

# Updated Research Statement

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## Abstract

My research analyzes strategic interactions between firms, regulators, and governments. Both the methodological as well as the topical aspects are important in linking the various pieces of my research together. In the topics dimension, my research interests have shifted from an international emphasis to the role of financial regulation. Methodologically, I have extensively studied dynamic relationships and contracts, in particular the trade-off between short-term interests and the long-run cost of short-sighted behavior.

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# 1 Research statement

**Applied theory** This line of research addresses in multiple related papers a very basic question: What is the optimal design of long-term agreements with an impatient agent whose preferences are inherently short-term oriented? In which settings might this be empirically relevant? Think about making a large investment in a cash-starving emerging market country with poor legal enforcement, such as Exxon-Mobil’s decision to invest in Venezuela. In these settings, the management of expropriation risk plays a major role in the capital budgeting process. My job market paper “**Expropriation risk and technology**” (*Journal of Financial Economics*, 2012) argues that contracts that are seemingly unfair to the government and ex-post used by government officials to justify the act of expropriation may, in fact, be optimal contracts that “anticipate” high expropriation risk. Expropriation risk is particularly high for firms and sectors where the technology advantage of the multinational relative to the second-best local government technology is low.

The paper “**Impatience versus incentives**” (joint with J. Zhu, *Econometrica*, 2015) builds on my job market paper and extends it to analyze the more general implications of repeated interactions with an impatient agent. This is theoretically interesting because the valuation of future cash flows, a central theme in Finance, is pivotal to understanding how agents respond to incentives induced by long-term contracts. We show that optimal dynamic agreements generically feature endogenous cycles. These cycles result from the interplay between the incentive benefits of paying the agent late and the dynamic trading gain from paying the impatient agent early.

In ongoing work “**Only time will tell: A theory of deferred compensation and its regulation**,” (joint with Florian Hoffmann and Roman Inderst) we characterize how to optimally incentivize a worker when it may take a long time until the full impact of her actions are observed. This is not only relevant in the financial sector, where risk-taking by employees might only be exposed in downturns, but in many other real-life settings. Should we wait for more precise information or reward the liquidity-constrained (impatient) agent early? Our paper provides a complete characterization of optimal contracts regardless of how information (contractible signals) arrive over time. We show that the optimal duration of pay resulting from this *impatience* vs. *informativeness* trade-off is shorter if the agent’s outside option is higher, but may be non-monotonic in the implemented effort level.

While these previous papers have analyzed the dynamics of bilateral relationships, the paper “**Markup cycles, dynamic misallocation, and amplification**” (joint with C. Parlour and J. Walden, *Journal of Economic Theory*, 2014) analyzes the aggregate implications resulting from individual strategic behavior. Precisely, we consider a continuum of heterogeneous industries, where each industry consists of a finite number of firms engaging in a dynamic Bertrand pricing game à la Rotemberg and Saloner (1986). This paper uses both the repeated game tools of my job market paper as well as the standard CES general equilibrium framework in international trade,

which I also employ in “**Tariff wars in a Ricardian model with a continuum of goods**” (*Journal of International Economics*, 2010). Our paper makes two points. First, oligopolistic competition can produce procyclical, acyclical, or countercyclical markups as soon as one departs from the assumption of risk-neutrality (consistent with empirical evidence by Nekarda and Ramey (2013)). Second, myopic price-setting at the industry level can generate “endogenous fluctuations” through feedback effects in general equilibrium.

**Financial regulation** The recent financial crisis has (once more) illustrated the special role of the financial sector for the functioning of the overall economy. These spill-over effects have motivated governments across the world to massively support ailing banks. While such interventions may have prevented an even larger scale of the crisis ex post, it is well understood that the expectation of such policies creates ex-ante distortions. Financial institutions, in particular too-big-to-fail institutions, do not fully internalize the cost of their own failure and, hence, have an incentive to take on more risks than would be socially optimal. In such environments, banks are able to “privatize gains and socialize losses,” implying a major reason for regulating the financial sector in the first place. One of the primary tasks of financial regulation is to mitigate such misalignment of private and social incentives.

Within the field of financial regulation, my research analyzes policies which try to tame risk-taking incentives: capital regulation, the measurement of risk within financial regulation (credit ratings), as well as the regulation of compensation targeting risk-taking. My (mostly) theoretical approach is motivated by the fact that most proposed regulatory changes cannot be evaluated empirically before they are implemented. Moreover, relevant outcomes, such as exposure to unlikely tail events, are oftentimes not observed until it is “too late.” This creates the need for models that capture relevant economic trade-offs. While my research does not take an a-priori stance on the effectiveness of a particular policy, it takes the view that financial institutions rationally respond to regulation.

If regulators across the world rely on ratings produced by private, profit-maximizing credit rating agencies to measure risks on the asset side of financial institutions, then credit ratings themselves will reflect regulatory certification. This is the basic point of “**Rating agencies in the face of financial regulation**” (joint with C. Opp and M. Harris, *Journal of Financial Economics*, 2013) building on Opp and Opp (2009). It can explain why rating inflation is more likely to occur for complex, structured securities and why sophisticated institutional investors purchase these assets nonetheless.

While rating agencies have thus played a role in fueling the financial crisis by enabling financial institutions to hold risky assets without appropriate capital buffers, the risk-taking actions have been ultimately taken by banks. Post crisis, this has triggered calls for more stringent regulation of banks, in particular in the form of higher capital requirements (Admati et al. (2011)) and intervening in short-termist compensation design.

“Compensation schemes overvalued the present and heavily discounted the future, encouraging imprudent risk taking and short-termism. (...) In the UK, we have introduced a remuneration code prescribing that payment of bonuses must be deferred for a minimum of three years and, after payment, be exposed to clawback for up to seven years.” *Mark Carney, Governor of the Bank of England, November 17, 2014.*

From a conceptual perspective, capital regulation and restrictions on compensation design are very different approaches. The idea behind capital regulation is that it affects shareholders’ incentives and will, thus, *indirectly* feed back into how shareholders incentivize their managers. In contrast, recent regulation mandating minimum deferral periods for bonuses or clawback clauses *directly* targets the structure of compensation contracts. My current working papers address the effects of both types of policies.

In “**Only time will tell: A theory of deferred compensation and its regulation**” (joint with Florian Hoffmann and Roman Inderst) we show that regulatory proposals to intervene in the timing dimension of compensation target a symptom of short-term actions, not the cause. When bank shareholders face regulatory constraints on how to incentivize bank managers on the timing dimension of pay, they will adjust other dimensions of the compensation contract, in particular, the size or the contingency of payouts. Despite this, we show how moderate required minimum deferral periods can be successful in nudging the principal to induce more long-term actions from the agent: Deferral regulation operates akin to a (Pigouvian) tax on short-term actions. Our theory also provide a rationale for the additional use of mandatory clawback clauses.

In contrast, capital requirements do target the cause of excessive risk-taking, namely limited “skin in the game,” but may come at the cost of constraining aggregate credit supply (see e.g., Blum and Hellwig (1995)). In a working paper (“**Bank capital, risk-taking, and the composition of credit**”) my co-authors Milton Harris, Christian Opp and I propose a general equilibrium framework to analyze the cross-sectional distribution of credit and its exposure to shocks to the financial system, such as changes to capital requirements, bank capital, and interest rates. Consistent with evidence on banks’ asset portfolios in Europe, our framework predicts that banks endogenously specialize in financing different segments of the borrower risk distribution to optimally exploit public guarantees such as deposit insurance. As a result of these financing distortions, economies typically exhibit simultaneously over- and underinvestment in different parts of the borrower distribution. While relatively safe, bank-dependent borrower types are credit rationed, some surplus-destroying high-risk borrowers obtain funding from risk-seeking banks. We show that *capital ratio* requirements unambiguously increase total surplus as long as there is sufficient capital in the banking sector. Otherwise, it risks backfiring, and can, surprisingly, make the financial system riskier.

Finally, in the working paper “**Regulatory reform and risk-taking: replacing ratings**” Bo Becker and I expose that a reform officially justified by replacing flawed credit ratings as

inputs to capital regulation of insurance companies, effectively eliminated capital requirements for structured securities. We document a massive increase in risk-taking behavior by insurance companies post reform.

## 2 Paper summaries

### 2.1 Applied theory

Motivated by Hugo Chavez’s expropriation of ConocoPhillips in Venezuela in 2007, my job market paper “**Expropriation risk and technology**” (*Journal of Financial Economics*, 2012) tries to understand the economics and dynamics of expropriation risk. Given the lack of contractual enforcement possibilities when the deviating party is the government, such a study begs the question of how (and why) such investments are made in the first place.

Typically, we think about property rights varying at the country level, such as through the channel of the legal system (La Porta et al. (1998)) or the channel of institutions (Acemoglu et al. (2001)). In my dissertation, I adopt a more granular perspective, and argue that property rights *within a country* vary across industrial sectors, linked to the technological level of the sector. Intuitively, the higher the comparative advantage of a firm (sector) to manage an asset, the less it has to fear expropriation by a government.

To understand firm investment dynamics in environments without resort to a legal system, contracts have to be self-enforcing. That is, neither party should have an incentive to deviate from the contract at any point in time. I model an environment in which a firm – e.g., a large multinational oil firm – interacts repeatedly with an impatient government (think about Venezuela, Russia). Formally, impatience implies that the government discounts the future at a higher rate than the multinational firm, which is supposed to capture the notion that a government is making short-sighted decisions and/or potentially starving for cash. By allowing for discount-rate shocks (induced by, for example, the election/coup of a new government), it is possible that a government expropriates in equilibrium – which is not typically a feature of repeated games. Upon such a discount-rate shock, expropriation of sectors is, however, not “random,” but rather evolves according to a pecking order, in which the government selects sectors which are relatively easy to expropriate.

My study has empirical implications: there is a tendency that expropriation occurs in those sectors that seemingly got a “good deal” from previous governments (see, for example, Yukos in Russia). That is, the typical official government narrative is that firms are expropriated as a punishment for paying “too” little for the projects *ex ante* and very few taxes afterwards (often implied by generous tax holidays in the first years). In my model, the same phenomenon occurs as an equilibrium outcome, but the causality is reverse. In the presence of strong expropriation risk, the only way to entice firm investment is to require a very low upfront payment and to

grant tax holidays. As long as the regime stays in place, firm profits are “extraordinarily” high to account for the possibility that the firm loses everything upon expropriation. In contrast, when expropriation risk is modest, large upfront payments, satisfying the immediate cash need of the government, are feasible. Interestingly, governments may not necessarily benefit from being weak: while government weakness makes it possible to achieve higher joint surplus (to be shared between the firm and the government), it limits the threat point of the government, i.e., the amount of surplus that the government can extract. Firms, in turn, can actively manage expropriation risk by optimally bundling activities in high- and low-expropriation risk sectors, consistent with the wide-spread phenomenon of conglomerates in emerging-market countries.

Building on my dissertation, “**Impatience versus incentives**” (joint with John Zhu, *Econometrica*, 2015) instead analyzes the general theoretical implications of dynamic contracting with an impatient agent. This paper has been included in the reading list for Ph.D. topics courses by Debraj Ray (NYU Economics), Mikhail Golosov (Princeton), Tim Worrall (Edinburgh Economics) and Willie Fuchs (UC Berkeley Finance). The assumption of an impatient agent has become common in finance (see Demarzo and Duffie (1999), DeMarzo and Fishman (2007)) and economics (Acemoglu et al. (2008)). It introduces an interesting tension for optimal dynamic contracting: On the one hand, *backloading* rewards to an agent has been considered the robust optimal incentives scheme since rewards do not affect incentives as soon as they are paid out (see Harris and Holmstrom (1982) and Becker and Stigler (1974)). On the other hand, the impatience force makes such early rewards valuable.

We consider a parsimonious dynamic-agency framework in the spirit of the general treatment by Ray (2002). We show that an infinitesimal amount of relative impatience on the agent side will cause virtually all Pareto-optimal contracts to oscillate around a unique Pareto-optimal steady state. Oscillation can be damped, converging to the steady state, or can persist in the long run. In the latter case, the amplitude of oscillation grows over time, causing even arbitrarily low participation constraints to bind in the long run. These endogenous cycles occur in the absence of exogenous uncertainty or any need to randomize. Our results highlight that the assumption of impatience is far more than purely an auxiliary assumption. It can have “strong” implications for contract design: Different discount rates create dynamic trading gains and, thus, introduce surplus from a borrowing-lending relationship on top of the surplus created by actions such as effort or investment. Moreover, our framework can be used to develop tractable models of endogenous cycles via the interaction of impatience and incentives.

In ongoing research joint with Florian Hoffmann and Roman Inderst, on “**Only time will tell: A theory of deferred compensation and its regulation**” we characterize optimal contracts in settings where the principal observes informative signals over time about the agent’s one-time action. If both are risk-neutral, contract relevant features of any signal process can be represented by a deterministic “informativeness” process that is increasing over time. The (slope of this) function fully encodes the notion of “Only time will tell.” The duration of pay of optimal

contracts trades off the gain in informativeness with the costs resulting from the agent’s liquidity needs. The duration is shorter if the agent’s outside option is higher, but may be non-monotonic in the implemented effort level. The broader take-away of our paper is that the observed duration of pay may reflect an optimal trade-off rather than necessarily a corporate governance failure. Our results suggest that the empirical analysis of compensation contracts ought to relate the timing dimension of pay also to variation of the nature of information arrival across industries. For example, it may be hypothesized that firms in R&D intensive industries (with year-long lags and few products) ought to design longer duration ontracts for their CEOs.

In joint work with Christine Parlour and Johan Walden, we study the “asset-pricing implications” for industrial organization (IO). In “**Markup cycles, dynamic misallocation, and amplification**” (*Journal of Economic Theory*, 2014). The published paper has two main results. First, counter to the conventional wisdom based on the oligopolistic-competition model of Rotemberg and Saloner (1986), industry markups may be procyclical with regard to aggregate shocks, consistent with recent empirical evidence by Nekarda and Ramey (2013). Intuitively, while high product demand in good times increases firms’ incentives to undercut competitors to reap immediate rewards (the conventional force of oligopolistic competition), the marginal utility of an additional dollar reaped in good times is also low, making it less valuable to deviate, which is the novel asset-pricing force we highlight. With risk-averse preferences, the latter force can dominate the “demand” effect and thereby lead to procyclical markups. This set of results has important implications for the design of monetary policy since the cyclicity of markups is a key building block of leading Neo-Keynesian macroeconomic models (see, among others, Goodfriend and King (1998) or Christiano et al. (2005)).

Second, if industries are heterogeneous in terms of their competitiveness or their exposure to (exogenous) aggregate shocks, intra-industry behavior can amplify shocks, or even produce endogenous fluctuations, in the absence of aggregate shocks. These aggregate implications arise from the fact that heterogeneous industries will set different markups state-by-state. This markup dispersion across industries leads to resource misallocation (see Lerner (1934)) and, hence, affects aggregate consumption. Following standard asset-pricing insights, changes in aggregate consumption affect agents’ marginal utilities across states and thereby the valuation of firms’ future cash flows; this, in turn, feeds back into the firms’ ability to sustain collusion, leading to the rich set of implications.

## 2.2 Corporate finance

### 2.2.1 Financial regulation

My paper “**Rating agencies in the face of financial regulation**” joint with Christian Opp and Milton Harris (*Journal of Financial Economics*, 2013, see also shorter Fame version) takes

as given that a large set of regulatory rules in the financial sector are tied to credit ratings.<sup>1</sup> As a result, ratings do not just convey information to investors about the creditworthiness of borrowers, but also provide regulatory certification to regulated investors, such as banks, mutual funds, money market funds, and insurance companies. If regulatory constraints of institutional investors bind, investors value the rating *label* in itself (see empirical evidence by Kisgen and Strahan (2010)), independent of the underlying information about credit risk. Following this logic, institutions should rationally care even about credit ratings that are “clearly” inflated.

By identifying this regulatory value, our main point follows immediately: the quasi-regulatory authority of credit-rating agencies feeds back into their incentives to acquire and disclose information, which ultimately affects the informativeness of ratings. Intuitively, our model predicts that the supply of highly rated securities increases with the regulatory shadow value of ratings, while the effect on informativeness is ambiguous. However, if the regulatory value of ratings is above an endogenous threshold, delegated information acquisition is no longer sustainable and rating agencies inflate ratings. The threshold, above which the regulatory shadow value triggers rating inflation, is the level at which the rating agency is just indifferent between *acquiring* the optimal amount of information and *disclosing* the “correct” rating on the one hand, and, simply capturing the regulatory benefit while producing no information on the other hand. If the credit rating agency spends costly resources to acquire valuable information, there is no point in diluting that information *ex post*. This type of rating inflation is more likely for complex securities (which are more costly to evaluate) or securities that offer more risk-taking benefits. Our predictions are, thus, consistent with empirical studies that document rating inflation only for complex structured securities, but not for corporate bonds (see Griffin and Tang (2012), Benmelech and Dlugosz (2009), Effing and Hau (Forthcoming) vs. Baghai et al. (Forthcoming) for evidence on corporate bonds).<sup>2</sup>

In ongoing work “**Bank capital, risk-taking, and the composition of credit**” my co-authors (Milton Harris and Christian Opp) and I propose a general equilibrium framework that can simultaneously explain the risk-taking behavior by banks in the years leading up to the financial crisis (see Jiménez et al. (2014)) and the credit crunch in its aftermath (see Ivashina and Scharfstein (2010)). That is, banks in our framework can play both a socially valuable role by alleviating credit frictions of bank-dependent borrowers and a parasitic role by engaging in excessive risk-taking that exploits public subsidies of banks’ debt financing cost. The key feature of our model is that it can flexibly capture cross-sectional borrower heterogeneity along multiple dimensions known to be essential for credit decisions, such as risk characteristics, profitability, and

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<sup>1</sup> Starting with ratings-based investment restrictions for banks in 1936, regulators have increasingly outsourced regulatory authority to credit-rating agencies. In 1975, the Securities and Exchange Commission (SEC) formalized this regulatory accreditation by establishing a list of nationally recognized statistical rating organizations for the purpose of dealer-broker capital requirements. One of the goals of the Dodd-Frank Act was to reduce/eliminate such reliance on credit ratings.

<sup>2</sup> In contrast to the suggestive term “inflation,” rating inflation is, thus, mostly a cross-sectional rather than a time-series phenomenon.



bank dependence. Hence, this framework allows us to analyze the cross-sectional distribution of credit and its exposure to shocks to the financial system, such as changes to bank capital, capital requirements, and interest rates.

Regarding banks' asset portfolio choices we find that typically a subset of banks chooses to specialize in borrower types with correlated downside risks, which exploits the "put" value (see Merton, 1977) obtained from public guarantees of bank debt. This prediction is consistent with existing empirical evidence that Spanish and Italian banks primarily hold government debt of their respective home countries (Acharya et al., 2014), and that banks tend to hold specialized portfolios (Rappoport et al., 2014). We characterize how such reaching for yield (Becker and Ivashina (2014)) will, in general equilibrium, be reflected in loan prices (yields). A bank-funded borrower's cost of capital reflects both a premium for a loan's use of scarce bank capital and a discount due to implicit government subsidies of banks' funding cost. As a result of these financing distortions, we characterize how over- and underinvestment in different parts of the borrower distribution are linked to the capitalization of the banking sector and the distribution of borrowers' risk characteristics and bank dependence.

Our framework yields the following policy implications. First, an injection of capital into the banking sector typically causes heterogeneous responses by banks (see evidence by Giannetti and Simonov (2013)), leading to a simultaneous increase in overinvestment in risky surplus-destroying projects, a reduction in underinvestment, and additional crowding out of regular public market investors. Second, if capital ratio requirements are increased, banks' equity holders have greater skin in the game, causing private loan profitability and allocative efficiency to become better aligned. When bank capital is not scarce, an increase in capital ratio requirements thus always weakly improves allocative efficiency. However, when an increase in capital ratio requirements either causes bank capital to become scarce, or scarcer than it previously was, aggregate bank credit also contracts. Paradoxically, a moderate increase in capital ratio requirements may then lead banks to disproportionately cut lending to firms with relatively safe cash flows and low profitability, causing an increase in risk taking by the average bank. Third, we evaluate the effects of changes to interest rates (e.g., due to monetary policy shocks), in particular, how banks pass through interest rate changes to their borrowers. We show why pass-through can be incomplete or excessive, varies across various borrower types in the cross-section, and depends on the scarcity of aggregate bank capital. In particular, when aggregate bank capital is scarce and the marginal borrower funded by the banking sector is bank-dependent, pass-through may be severely limited. This may explain the sluggish pass-through of low interest rates to borrowers in the aftermath of the financial crisis.

The previous theoretical study directly relates to an empirical examination of a regulatory reform of capital requirements. In "**Regulatory reform and risk-taking: replacing ratings**", Bo Becker and I study the first large-scale attempt by regulators to remove ratings as a basis for risk measurement in capital regulation. Officially motivated by the failures of credit-rating

agencies during the financial crisis, the National Association of Insurance Commissioners (NAIC) started using “expected-loss” estimates by PIMCO and BlackRock instead of traditional credit ratings to determine capital requirements for insurers’ asset holdings of private-label mortgage-backed securities (MBS) starting 2009/2010.<sup>3</sup>

Our study exposes that the calibration of the system to the new input implies capital buffers that only provide protection up to “expected losses,” but no protection against negative macro scenarios. As a result of this regulatory reform, industry-level capital requirements for mortgage-backed securities have been reduced from \$19.36bn (under the counterfactual previous system) to \$3.73bn. Insurers strongly respond to this new regulatory regime with increased risk taking within their MBS portfolios, but not in other asset classes that are unaffected by the change, such as other asset-backed securities and corporate bonds. Also, the regulation does not only apply to the existing stock of securities held by insurers, but also to new issues: while insurers’ new asset purchases consisted historically of only 10% junk-grade securities, this percentage has increased to 54.1% for their MBS portfolios after the regulatory change, a fundamental change in risk-taking behavior. If the market for new issuance of commercial mortgage-backed securities (CMBS) is reviving, we expect this behavior to also significantly affect the overall riskiness of insurers’ portfolios, potentially sowing the seeds for the next financial crisis. We conclude that these potentially large long-run costs have to be weighed against the benefits of avoiding a fire sale (see, e.g., Shleifer and Vishny (1992)) on the existing stock of MBS held by insurance companies after the crisis.

### 2.2.2 Corporate control

Many existing theories suggest that the choice of the medium of exchange in takeovers is related to, broadly speaking, private information (see, for example, Rhodes-Kropf and Viswanathan (2004), Fishman (1989), Shleifer and Vishny (2003)). While it is by definition difficult to test directly for private information, one route to make progress in identifying the information content of merger bids is to carefully examine failed transactions. Based on Lee and Opp (2005), my co-authors Ulrike Malmendier and Farzad Saidi and I document in “**Target Revaluation after failed takeover attempts – cash versus stock**” (*Journal of Financial Economics*, 2016) that cash- and stock-financed takeover bids induce strikingly different revaluations among targets. In the sample of unsuccessful takeover bids between 1980 and 2008, targets of cash offers are revalued on average by +15% after deal failure, whereas stock targets return to their pre-announcement level.

We analyze the role of future takeover activities and subsequent changes in operating policies to explain these differences, but find no evidence supporting these two channels. We conclude that the differential revaluations of cash and stock targets are most consistent with a pure information

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<sup>3</sup> Since ratings also intend to measure expected losses (Moody’s), one can understand the new inputs mostly in terms of “replacing raters” rather than “replacing ratings.”

story, in which cash bids reveal a previous undervaluation of the target to the market. We reconcile our conclusion with the one of Bradley et al. (1983) by pointing out a significant sample-selection bias affecting their analysis.

### 2.3 International trade

In “**Tariff wars in a Ricardian model with a continuum of goods**” (*Journal of International Economics*, 2010), I model the strategic interaction of countries in setting welfare-maximizing import tariffs. The issue of optimal protectionism is one of the classical and still relevant economic questions, as the ongoing negotiations about a free-trade agreement between the United States and the European Union suggest. According to Bagwell and Staiger (1999) the sole rationale for trade agreements is to escape terms-of-trade driven prisoner’s dilemma situations. My contribution to the literature is to analyze the implications of technology differences between two countries (absolute productivity advantage and comparative advantage) for optimal tariff rates and the resulting Nash equilibrium of tariffs. My general-equilibrium analysis takes place in a Ricardian model with a continuum of goods in the spirit of Dornbusch et al. (1977). I show that the optimal import tariff rate is uniform across goods. Tariffs are an increasing function of productivity-adjusted relative size, increasing in the potential gains from trade (comparative advantage), and decreasing in transportation cost. Intuitively, the larger the potential gains from trade, (the smaller the barriers to trade,) the less harmful a given tariff will be. The size of the non-traded sector is thus a function of both exogenous and endogenous barriers to trade. If a country is sufficiently large, it will prefer the globally inefficient Nash equilibrium of tariffs over free trade.

In “**Rybczynski’s theorem in the Heckscher-Ohlin world – anything goes**” (joint with Hugo Sonnenschein and Christis Tombazos, *Journal of International Economics*, 2009), we revisit one of the fundamental theorems of international trade, the Rybczynski theorem, in general equilibrium. Our setup features a classical Heckscher-Ohlin environment, i.e., 2 countries, 2 production factors (capital and labor), and homothetic preferences. The Rybczynski theorem (see Rybczynski (1955)) makes predictions about how changes in factor endowments, e.g., changes in the labor force in China, would affect its production. In its basic form, the Rybczynski theorem states an increase in labor supply leads to an *increase* in the equilibrium supply of the labor-intensive good and a *decrease* in the supply of the capital-intensive good. The theorem has received wide attention in trade theory in the context of a home economy that is small relative to the rest of the world, so that the price is determined by the rest of the world. Thus, the key to understanding its robustness in general equilibrium is to depart from the assumption of a “small” home economy. Our main contribution is to show that for a sufficiently large home economy price effects can indeed be so strong that the comparative-statics predictions of the Rybczynski theorem are reversed in sign. Such factor growth must harm the welfare of the home economy.

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