital and instead build their own U.S. patent portfolios.

A nation's level of technological development affects its incentive to impose quid pro quo China's incentives to use quid pro quo are, as noted above, very strong. Actually, any country has an incentive to impose quid pro quo on foreign investment for the same reasons countries have for taxing foreign investment. Indeed, quid pro quo is a type of tax, paid in units of technology instead of the local currency. What is interesting in our results is that China (compared to, say, the United States) has a particularly high incentive to adopt quid pro quo. The key is that China is starting from a low level of technology, while the United States is at a high level. China has more to gain in terms of foreign technology that it can grab, and not so much to lose if other countries started imposing quid pro quo on China's technology. Therefore, threatening to retaliate against quid pro quo with a countervailing quid pro quo policy is unlikely to stop China from using it.

China has been a member of the World Trade Organization (WTO) since 2001 and, as part of the accession protocol, it officially agreed that it would no longer make technology transfer a precondition for market access. However, this rule is difficult to enforce. Negotiations about technology transfer are secret, and individual foreign firms do not have an incentive to disclose information or publicly complain. (In fact, another Chinese requirement for market access is to “keep quiet” about such details.) Since China's WTO accession, new foreign automobile makers have continued to enter the Chinese market, such as BMW in 2003, but they all come in as 50-50 joint ventures. General Electric has a new avionics joint venture in China in which it has transferred jet navigation technology, and Boeing also has a recent technology transfer deal. There is little doubt that these deals were all quid pro quo.

Conclusion

Our first main finding is that China has strong incentives to use quid pro quo, so much so that it would be hard to get the country to stop doing it. Our second finding is that China's market is now so big that its quid pro quo policy has had a negative effect on multinational firms' investment in new ideas. Foreign firms try to limit such damage by restricting property right transfers to the Chinese market, but leakage is inevitable. Third, we find that because some direct innovation investment takes place in China despite quid pro quo disincentives, more than half of all technology now owned by Chinese firms was obtained from foreign firms.

How U.S. or WTO policy might be changed to induce China to change its behavior is a difficult question to which we don't yet have an answer. We can say that, on its own, the United States currently has little leverage. A "tit for tat" strategy where the United States responds to China's quid pro quo with its own quid pro quo toward China would have little effect on China's incentives. And while the model predicts that the United States would gain something from turning the tables and expropriating technology from China, the predicted gain is negligible because China has only a relatively small base of advanced technology.

Moreover, if the United States were to play the expropriation tactic against China, the precedent would have negative consequences in dealings with other developing countries about protection of intellectual property. As China becomes richer, and its technology advances, the incentives underlying its existing policies may change. China will then have greater motivation to promote the protection of intellectual property.