Minority Rules: Credible State Ownership and Investment Risk Around the World*

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Minority Rules: Credible State Ownership and Investment Risk Around the World

Abstract

Research in management and related fields largely assumes that host-country state (state) ownership in investment projects raises risk for private co-investors. We question that assumption in theorizing that minority state ownership may actually decrease investment risk in host countries where policy stability is low. Non-controlling but still substantial state ownership signals to private co-investors that states will maintain initial investment project terms, yet limit interference in project management under those same initial terms. Analyses of 1373 investment projects announced in 95 host countries from 1990-2012 support this proposition: 1) low policy stability in the host country increases investment risk measured as the percentage of equity comprising all project capital funding on announcement date; but 2) minority state ownership diminishes the risk-increasing impact of low policy stability; and 3) the risk-diminishing effect is greatest when policy stability is low and the state holds from 21-30% of investment project equity. Where permitted, private investors can use state ownership as a risk-reducing strategy in response to low policy stability. Our study highlights where these “minority rules” hold and state ownership signals credible assurance to private co-investors in less stable policy environments.

Key words: state ownership, investment projects, risk management, policy stability
Decades of research in management and related fields have been devoted to understanding the often fickle nature of state policies relevant to private investors, particularly in the developing world. In the 1950s, Balgooyen discussed the penchant of Latin American governments to “repeated political upheavals” resulting in new leaders with little interest in upholding “previous agreements with US investors” regarding taxes, royalties, prices and other terms affecting the survival and success of large power, water and industrial projects (1951: 336). In the next 50 years, Vernon (1971), Kobrin (1979, 1987), Henisz (2000) and others (e.g., Ramamurti, 2001) developed and empirically tested theoretical models describing host-country state (“state”) tendencies to raise risks for private investors by opportunistically revising public regulatory and more specific contract policies, especially when those private investors have valuable fixed local assets vulnerable to expropriation.

States influence private investor incentives not only through broad regulatory and more individualized contracting policies but also through occasional equity partnership. In the 1970s, Robinson (1973) noted conditions when foreign investors might address state interests by inviting state equity participation in public-private joint ventures. In the next 40 years, Raveed (1977), Perotti (1995), Boycko, Shleifer and Vishny (1996), Vaaler and Schrage (2009) and others (e.g., Cuervo and Villalonga, 2000) developed or empirically tested theoretical models of public-private co-investment demonstrating that private owners seek profits, state owners seek public welfare,¹ and conflict arising from seeking both at once both complicates enterprise management and raises risks of investment project dysfunction or failure.

Taken together, these research streams imply that risk to private co-investors decreases when states exhibit more consistency in the way they set policies related to investments —exhibit high policy stability— and when states take smaller equity stakes in those investments. A strong (weak) risk-management scenario for private co-investors is high (low) state policy stability paired with smaller (larger) state equity stakes. We think such implications are facile, follow from a narrow view of relevant theories explaining investment risk, and ignore a history of risk management strategies that apparently encourage rather than discourage mixed project ownership with substantial state equity participation under certain conditions.

¹ By welfare, we mean a range of economic outcomes relevant to state policy-makers: inflation, unemployment, growth, productivity and income. We contrast welfare-seeking state owners with profit-seeking private owners seeking to optimize firm income (profits) alone. For a discussion of such contrasts and their modelling in the context of privatizing infrastructure investment decisions, see, e.g., Galal, Jones, Tandon, and Vogelsang (1994).
To demonstrate this point, we develop a credible model of investment risk ("credible model") building on previous models applied to enterprise privatization and partial state ownership by Perotti (1995) and Vaaler and Schrage (2009) with additional grounding in institutional economics (IE) (Acemoglu and Johnson 2005; North 1990), transaction cost economics ("TCE") (Henisz 2000; Williamson 1975, 1985) and signaling (Connelly, Certo, Ireland and Reutzel 2011; Spence 1973) theories. Our credible model shares with principal-agent counterparts (e.g., Boycko et al. 1996) the assumption that conflicting priorities between public and private co-owners typically increase risk associated with a specific investment project such as an electricity generator, gas pipeline, waste-water treatment plant, or toll road. State ownership in such projects signals the possibility of interference with profit-oriented (not welfare-oriented) goals of private co-investors under existing policies defined by state laws and regulations as well as more specific contract terms states may have negotiated with private co-investors. But our credible model also shares an assumption from earlier research (e.g., Perotti 1995) that state ownership may also decrease investment risk. It signals state intention to maintain existing policies or suffer losses along with private co-investors when policies change substantially and unexpectedly.

Our credible model proposes contingencies to explain when the maintenance or interference signal will dominate with what net effect on investment risk. The contingencies relate to state policy stability and ownership. When policy stability in the host country is high, that is, state institutions permit credible commitment to uphold existing policies relevant to private co-investors, then the dominant signal of state ownership is risk-increasing interference. But when policy stability is low, that is, state institutions leave existing policies vulnerable to substantial and unexpected change, then the dominant signal of state ownership may be risk-reducing maintenance if state ownership is substantial yet still non-controlling (< 50%) –minority state ownership.

We document support for predictions derived from our credible model in a broad-sample study of investment risk associated with 1373 infrastructure projects announced from 1990-2012 in 95 host countries. Low policy stability in the host country increases investment risk measured as the percentage of equity comprising all project capital funding on announcement date. But minority state ownership diminishes the risk-increasing impact of low policy stability. That risk-diminishing effect is greatest when policy stability is low and the state holds from 21-30% of investment project equity. These core results prove robust to reasonable variation in sampling, model specification and estimation strategies.
Our study makes two broad contributions to research on investment risk management. First, we develop a credible model that differs with more conventional principal-agent models and highlights key contingencies determining the net effect of state policy stability and ownership on investment risk. The mix of IE, TCE and signaling theory elements distinguishes our explanation from others that might explain when and how state co-investment reduces risk with IE or TCE theory alone. Our model describes not one but two signals – maintenance and interference – and how the dominance of one or the other signal might affect investment risk for a broad range of *de novo* projects involving public-private co-investment. Our model outlines alternative scenarios for evaluating investment risk for these projects: a “credible” scenario combining low policy stability and minority state ownership; and alternative “interfering” or “superfluous” or “ideological” scenarios where one or both of these conditions are missing.

Second, we contribute new empirical methods for identifying and analyzing investment risk by exploiting the properties of an organizational context that management research to date has largely ignored. The announced capital structure – mix of debt and equity – of so-called “project investment” companies provides researchers with a novel, alternative indicator of investment risk amenable to analysis of state policy stability and ownership effects (James and Vaaler 2017). We exploit Myers’ dictum that “[r]isky firms ought to borrow less, other things equal” (1984: 581), and measure investment risk as the percentage of equity comprising overall project capital at the date of a project’s initial announcement. Our indicator is fine-grained. It measures risk for an *individual* investment project. Our indicator is forward-looking. It appears at the time of the project’s first announcement and portends future project ease or difficulty in subsequent construction and profitable operation. Evidence derived from our project investment context complements evidence from more conventional contexts assessing investment risk in established firms often managing multiple projects with different risk profiles under the same corporate umbrella.

These contributions advance organization research linking differences in organizational behavior and performance to organizational ownership (*e.g.*, Greenwood, Deephouse and Li 2007). They also heed a call in this journal for research analyzing interactions between public and private actors and interests (Mahoney, McGahan and Pitelis 2009). More recently, that research has assumed that substantial but non-controlling state ownership in public-private enterprises fills financial gaps and provides political connections useful for enterprise survival and success (*e.g.*, Inoue Lazzarini and Musacchio 2013). Our study adds nuance to that view. State ownership may create political connections that help maintain initial terms advantageous to private
co-investors, but state ownership may also lead to political interference with the commercial goals of private co-investors under those same initial investment terms. Our theory explains when the maintenance signal will dominate and “minority rules” of state ownership reduce investment risk for projects around the world.

**Context**

Additional explanation of the empirical context for our study provides helpful foundation for our theoretical model and derived hypotheses related to host-country policy stability, state ownership, and investment risk. Our explanation relies primarily on Esty (2002, 2004) from finance, and James and Vaaler (2017) and Sawant (2010a, b) from management research. Project investment involves the creation of a stand-alone, single-business company (project) that is bankruptcy remote from its so-called “sponsors” (owners) providing equity, but still largely reliant (~70% of overall project capital) on non-recourse debt from its creditors to fund construction and operations. Debt capital often comes in the form of loans from large, well-known commercial banks (e.g., Mitsubishi Bank) designated for specific projects (Kleimeier and Megginson 2000). The non-recourse nature of the debt means that creditors agree in advance to secure their loans with the assets of the project alone rather than with a larger pool of assets from all projects funded by the same sponsor. Thus the project must generate sufficient cash-flows itself to meet regular and substantial interest payments, and comprise substantial and salable assets to liquidate in the event of the project’s temporary hold-up or failure (James and Vaaler 2017). In this way project financing differs from corporate financing approaches where several projects are typically pooled under a single corporate umbrella, often with the corporation’s guarantee of project solvency.

Given these attributes, project capital structure at the time of initial announcement offers a fine-grained, forward-looking indicator of investment risk akin to business risk. As Esty (2002) and others (e.g., James and Vaaler, 2017) have documented in prior studies of project capital structure and risk, more debt (equity) financing a project indicates lower (higher) investment risk. This correlation is akin to business risk and capital structure observed in newly-established firms (Brealey and Myers 2003), and follows Myers’ dictum that risky firms should borrow less (1984: 581). Williamson (1988) echoes Myers in TCE terms. Risky businesses are more prone to non-payment from strategic default, bankruptcy or liquidation due to inherent contract incompleteness, greater volatility in firm asset values, and opportunism by firm managers. Lenders

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2 In the remainder of our study, we will refer to project investors, sponsors, and equity holders synonymously.
respond by rationing credit and requiring firms to set aside more equity as a percentage of overall capital to fund operations.

Project financing mitigates information asymmetry between lenders and borrowers by limiting a project owner’s ability to substitute riskier assets jeopardizing re-payment (Shah and Thakor 1987). Thus, project capital structure better reflects risk of underlying project hold-up or failure. Project financing also reduces agency costs between owners and managers (Esty 2003). Extensive contracting on project asset and cash flow use keeps managers from pursuing perquisites to the detriment of owners. Factors that might distort capital structure as a valid proxy for risk with corporate financing are substantially reduced or even eliminated with project financing. Myers’ point about capital structure reflecting risk thus applies well to this empirical context.

Projects differ not only in financing but also in governance. As Esty (2004) notes, projects replace more conventional corporate governance based on general employment contracts and hierarchically-based fiat with a web of specialized contracts between project owners and the management team, and between the management team and various suppliers providing goods and services that employees might provide to a conventional firm. If a key financing advantage of projects is shifting principal responsibility for capitalization from owners’ equity to creditors’ debt, then a key governance advantage is contract-based specialization of suppliers. People, products and processes for projects are not limited to those employed by the owners. Managers can and do contract with best-in-class suppliers of key project inputs (e.g., construction materials) and outputs (e.g., electricity). In these ways, project financing demonstrates how “structure matters” for risk management purposes (Esty 2004).

In this context, it is not surprising that firms resort more often to project rather than corporate financing when the required size of investment is larger, the need for infrastructure greater, equity more scarce, and other risks, often political in nature, are higher (Sawant 2010a, b). Such resort has been substantial. From the 1960s to the early 2000s projects accounted for more than US$1.26 trillion in investments in industrialized countries of the Organization for Economic Cooperation and Development (Esty 2004). In developing countries like the Philippines and Indonesia, risk management advantages of using projects mean that nearly 70% of all foreign direct investment arrives in this form. Notable case examples of risk management with projects include the Bougainville Copper Company mining project in Papua New Guinea started in the 1960s (Hammond and Allen 1974), Enron’s Dahbol power project in India started in the 1990s (Wells 1997), and the
World Bank’s Chad-Cameroon petroleum development and pipeline project also started in the 1990s (Esty, Sesia and Ferman 2001). In each case, private co-investors allocated substantial though non-controlling equity to states. They did so against the backdrop of expected volatility in state policies and related risk of project hold-up or failure. Our study complements such case anecdotes with theory development and broad-sample quantitative evidence regarding how investment risk related to projects varies with host-country policy stability and state ownership individually and in combination.

**Theory and Hypotheses**

**Credible Model Origins**

With this empirical context, we turn next to development of our credible model explaining relationships between state ownership and investment risk for projects located in host countries with differing levels of policy stability. Historical origins for the model follow from research in two broad streams. We already noted origins in joint venture research since the 1970s (Raveed 1977; Robinson 1973) highlighting challenges in reconciling the welfare aims of state owners with the profitability aims of private owners. A prescriptive implication consistent with principal-agent interests in incentives alignment (Jensen and Meckling 1976) counsels the minimization of state ownership unless private co-investors are compelled to venture with the state due to regulation or scarcity of private capital. The 1990s and 2000s saw continued study of such joint ventures, often re-styled as public-private partnerships (Yescombe 2007). Models here compared increasing investment risk related to incentives mismatch between state and private co-investors to the risk-reducing benefits of having state owners presumably willing to intervene on behalf of their private co-investors. Thus, research on public-private joint ventures helped identify conflicting effects of state ownership on investment risk even if that research did not also provide insight on contingencies to assess their net impact on investment risk.

Another research stream related to enterprise privatization highlighted these conflicting effects and yielded insight on contingencies changing their net impact on investment risk. Starting in the 1990s with the end of the Cold War and adoption of the so-called “Washington Consensus” (Williamson 1989), developing-countries implemented divestment and deregulatory programs in formerly state-owned and often heavily-regulated industries such as power, telecommunications, transportation and water. Former justifications for state ownership of industries based on economies of scale, national sovereignty and security, or partisan political preferences gave way to alternative justifications grounded in comparative economic efficiency analyses.
of fully-public, fully-private and various mixed ownership structures (Yergin and Stanislaw 1998). In this context, academics and policy-makers sought models guiding the choice of which industries to privatize as well as the pace and extent of state divestment.

Again, principal-agent models provided much of that guidance with standard analyses from economic advisors to developing country states (e.g., Boycko et al. 1996) emphasizing the problem of poor productive efficiency with state-owned enterprises, and the problem of conflict between state and private co-investors in public-private partnerships. Prescriptive implications included rapid and complete state divestment. Privatization models in management research elaborated on basic principal-agent assumptions with, for example, additional model components highlighting the role of political controls such as elections in disciplining state owners and mediating conflicts with private co-investors in partially-privatized enterprises (e.g., Cuervo and Villalonga 2000). A recurring assumption in these principal-agent models is that reduction of state ownership helps stay the “grabbing hand” of politicians and decreases investment risk by highlighting enterprise goals of increasing productive efficiency and profitability (Shleifer and Vishny 1994). In line with these views, cross-country studies of privatizing enterprise performance summarized by Megginson and Netter (2001) and Gupta (2005) generally document higher operating and financial performance as the percentage of state ownership decreases over time.

Credible privatization models arose as a rebuttal to these principal-agent perspectives based on observation in the field. Perotti’s (1995) credible model is illustrative. It followed from his experience as an advisor on bank privatization to states in Central Europe. Some preferred to divest from state-owned banks in gradual tranches over time even though there appeared to be sufficient interest among prospective private investors to support immediate and complete state divestment in a single offering (Perotti and Guney 1993). Perotti’s (1995) credible model treated this observed policy preference as a response to private investor skepticism about the longevity of beneficial terms offered by the state at the time of initial divestment —think of terms mandating long-term tax breaks or long-term limits on competitive entry by rivals. Continued partial state ownership provides credible assurances to private co-investors by giving states a continuing interest in maintaining initial terms or share in losses with private co-investors when initial terms are changed.

Perotti (1995: 853) suggested “a large stake” of continued state ownership to assure private co-investors during a near term of uncertain duration. In a related credible model, Vaaler and Schrage (2009) provided additional precision regarding the size and duration of partial state ownership during privatization.
Their analysis suggested non-controlling minority state equity stakes for privatizing enterprises located in host countries where the possibility of investment policy reversal is higher. They also suggested time-limits on the effectiveness of such minority ownership stakes tied to the duration of political cycles perhaps tied to local government terms of office or elections. They investigated empirical support for these propositions in 15 privatizing telecommunications enterprises and their financial returns following announcements of new investments such as acquisitions or expansions into foreign markets. They observed the highest post-announcement financial returns in the first 1-2 years after state divestment begins and when partial state ownership was in the 15-30% range.

This brief overview of principal-agent and credible models of state ownership in joint venture and privatization research suggests at least two points relevant to how these models differ in addressing broader research questions about investment risk. First, credible models highlight the impact of state ownership on investment risk contingent on assessment of the broader institutional environment governing policies relevant to private co-investors. Where institutions guarantee the maintenance of initial policies, then credible model analyses yield results similar to those of the principal-agent models. Mixed state and private co-ownership creates conflicts and complicates managerial oversight, thus increasing investment risk. But where institutions render initial policies vulnerable to change, then state ownership has the potential to play a risk-reducing role, thus leading to a second point of distinction. Credible models condition the risk-reducing effects of state ownership on the extent state ownership. To be net risk-reducing, state ownership can be neither trivial (~0%) and thus incredible as assurance to private co-investors against near-term change in initial policies, nor controlling (> 50%) and thus credible but potentially interfering with private co-investor aims under those same initial policies. We elaborate on these points about state ownership in deriving hypotheses about investment risk associated with projects operating across a broad range of industries in states with varying levels of policy stability.

**Credible Model Development**

**Institutional Factors.** Both TCE (Henisz 2000; Williamson 1975, 1985) and IE theory (Acemoglu and Johnson 2005, North 1990) provide grounding for our first credible model hypothesis about the impact of state policy stability on investment risk. From a TCE perspective (Henisz 2000, Williamson 1975, 1985), private co-investors look to states as enforcers of a so-called “public contract” assuring predictable exercise of bargained for policies over the life of a project. Policies beneficial to private co-investors may have been bargained for
directly with the state as part of a concession to drill for oil or a license to generate and transmit electrical power —for example, favorable tax treatment of project profits or guaranteed prices on project output. More often, the contract is not directly negotiated but part of the state’s general guarantee to private co-investors operating in its jurisdiction —for example, constitutional guarantees of equal protection under the law or treaty-based guarantees of so-called “national treatment” for foreign investors equal to treatment given domestic investors (see, e.g., Trachtman 2008). In either case, inherent public contract incompleteness presents states with challenges regarding how to handle inevitable disagreements with private co-investors over the life of a project. Add to this the prospect of state opportunism in reneging on initial policies after private co-investors have incurred substantial sunk costs, a prospect particularly relevant to foreign investors described in Vernon’s (1971) obsolescing bargain model, in Kobrin’s (1979, 1987) bargaining hypothesis, and in related models described by Ramamurti (2001, 2003) and others (e.g., Rodrik 1991).

Contract incompleteness and state opportunism raise risks for private co-investors, depending on how effective states are at meeting what Ramamurti (2003) calls the “institutional design” challenge. The state needs public officials and agencies with expertise to hear and resolve naturally occurring conflicts over the life of a project. Perhaps more importantly for project risk management, the state needs officials and agencies with power to constrain the executive branch of the state from contriving disputes opportunistically in order to renege on initial policies. Acemoglu and Johnson (2005) survey domestic institutional mechanisms serving those ends —for example, independent regulatory or judicial bodies with industry expertise to hear disputes and the ability to strike down executive actions if inconsistent with initial policies. Ramamurti (2001) and Trachtman (2008) analyze international mechanisms serving those ends —for example, international organizations like the World Trade Organization with expertise to hear disputes by and grant relief to home-country states of private co-investors with assets expropriated by (host-country) state executives. Henisz (2000) assesses constraints on state executive authority based on the number of players able to veto proposed policy changes. Beck and colleagues (Beck, Clarke, Groff, Keefer and Walsh 2001) combine the veto players approach with adjustment for other substantive institutional design features noted above. Such domestic and international institutional features provide assurances that the rules of the business game (North 1990) when initial project policies were set will have near-term persistence. In states where these institutional features provide weaker assurances, project risk increases for private investors. This research helps us establish a baseline hypothesis that investment risk is higher for projects located in states where policy stability is low.
Hypothesis 1: Investment risk is higher for projects in host countries with low policy stability.

Ownership Factors. TCE and IE theories contributed by Henisz (2000) and Acemoglu and Johnson (2005) might explain investment risk as a response to incomplete policy articulation and the prospect of opportunistic near-term policy change after project assets become vulnerable to temporary hold-up if not expropriation. But states are also aware of and anticipate such concerns as part of their political strategies to attract more investment from private, often foreign investors (Murtha and Lenway 1994). In this context, signaling theory (Connelly et al. 2011; Spence 1973) provides additional complementary insight by accounting for state actions that influence private co-investor assessment about the likelihood of near-term re-negotiation of initial project terms and project hold up or expropriation. We use signaling theory to explain when and how one strategy, minority state ownership, becomes a credible indicator that investment risks highlighted in IE and TCE theories are less likely to materialize in the near term.

First developed to explain decision-making in labor markets (Spence 1973), signaling theory in economics and management holds that economic agents often interact without complete information regarding the prospective transaction at hand. In such contexts, agents use cues to signal what that missing information is with more (less) costly cues constituting stronger (weaker) signals about the missing information. Thus, job applicants credibly signal to prospective employers their qualification for a position through costly, rigorous higher education (Spence 1973). Signaling theory has since been applied to other business-related contexts. Entrepreneurs signal to investors greater confidence in the future value of the firms they lead by retaining large equity stakes during initial public offerings (Downes and Heinkel 1982). Executives signal to shareholders in publicly-listed firms greater confidence in diversification strategies through share purchases after diversification announcements (Goranova, Alessandri, Brandes and Dharwadkar 2007). Credit rating agencies signal to a range of financial market participants greater confidence in the ability and willingness of states to meet their financial obligations to lenders through higher sovereign risk ratings (Vaaler and McNamara 2004).

At first glance, application of signaling theory to our credible model and investment project context appears straightforward. Prospective private co-investors seek information regarding the near-term stability of initial policies. If less vulnerable to change, then asset values and cash flows are more predictable and project lenders are more willing to provide debt. When state policy stability is low, prospective private co-investors seek alternative assurances that initial state policies will be maintained. A simple credible model response would be for the state to take an equity stake in the project. It would signals through costly investment an intention to
maintain initial project terms or share in losses with private co-investors when terms change. State ownership in a project would be akin to giving a hostage to private co-investors, thus assuring fidelity to initial policies notwithstanding any history of policy reversals. Sappington and Stiglitz (1987) prescribe such a signaling strategy when state regulatory institutions are new, thus lacking any record of predictable operation. Increasing state investment in a project would increase cost and strengthen the signal, thus also increasing credibility.

But the signal sent by state ownership has more than one meaning for private co-investors. In addition to assurance that initial project terms will be maintained in the near term, state ownership would signal the potential for interference by welfare-seeking policy-makers with the profit-seeking aims of private co-investors and project executives working for them under those same initial policies. Interference would imply more volatile project asset values and cash flows, both rendering lenders less willing to provide credit.

Resolution of this duality requires an additional assumption for our credible model. We assume that non-controlling minority (controlling majority) equity stakes by states signal to private co-investors maintenance of (interference under) initial policies. When non-controlling state ownership levels are very low (e.g., $\geq 5\%$), maintenance signal strength increases with little or no threat of interference, thus diminishing higher investment risk related to low policy stability. As state ownership becomes more substantial though still non-controlling (e.g., $\geq 25\%$) then maintenance signal strength continues to increase, but an interference signal also emerges and strengthens, thus negating some of the investment risk reduction. As state ownership increases from non-controlling minority to controlling majority levels, interference signal strength drowns out the maintenance signal and net investment risk increases. Private co-investors are now dealing with both low policy stability and a state owner with the potential to control project goals. Thus, signaling theory logic can reverse investment risk assumptions derived from more conventional models. It is only when state policy stability is low and state ownership is substantial but still non-controlling that state ownership diminishes rather than magnifies investment risk:

**Hypothesis 2:** Minority state ownership diminishes higher investment risk for projects in host countries with low policy stability.

**Alternative credible model scenarios.** Our credible model logic incorporating IE, TCE and signaling theory elements can also explain investment risk for projects where state policy stability and ownership vary from the scenario we just described. These alternative scenarios are illustrated in Figure 1 as different quadrants listing key model components and illustrative investment projects from our sample exhibiting those model
components. The horizontal axis of Figure 1 has two discrete cells: one for projects with minority state ownership; another for projects with majority state ownership. Figure 1’s vertical axis also has two discrete cells: one for projects located in host countries with low policy stability; another for projects in host countries with high policy stability.3

-----Insert Figure 1 Approximately Here-----

Our “Credible State Ownership” base scenario falls into the lower left-hand Quadrant 3 combining low policy stability with minority state ownership. An illustrative project is Colombia’s Termobarranquilla power project valued at US$150 million when first announced in 1993 (Davis 1996). The 750 megawatt gas-fired combined cycle power station located in Barranquilla on Colombia’s north coast was to be funded with 60% debt and 40% equity, of which the state-run Colombia Atlantic Coast Electricity Company (CORELCA) would hold a minority stake of about one third of the total equity funding the project (SDC 2013).

For projects like Termobarranquilla falling into this Credible State Ownership scenario we assume that initial project terms are vulnerable to near-term reversal detrimental to private co-investors such as the Swedish-Swiss multinational Asea Brown Boveri (ABB), also part of the Termobarranquilla project. In this context, a substantial minority equity stake by state-run CORELCA signals credible assurance to ABB and other private co-investors that initial policies will be maintained even as one Colombian senator described those policies as creating the “best business in the world for investors but the craziest” for the nation (El Tiempo 1995). That maintenance signal dominates an alternative signal of potential state interference with private co-investor aims. At the time of the project’s announcement, the Colombian Minister of Mines and Energy described ABB’s operational discretion as including “no serious risk: neither legal nor economic” (El Tiempo 1995).

Compare the state policy stability and ownership components associated with the Termobarranquilla project located in Quadrant 3 to another power project in Quadrant 4’s “Interfering State Ownership” scenario, which combines low policy stability with majority (not minority) state ownership. China’s Zhuijiang power project was valued at US$355 million when first announced in 1992. The 600 megawatt coal-fired power station

3 Development of our 2x2 framework benefitted from comments and illustrative anecdotes by Lou Wells and Glenn Turner. Comments from Lou Wells helped us think about sometimes subtle distinctions between maintenance and interference effects of state ownership in large investment projects around the world in mining (e.g., Bougainville Copper’s Panguna project in Papua New Guinea during the 1970s) and energy generation (e.g., Enron’s Dahbol project in India during the 1990s). Comments from Glenn Turner, an executive in the diamond mining industry, helped us think about how private investors negotiate initial project terms of investment, including state co-investment terms, with host-country governments in Southern Africa (e.g., Gem Diamonds Letšeng project in Lesotho during the 2000s). We are grateful to both for their helpful insights.
located in Guangzhou was to be funded with 55% debt and 45% equity. The state-run Guangzhou Economic Construction Development Company (GECDC) held a majority stake\(^4\) of that equity (SDC 2013; World Bank 2016). With a controlling equity stake, the state-run GECDC could dictate to private co-investors like Hong Kong-based NWS Holdings project strategy under the initial project terms and, presumably, in line with the welfare-oriented aims of a state agency. The net effect is more investment risk compared to an equivalent project with minority state ownership located in Quadrant 3:

**Hypothesis 3:** Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with low policy stability and majority state ownership.

Next, compare overall investment risk trends in Quadrant 3 to another project in Quadrant 1’s “Superfluous State Ownership” scenario, which combines high policy stability with minority state ownership. Australia’s Botany Co-Generation power project was valued at US$209 million when first announced in 1996. The gas-powered heating and lighting plant near Sydney was to be funded with 72% debt and 28% equity. The New South Wales state-run enterprise, Energy Australia, would hold a fifth of that equity (MPS 1996; SDC 2013). Credible assurance conveyed by minority state ownership is a superfluous auxiliary to high policy stability in Australia already assuring the near-term maintenance of initial policies for private co-investors like Australia-based AGL Energy. High policy stability weakens maintenance but not interference signals associated with minority ownership by Energy Australia. The net effect is higher investment risk compared to an equivalent project in a state with low policy stability in Quadrant 3:

**Hypothesis 4:** Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with high policy stability and minority state ownership.

Finally, compare overall investment risk in Quadrant 3 to another project in Quadrant 2’s “Ideological State Ownership” scenario, which combines high policy stability with majority state ownership. France’s Gardanne power project was valued at US$209 million when first announced in 1996. The 250 megawatt coal-fired power station located in Provence was to be funded with 90% debt and 10% equity. The state-owned electricity enterprise, Electricité de France (EDF), would hold just over half of that equity (Jaud 2010; SDC 2013). With a majority of project equity, EDF could dictate project strategy, thus signaling to co-investors like Spain’s Endesa potential interference in an institutional context where the policy environment is also substantially stable.

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\(^4\) State ownership is assumed to be majority state ownership if the host-country government holds between 50 and 100% of the equity of the project.
and state ownership a superfluous additional guarantee of maintenance. With no discernible risk management motivation for state ownership in this scenario, we conjecture that dictates of political ideology explain EDF’s majority equity stake. Such factors suggest more investment risk compared to an equivalent project with non-controlling minority state ownership and located in a host country with low policy stability in Quadrant 3:

Hypothesis 5: Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with high policy stability and majority state ownership.

Methodology

Data Collection and Sampling

To evaluate empirical support for the five hypotheses derived from our credible model, we collect data from multiple sources listed in Table 1. We follow Vaaler (2008) and James and Vaaler (2017) in using the Thomson-Reuters Securities Data Corporation (SDC) online project investment database (SDC 2013) to identify a sample of 1373 investment project companies announced in 95 host countries5 and intended to operate in six different industry sectors from 1990-2012: mining, oil and gas, power generation and transmission, telecommunications, waste and recycling, and water and sewage. From the late 1980s on, SDC provides comprehensive international coverage of initial investment project company announcements as well as follow-on financing and construction notices based on regular review of filings by project owners with securities regulators (e.g., US Securities Exchange Commission) and announcements in mass-market media outlets (e.g., Financial Times of London) and more specialized project finance publications (e.g., Project Finance International). Such coverage assures against bias in sampling based on the publicly- or privately-owned status, size and or location of projects. About 12% of our 1373 observations (167) include a state entity as an equity holder.

---Insert Table 1 Approximately Here---

Data for our dependent variable, Investment Risk, and several right-hand side (RHS) variables related to specific investment project characteristics (Project Size, Syndicate Ownership, Percent Domestic, Offtake Contract, Project Bid, Lead Sponsor Experience) also come from SDC, as do data for one RHS variable of central interest related to state ownership (Minority State Ownership). Data for another RHS variable of central interest related to country-

5 These 95 host countries are: Albania, Algeria, Angola, Argentina, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Bolivia, Brazil, Bulgaria, Cambodia, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, Egypt, El Salvador, Estonia, Finland, France, Gabon, Germany, Ghana, Greece, Guatemala, Honduras, Hungary, India, Indonesia, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Libya, Lithuania, Madagascar, Malaysia, Mali, Mexico, Moldova, Morocco, Mozambique, Namibia, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Singapore, Slovak Republic, South Africa, South Korea, Spain, Sri Lanka, Switzerland, Taiwan, Thailand, Trinidad and Tobago, Tunista, Turkey, Ukraine, United Kingdom, United States, Uruguay, United Arab Emirates, Venezuela, Vietnam, and Zambia.

**Empirical Model and Variable Measures**

To test Hypotheses 1-2, we define the following statistical model explaining investment risk:

$$
Investment Risk_{i,j,k,t} = \alpha + \sum_{j=1}^{6} Project Controls_{j,k,t} + \chi_{i} Industry Demand_{i} + \delta_{t} Country Rating_{k,t} + \beta_{1} Policy Stability_{k,t} + \beta_{2} Minority State Ownership_{i,k,t} + \beta_{3} Minority State Ownership \times Policy Stability_{i,k,t} + \tau \sum_{t=1990}^{2011} Years_{t} + \pi \sum_{i=1}^{5} Industries_{i} + \epsilon_{i,j,k,t}
$$

(1)

Table 1 describes all terms in Equation 1. The dependent variable, Investment Risk, is the level of risk associated with a project $i$, operating in industry $j$, domiciled in host country $k$, and announced in year $t$. Investment Risk is measured as the percentage of equity funding the project—it is initial equity divided by the sum of equity plus debt multiplied by 100. Here, we follow previous research in management (James and Vaaler 2017) using capital structure at announcement date as a forward-looking indicator of the likelihood of loss from project term renegotiation, hold up or expropriation. Investment Risk is akin to standard business risk of loss for newly-formed and corporately-financed single business operations (Brealey and Myers 2003).

**Investment Risk** is regressed on a constant ($\alpha$), a series of project-specific controls ($\gamma_{1-6}$), an industry control ($\chi$), a country control ($\delta_{1}$), host-country policy stability ($\beta_{1}$), whether the state holds a minority ownership stake in the project ($\beta_{2}$), their interaction ($\beta_{3}$), year ($\tau_{1990,2011}$) and industry ($\pi_{1-5}$) fixed effects, and an error term ($\epsilon$). The key RHS terms relate to host country policy stability (Policy Stability) ($\beta_{1}$) and state ownership in the project (Minority State Ownership) ($\beta_{2}$). Policy Stability assesses the ease of changing policies relevant to private co-investors such as a law permitting them to demand international arbitration of disputes with state owners. We measure Policy Stability as the natural log of the so-called “checks and balances” score published in the DPI (Beck et al., 2001; Keefer and Stasavage 2003) for each host country $k$ in year $t$. The score, which ranges from 1 (no/minimal checks) to 18 (substantial checks), reflects the number of relevant veto holders in a state’s national polity. Higher values indicate more veto holders and thus greater policy stability.6

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6 The score assumes linearity in effect with each additional veto player. Extreme values for a few developing countries (e.g., India) have led researchers to use a log transformation (e.g., Vaaler 2008). We obtain results consistent with those reported below using the untransformed linear measure. Those results are available from the authors.
Ownership is a 0-1 dummy that takes the value of 1 when the state owns equity greater than 0% and less than 50% (effectively 1-49%) for a project $i$ operating in industry $j$, within host-country $k$ in year $t$. These variable choices and measures follow previous management research using the DPI checks and balances measure as a proxy for volatility in the host-country investment policy environment (e.g., Vaaler 2008) and non-controlling minority ownership as categorical as well as integral variable (James and Vaaler 2017; Vaaler and Schrage 2009).

We test Hypothesis 1’s prediction that investment risk is higher in host countries with lower policy stability by excluding the Minority State Ownership ($\beta_2$) and Minority State Ownership*Policy Stability ($\beta_3$) terms in Equation 1 and regressing Investment Risk on Policy Stability ($\beta_1$). Consistent with Hypothesis 1, we expect that $\beta_1 > 0$. To test Hypothesis 2’s prediction that minority state ownership in projects diminishes the increase in investment risk due to low policy stability we then add back the Minority State Ownership ($\beta_2$) and Minority State Ownership*Policy Stability ($\beta_3$) terms in Equation 1. Consistent with Hypothesis 2, we expect that $\beta_2 < 0$ and that $\beta_3 > 0$. When policy stability is low, then minority state ownership diminishes increased investment risk. As policy stability increases, minority state ownership diminishes increased investment risk less.

To render these tests more rigorous, we also include in our estimations of Equation 1 six project-, one industry- and one country-specific control variables, as well as fixed year and industry effects. The expected signs on project controls are largely intuitive. Project Size ($\gamma_1$), the natural log of the total project investment cost in $US millions, should increase Investment Risk as larger projects are more difficult to liquidate in the event of failure (Esty 2004; James and Vaaler, 2017). Syndicate Ownership ($\gamma_2$), the concentration of project ownership measured as a Herfindahl-Hirschman index, should decrease Investment Risk as fewer owners with larger stakes help align incentives and reduce agency oversight costs (Esty and Megginson 2003; Jensen and Meckling 1976). Percent Domestic ($\gamma_3$), the percentage of project ownership held by individuals in the same country where the project is located, should decrease Investment Risk by blunting what otherwise could be a project liability of foreignness (Zaheer 1995). Offtake Contract ($\gamma_4$) is a 0-1 dummy equaling one if a counter-party such as another firm or government agency has agreed in advance to buy the project’s output (e.g., electricity from a coal-powered generator), often with pre-specified penalties when in breach. This assurance should decrease Investment Risk. Project Bid ($\gamma_5$) is another 0-1 dummy equaling one if the project is put out to some bidding process, often overseen by a state agency. This process should decrease Investment Risk as potential investors spell out their commitments under the bid terms, state agencies managing the process spell out the near-term inviolability of such terms, and both publicize their undertakings, thus increasing reputational costs should
either renege. *Lead Sponsor Experience* ($\gamma_i$) is the number of previous projects by the first-named lead investor in the same country and industry. Higher values should decrease *Investment Risk*, a conjecture that finds support in previous research involving the likelihood of investment by foreign firms with prior deals in the same host country (e.g., Henisz and Macher 2004). All six of these controls potentially vary for announced project $i$, operating in industry $j$, within state $k$, in year $t$.

*Investment Risk* may also vary due to broader industry-related factors. We control for those factors two ways. First, we sort all sampled projects by their SDC industry sector descriptor, roughly corresponding to 2-3 digit Standard Industrial Classifications. We include five industry dummies ($Industries$) ($\pi_{1-5}$), omitting the most numerous industry category, power generation and transmission. These five dummies should capture unspecified idiosyncratic industry effects on *Investment Risk*. Second, we control for one plausible effect on *Investment Risk* that may be common to all industries: varying industry demand for projects across host countries. Our *Industry Demand* control ($\chi_1$) creates a standardized score (Mean = 0, S.D. = 1) for each host country $k$ in year $t$. A Higher scores indicate either: 1) greater “demand-as-need” for an announced project $i$ in a given industry $j$ (e.g., greater demand for electricity power projects in host countries with less generating capacity compared to other host countries); or 2) greater “demand-as-greed” for an announced project $i$ in a given industry $j$ (e.g., greater demand for oil and gas projects when world energy prices increase in host countries exporting less energy compared to other host countries). *Investment Risk* should decrease for projects operating in industries where the state has a higher standardized score indicative of greater industry demand as need or greed related to a project.

No doubt, substantive country-level macroeconomic factors (e.g., inflation) and institutional factors (e.g., rule of law), aside from policy stability, might affect *Investment Risk*. One strategy to control for such factors is to include them individually, but then the list can grow quickly with debatable items to include or exclude at the margin. An alternative strategy takes advantage of research in financial economics (Butler and Fauver 2006; Cantor and Packer 1996) documenting that sovereign risk ratings published by major credit rating agencies explain not only the likelihood of government default on financial obligations, but also variation in underlying macroeconomic and institutional factors associated with that default likelihood: gross domestic product, per capita income, economic growth, inflation, domestic budget and external debt balances, trade balances, rule of law, legal system, previous default history. We therefore use the average sovereign rating (*Country Rating*) ($\delta_i$) published by up to six major credit rating agencies listed in Table 1 as a summary proxy for state factors, aside
from policy stability, that may also affect Investment Risk. Finally, we include 0-1 dummies for unspecified but idiosyncratic year effects. Our period of observation runs from 1990-2012, so we include 22 year dummies (Years) \((\tau_{1-22})\), omitting one year (2012).

To test Hypotheses 3-5, we define the following variant of Equation 1 permitting comparison of investment project risk trends in the Credible State Ownership scenario with the other three model scenarios:

\[
\text{Investment Risk}_{ijkt} = \alpha + \gamma \sum_{\tau=1}^{22} \text{Project Controls}_{ijkt} + \chi \text{Industry Demand}_{j} + \delta \text{Country Rating}_{hi} \\
+ \phi_1 \text{Superfluous State Ownership}_{ijt} + \phi_2 \text{Ideological State Ownership}_{ijt} \\
+ \phi_4 \text{Interfering State Ownership}_{ijt} + \tau \sum_{\tau=1990}^{\tau=2011} \text{Years}_{i} + \pi \sum_{\pi=1}^{\pi=5} \text{Industries}_{j} + \epsilon_{ijkt}
\]

Equation 2 replaces the three beta \((\beta)\) terms with three phi \((\phi)\) terms, each a 0-1 dummy taking the value of one when an investment project falls into the Superfluous State Ownership Scenario \((\phi_1)\) (above average sample policy stability and state ownership < 50%), Ideological State Ownership Scenario \((\phi_2)\) (above average sample policy stability and state ownership > 50%), or Interfering State Ownership Scenario \((\phi_4)\) (below average sample policy stability and state ownership > 50%). We test Hypotheses 3-5 by regressing Investment Risk on the same set of controls and these three scenario dummies. Consistent with Hypotheses 3-5, we expect that \(\phi_4 > 0\) (H3), \(\phi_1 > 0\) (H4), and that \(\phi_2 > 0\) (H5). Projects in host countries with high policy stability and minority or majority state ownership (or in host countries with low policy stability and majority state ownership) will have higher investment risk than projects in host countries with low policy stability and minority state ownership.

**Empirical Model Estimation**

We implement all estimations of Equations 1-2 using Stata Release 12 statistical software (StataCorp 2011). We use generalized least squares (GLS) as our primary estimator. GLS includes robust (to heteroskedasticity) standard errors clustered by country to account for possible non-independence in investment project risk assessments within (but not between) host countries. This adjustment widens standard errors, thus posing a more rigorous test of coefficient significance. We also use linear trend-line analyses to graphically illustrate simple relationships between state ownership levels and investment risk for projects in host countries with differing levels of policy stability.

In addition to these core analyses we report additional analyses confirming support for Hypothesis 2 and the risk-reducing effect of minority state ownership when policy stability is low. We implement and report results for Hypothesis 2 with alternative sample sizes and estimators including a two-stage Heckman (Heckman...
1979) estimator to address potential sample selection, and an instrumental variables (IV) estimator to address potential endogeneity issues associated with state ownership and investment risk. We also implement and report results for Hypothesis 2 with an alternative dependent variable related to investment risk, whether an announced investment project’s financing is delayed, and then re-estimate with a two-stage probit-probit estimator to address (again) potential sample selection issues. We elaborate on justifications for these robustness analyses below.

**Results**

**Preliminary Analyses**

Sample attributes seem well suited for hypothesis testing. The spread of projects with state ownership is distributed across all four scenario quadrants of our credible model: 39 investment projects are in Quadrant 1’s Superfluous State Ownership scenario where Policy Stability is greater than the sample mean of 1.32 and state ownership is less than 50% of total project sponsor equity; 53 are in Quadrant 2’s Ideological State Ownership scenario where Policy Stability is again greater than the sample mean and state ownership is 50% or more of total project sponsor equity; 37 are in Quadrant 3’s Credible State Ownership scenario where Policy Stability is again below the sample mean and state ownership is below 50% of total project sponsor equity; and 38 are in Quadrant 4’s Interfering State Ownership scenario where Policy Stability is again below the sample mean but state ownership is 50% or more of total project equity. Descriptive statistics presented in Table 1 comport with intuition and previous research. For example, the Investment Risk sample mean of 19.52 fits with mean percentage levels of equity investment in projects reported in other studies (e.g., Esty 2002). The Country Rating sample mean of 10.80 (≅ A) and standard deviation of 5.29 imply a broad range of general country risk profiles consistent with industrialized, emerging-market, and less-developed country types in our 95-country sample.

-----Insert Table 2 Approximately Here-----

Pair-wise correlations in Table 2 yield preliminary insight related to our hypotheses and the credible model from which they are derived. Consistent with Hypothesis 1, we see that Investment Risk is negatively correlated with Policy Stability (-0.09, p < 0.01). Figure 2 confirms this insight in a linear trend-line analysis of Policy Stability and Investment Risk using all 1373 projects sampled. Consistent with Hypothesis 1, the negative trend-line indicates that projects located in states with lower (higher) Policy Stability plotted on the x-axis have higher (lower) Investment Risk plotted on the y-axis.

-----Insert Figure 2 Approximately Here-----
Figures 3a and 3b present additional trend-line analyses relevant to hypotheses derived from our credible model. Figure 3a uses only the 76 projects with minority state ownership (1-49%) and plots project observations based on the level of minority state ownership on the x-axis and the level of investment risk (Investment Risk) on the y-axis. We create two trend-lines by partitioning minority state-owned projects based on whether they are located in host countries with Policy Stability above (●) or below (x) the sample mean of 1.32. Consistent with Hypothesis 2, we observe in Figure 3a a negative (positive) trend-line indicating that increasing minority state ownership is associated with lower (higher) investment risk in host countries with low (high) policy stability.

Figure 3b presents similarly matched trend-line analyses, but now for 91 projects with majority state ownership (50-100%). The two trend lines again partition majority state-owned projects based on whether they are located in host countries with Policy Stability above (●) or below (x) the sample mean of 1.32. Both trend-lines are essentially flat and run parallel to each other across Figure 3b. Together, trend-lines in Figures 3a and 3b suggest that the investment risk impact of state ownership in Quadrant 3’s Credible State Ownership scenario differs from the impact of state ownership in the other three quadrants comprising our theoretical model. Only in Quadrant 3 do we observe trend-line evidence consistent with the idea that increasingly substantial but still non-controlling state ownership in projects signals risk-reducing maintenance of rather than interference with the profit maximizing goals of private co-investors.

Core Regression Results

Multiple regression results in Table 3 largely confirm preliminary empirical trends illustrated in Figures 2, 3a and 3b. These regression results constitute the evidentiary core used to evaluate support for Hypotheses 1-5 derived from our credible model. Column 1 reports results from GLS estimation of Investment Risk with the eight base controls and fixed year and industry effects using the full sample of 1373 investment projects and the full range (0-100%) of state ownership. Six of the eight base controls exhibit the expected signs with three at 10% or higher levels of statistical significance.

Column 2 adds to these controls Policy Stability and a continuous (0-100%, not categorical 0-1) percentage measure of project state ownership (Percent State Ownership) (β2,4). Consistent with Hypothesis 1, Policy Stability enters with a significant negative sign (β1 = -1.72, p < 0.10). Recall that Policy Stability is the natural log of DPI’s checks and balances value. Thus, a mean value of 1.32 translates into an unlogged checks and balances score of approximately 3.75. A one unit increase in the logged value from 1.32 to 2.32 translates
into an unlogged checks and balances score increase from approximately 3.75 to 10. The net impact on Investment Risk is a decrease of 1.72 percentage points. Column 3 re-estimates this same abbreviated specification of Equation 1, but after replacing the continuous measure of state ownership with the 0-1 dummy taking the value of one when state ownership is from 1-49% (Minority State Ownership) (β2). Policy Stability again enters negatively and significantly (β1 = -1.71, p < 0.10). Thus, initial regression results confirm preliminary evidence supporting Hypothesis 1 and the general risk-reducing effects of policy stability. In Columns 2-3, the state ownership terms enter with the expected negative sign, but neither enters with statistical significance at commonly accepted levels. Were we to end our analyses here, we might conclude only that preliminary results are confirmed in multiple regression analyses for Hypothesis 1.

-----Insert Table 3 Approximately Here-----

Recall, however, that Hypothesis 2 predicts that the risk-increasing effects of low policy stability will be diminished with minority state ownership emitting a dominant signal of initial policy maintenance beneficial to private co-investors. Re-estimation of a fully-specified Equation 1 in Column 4 lets us evaluate support for Hypothesis 2. Policy Stability again enters with a significant negative sign (β1 = -2.53, p < 0.05). So, too, does Minority State Ownership (β2 = -13.26, p < 0.01). Effects on Investment Risk are also practically substantial. Investment Risk decreases by more than 13 percentage points when the Minority State Ownership dummy equals one. But this interpretation is complicated by the presence of an additional significantly positive interaction term, Minority State Ownership*Policy Stability (β3 = 11.63, p < 0.01). In this context, Minority State Ownership captures effects on Investment Risk when the state holds a 1-49% ownership stake in the project and the project is located in a state with Policy Stability near zero.

We find several such projects in our sample, including those located in Indonesia during the mid-1990s and Kazakhstan in the 2000s. In these low policy stability states, Investment Risk decreases by more than 13 percentage points with minority state ownership. For an average-sized project in our sample (∼ US$265 million), investors in this scenario are shifting approximately US$34 million in financing from owners’ equity to creditors’ debt.

As Policy Stability increases, the positively signed and significant Minority State Ownership*Policy Stability interaction term comes into play. Risk-diminishing effects of minority state ownership fade according to a simple formula based on the linear combination of the two coefficients (β2 + β3). When Policy Stability values reach the sample mean of 1.32, that is, approximately the Policy Stability values for Greece and Hungary in the mid-1990s,
then net effects from linear combination of the two terms are no longer negative at commonly-accepted levels of
statistical significance. Indeed, when Policy Stability is one standard deviation above the sample mean of 1.32, that
is, 1.94, net effects from linear combination turn positive and significant at the 1% level. Investment Risk increases
consistent with assumptions of Quadrant 1’s Superfluous State Ownership scenario.

In Column 5 we re-estimate Equation 1, but only with projects having some state ownership (1-100%).
Sample size falls from 1373 to 167 while the coefficient of determination (i.e., \( R^2 \)) increases from 0.15 to 0.34.
Policy Stability again enters negatively but not at commonly-accepted levels of statistical significance. Consistent
with Hypothesis 2, however, Minority State Ownership again enters with a negative and significant sign (\( \beta_2 = -12.76, p < 0.10 \)), while Minority State Ownership*Policy Stability again enters positively and significantly (\( \beta_3 = 8.85, p < 0.05 \)). When Policy Stability is near zero, Investment Risk again decreases by approximately 13 percentage
points when the Minority State Ownership dummy equals one. A non-controlling state equity stake diminishes
increasing investment risk consistent with Hypothesis 2 and the broader logic of our credible model. As Policy
Stability increases to the sample mean and beyond, the risk-reducing signal of non-controlling state ownership to
assure maintenance of initial policies and profit-seeking management aims weakens in favor of an alternative
signal foretelling interference by the state under those same initial policies.

Column 6 reports results from GLS estimation of Equation 2, which tests Hypotheses 3-5. Recall that
these tests compare investment risk for projects in Quadrant 3’s Credible State Ownership scenario with the other
three scenarios of our model. After controlling for other factors, we expect projects located in these other three
scenarios to exhibit higher investment risk. We again sub-sample from the 167 projects with some state
ownership.

Results largely support these credible model predictions. All three alternative scenario dummies exhibit a
positive sign indicating greater investment risk for projects not including both low policy stability and minority
state ownership attributes associated with the Credible State Ownership scenario. Positive effects on investment
risk are statistically significant and practically substantial for two of three scenario dummies. Consistent with
Hypothesis 3, Investment Risk increases 12 percentage points for projects in the Quadrant 4’s Interfering State
Ownership scenario (\( \phi_4 = 12.02, p < 0.01 \)), an increase that translates into approximately US$30 million in
additional owners’ equity for the average-sized project in our sample. Investment Risk increases nearly nine
percentage points for projects in Quadrant 1’s Superfluous State Ownership scenario (\( \phi_1 = 8.54, p < 0.10 \))
consistent with Hypothesis 4. That increase implies nearly US$25 million in additional owners’ equity for the
average-sized project. A switch either from minority to majority state ownership or from low to high policy stability shifts signal dominance for private co-investors from maintenance to interference. The coefficient for projects located in Quadrant 2’s Ideological State Ownership scenario is also positive but not statistically significant at commonly-accepted levels ($\phi_2 = 5.87, p < 0.17$). Thus, we do not find support for Hypothesis 5 predicting greater investment risk when both policy stability and state ownership attributes deviate from the Credible State Ownership scenario.

**Related Regression Results Assessing Central Model Prediction**

Having documented large-sample statistical support for four of the five hypotheses derived from our credible model, we next assess the breadth of that support for what is arguably the central prediction of our model: Hypothesis 2’s prediction that minority state ownership diminishes increased investment risk for projects located in host countries with low policy stability. To do so, we implement various changes in sampling, model specification, and estimation strategies. We report results after implementing these changes in Table 4.7

In Column 1 of Table 4 we vary our sampling strategy to investigate the possibility that support for Hypothesis 2 relies on contrasts between projects with minority state ownership in Quadrant 3’s Credible State Ownership scenario and the two majority state ownership scenarios (Superfluous and Ideological State Ownership). We investigate that possibility in Column 1 by re-estimating Equation 1 using only projects with no or minority state ownership (0-49%). This decreases our sample from 1373 to 1282. We obtain the same pattern of results supporting Hypothesis 2: significantly negative estimates for Policy Stability ($\beta_1 = -2.89, p < 0.01$) and Minority State Ownership ($\beta_2 = -13.44, p < 0.01$); and a significantly positive estimate for their interaction, Minority State Ownership*Policy Stability ($\beta_3 = 11.94, p < 0.01$).

In Column 2 we retain the 1282 sub-sample and then vary slightly the Equation 1 model specification by replacing the 0-1 Minority State Ownership dummy with a continuous Percent State Ownership term, which we also interact as Percent State Ownership*Policy Stability ($\beta_{10}$). Again, we observe the same pattern of results supporting

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7 Though not reported here, we also obtain results consistent with those reported in Table 3, Column 4 (Equation 1 estimation with all controls and Policy Stability, Minority State Ownership and Minority State Ownership*Policy Stability) when we do the following: 1) replace our primary measure of Policy Stability based on the DPI’s checks and balances score with an alternative measure of Policy Stability based on Henisz’s (2000) political constraints (“POLCON”) score; 2) add controls for host-country institutional quality related to Voice and Accountability, Political Stability and the Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (Kaufmann, Kraay and Mastruzzi 2009); 3) add controls for institutional distances and trade dependence between the host country and lead-owner’s home country (Berry, Guillen and Zhou 2010; Holburn and Zelner 2010); 4) add controls for the extent of state ownership of banks (Barth, Caprio and Levine 2001; La Porta, Lopez-de-Silanes and Shleifer 2002); and 5) replace the GLS estimator with a two-sided Tobit censored regression estimator with lower 0% and upper 100% state ownership limits. These results are available from the authors.
Hypothesis 2: significantly negative estimates for Policy Stability ($\beta_1 = -2.70, p < 0.05$) and Percent State Ownership ($\beta_{2A} = -0.44, p < 0.01$); and a significantly positive estimate for their interaction, Percent State Ownership*Policy Stability ($\beta_{3B} = 0.37, p < 0.01$).

In Columns 3-4, we vary model specification and estimation strategies to investigate the possibility of sample selection bias in evidence supporting Hypothesis 2. More specifically, characteristics of investment risk assessment may be conditional on the presence of any state ownership. To control for that possibility, we employ a Heckman (1979) two-stage estimator including a first-stage selection equation in Column 4 with a 0-1 dependent variable taking the value of one when there is any state ownership in an announced project. After probit estimation of this first equation, we report in Column 3 second-stage GLS results based on Equation 1.

For identification purposes, the first-stage selection equation differs from Equation 1. We drop Minority State Ownership, Policy Stability and their interaction, and include a new model term related to the likelihood of state ownership in an investment project: Competitive Legislature ($\omega_1$), a 0-1 dummy taking the value of one when the host country has a competitive legislative electoral system. We assume that Competitive Legislature is negatively related with the likelihood of state ownership. Research in political science and international relations suggests that there is a “democratic advantage” (Schultz and Weingast 2003) for private co-investors that strengthens with more competitive electoral politics. Legislators are less likely to pass laws mandating state ownership lest those same legislators risk criticism of political cronyism from a viable challenger at the next election. Data for Competitive Legislature come from the World Bank’s DPI (Beck et al. 2001). The sample mean (standard deviation) for Competitive Legislature ($\omega_1$) is 0.88 (0.32).

In Column 4’s first-stage probit results, Competitive Legislature exhibits the expected negative sign at a commonly-accepted level of statistical significance ($\omega_1 = -0.56, p < 0.01$). Projects in states with more competitive electoral systems are less likely to include any state ownership. Column 3’s second-stage GLS estimation again yields signs and significance levels for Minority State Ownership ($\beta_2 = -12.58, p < 0.05$) and Minority State Ownership*Policy Stability ($\beta_3 = 8.85, p < 0.05$) consistent with Hypothesis 2.

-----Insert Table 4 Approximately Here------

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8 The World Bank’s DPI measures Competitive Legislature (see DPI variable “liec” in Beck et al. 2001) on a 1-7 ordinal scale, where seven signifies countries with the most competitive legislative electoral systems. In those countries, there have been recent elections where the largest party in a national legislative body received less than 75% of the national vote. Values of 1-6 apply to countries where, for example, there may be no national legislature, an unelected legislature, or an elected legislature where the largest party has always received 75% or more of the national vote.
In Columns 5-6 we vary sampling, model specification and estimation strategies, this time to investigate potential endogeneity following from sources other than from sample selection. More specifically, state ownership may be imposed on private co-investors, may be sought by private co-investors, or as is most likely the case, may be the outcome of lengthy negotiations between states and private co-investors with a mix of motivations on both sides. In any case, it is easy to think of scenarios where state ownership could not merely cause but also be caused by variation in investment risk, thus giving rise to concerns of reverse causation.

To investigate this possibility, we implement a two-stage IV estimator and a modified sampling strategy. We rely on guidance from Bascle (2008) and others (e.g., Vasudeva, Zaheer and Hernandez 2013) for this implementation. Recall that with the full sample, Hypothesis 2 involves evaluation of both Minority State Ownership and Minority State Ownership*Policy Stability. To simplify that evaluation using an IV estimator, we sub-sample only from projects with 0-49% state ownership and below sample average policy stability (i.e., Policy Stability < 1.32). For these 415 projects, a test of Hypothesis 2 simplifies to an evaluation of sign and significance on Minority State Ownership in the second stage of the IV estimation. In the first-stage IV estimation, we position Minority State Ownership as the dependent variable, include other RHS terms from Equation 1 as well as two additional terms for identification purposes. These two instruments should be explicitly related to the likelihood of state ownership but not explicitly related to Investment Risk, the dependent variable in the second-stage equation where Minority State Ownership enters as a RHS term.

As instruments in the first-stage equation, we again include the 0-1 dummy for Competitive Legislature, which has a sub-sample mean (standard deviation) of 0.71 (0.45). Here again, we assume that more competitive electoral systems are less likely mandate state ownership in projects. It is not clear whether competitive legislative systems are positively or negatively related to Investment Risk. The evidence is mixed. Less democratically accountable, often authoritarian governments may decrease perceived risk for private investors as such governments and their policies appear less vulnerable to electorally-related change (e.g., Oneal 1994). But those same governments may also increase perceived risk because their policies need not reflect a median voter typically interested in protecting contract and property rights also important to private investors (e.g., Jensen 2008).

We also include a second instrument, a 0-1 dummy for African Country (ω2), which takes the value of one when a project is announced in a state on the African continent and has a sub-sample mean (standard deviation) of 0.08 (0.27). Here, we assume that projects in Africa will have higher levels of state ownership but
that project location in Africa does not itself vary \textit{Investment Risk}. Our assumption follows Megginson and Netter (2001) and others (e.g., Rondinelli and Iacono 1996), who have noted that state equity in Africa-based infrastructure projects follows substantially from an interest in asserting sovereignty and promoting state-centered economic growth in post-colonial states, which comprise virtually the entire African continent. Thus, we have two instruments correlated with \textit{Minority State Ownership} but plausibly uncorrelated with \textit{Investment Risk}.

We use GLS with standard errors clustered on host countries in both first- and second-stage estimations. Standard diagnostic analyses suggest that our first-stage equation is well-identified, that our instruments are not weakly correlated with \textit{Minority State Ownership} in the first stage, and that our two instruments are valid as a group.\footnote{Bascle (2008) and Vasudeva and colleagues (2013) provide guidance for testing the relevance and exogeneity of our instruments. We use a Lagrange-Multiplier (LM) model identification test based on the Kleibergen and Paap (2006) \textit{rk} statistic (7.92, p < 0.05), which rejects the null hypothesis that the first-stage equation is under-identified. This result suggests that our two instruments are correlated with the potentially endogenous variable, \textit{State Ownership}. A Kleibergen-Paap \textit{rk} Wald \textit{F} statistic of 7.71 compared to critical values from Stock and Yogo (2005) also suggests that our two instruments are not weakly correlated with \textit{Minority State Ownership}. Strong correlation with \textit{Minority State Ownership} means that our instruments are relevant. A Hansen’s \textit{J} over-identification test does not reject the null hypothesis that our two instruments together are exogenous (p < 0.55). Thus, we demonstrate that our two instruments separately identify the first-stage model and are not weakly correlated with the instrumented variable (our instruments are relevant), and that our instruments can be considered exogenous.} In Column 6, our two instruments enter the first-stage equation with \textit{Minority State Ownership} as the dependent variable sensibly: \textit{Competitive Legislature} ($\omega_1$) enters with the expected negative sign while \textit{African Country} enters with the expected positive sign and is significant at commonly-accepted levels ($\omega_2 = 0.26, p < 0.01$). In Column 5, the second-stage GLS estimation with \textit{Investment Risk} as the dependent variable again yields results consistent with Hypothesis 2: \textit{Minority State Ownership} enters significantly and with the expected negative sign ($\beta_{2A} = -35.69, p < 0.01$).

In Columns 7-8, we report results from one last investigation, again varying model specification, sampling and estimation strategies. Up until now, our analyses have depended on an assessment of investment risk made at the time a project is first announced. What about after initial announcement? Does minority state ownership for projects located in host countries with low policy stability send the same dominant message of maintenance (not interference) to private co-investors? We address that question by analyzing the time needed to finalize financing for announced projects. Speed in closing on announced loan agreements is a critical next step that might otherwise lead to project delays or even abandonment. Announced projects slower to secure financing from creditors thus represent riskier investments (Finnerty 2013).
With this in mind, we replace Investment Risk with an alternative 0-1 dependent variable, Delayed Financing, which takes the value of one when the closure date for project financing is deemed slow. Because we may truncate observation of delays for more recent projects, we end observation of project announcements after 2007. This sub-sampling strategy gives a project up to five years to close on financing. We have 1190 observations in this sub-sample with a mean number of days from announcement to closing of 453 and a standard deviation of 634. The 0-1 Delayed Financing dummy takes the value of one when the number of days after initial project announcement and before closing on financing is greater than one standard deviation above the sample mean, that is, greater than 1087 (453 + 634 = 1087) days.

As with Investment Risk, estimates of Delayed Financing could be subject to sample selection bias, so we use a two-step “heckprobit” (probit-probit) estimator. The dependent variable for the first-stage probit of 1190 projects announced from 1990-2007 is again a 0-1 taking the value of one when the state takes any ownership. For identification, we again drop Minority State Ownership and Policy Stability and add Competitive Legislature (ω1), which has a sub-sample mean (standard deviation) of 0.86 (0.35). Column 8 reports these first-stage probit results. Competitive Legislature again enters with the expected negative sign at a commonly-accepted level of significance (ω1 = -0.48, p < 0.05). Column 7’s second-stage probit with Delayed Financing as the dependent variable once again yields estimates of Minority State Ownership (β2 = -1.06, p < 0.05) and Minority State Ownership*Policy Stability (β3 = 0.57, p < 0.05) with signs supporting Hypothesis 2 at commonly-accepted levels of statistical significance. Together, the results in Table 4 indicate broad-based evidentiary support for the central prediction of our credible model.

Related Regression Results Assessing Central Prediction Magnitude
Documenting such support leads to a logical follow-on question. What level of minority state ownership diminishes investment risk from low policy stability the most? To address this question, we first create alternative “windows” or ranges of state ownership. We create minority state ownership windows of 1-10%, 11-20%, 21-30%, 31-40%, 41-49%, and a majority state ownership window of 50-60%. Our method for assessment using the 1-10% window applies to other windows. First, we re-measure the Minority State Ownership 0-1 dummy to take the value of one when minority state ownership is in the 1-10% range. Second, we re-estimate Equation 1 using a sub-sample of the 1373 projects in our full sample. This sub-sample is 1373 minus
the number of projects with state ownership levels in the 11-49% range.\footnote{Recall that there are 76 projects with 1-49% state ownership. Of these, and as noted in Table 5, 19 projects have between 1-10% state ownership. Therefore, 76 – 19 = 57 projects have between 11-49% state ownership. And thus, the re-estimation is based on a subsample of 1373 – 57 = 1316 projects.} We are comparing investment risk effects of projects with 1-10% state ownership against projects with no state ownership or majority state ownership. Re-estimation based on the 1-10% window yields an estimate of Minority State Ownership ($\beta_2 = -7.56$) and Minority State Ownership*Policy Stability ($\beta_2 = -7.16$) both reported in a column of Table 5 entitled “Investment Projects with 0-100% State Ownership.” In a third methodological step, we re-estimate using the same 1-10% window but now for comparison with other projects having majority state ownership. Recall that the number of projects with any state ownership is 167. We ascertain the number of projects in the 1-10% window by taking the difference of 167 and the number of projects with state ownership levels between 11-49%\footnote{Of the 76 projects with minority state ownership, 19 projects have between 1-10% state ownership. Therefore, 76 - 19 = 57 projects have between 11-49% state ownership. And thus, the re-estimation is based on a subsample of 167 – 57 = 110 projects.}. Results are reported in another column of Table 5 entitled “Investment Projects with 1-100% State Ownership.”

\begin{table}
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Window} & \textbf{Coefficient Estimate} \\
\hline
1-10% & -7.56 \\
11-20% & -7.02 \\
21-30% & -6.54 \\
31-40% & -6.06 \\
41-49% & -5.58 \\
50-60% & -5.10 \\
\hline
\end{tabular}
\caption{Coefficient Estimates for Investment Risk Reduction Across State Ownership Windows}
\end{table}

We repeat these three methodological steps for alternative state ownership windows: 11-20%, 21-30%, 31-40%, 41-49%, and a majority state ownership window of 50-60% Table 5 presents the coefficient estimates and robust standard errors for these terms and their interaction with Policy Stability (Minority State Ownership*Policy Stability, Majority State Ownership*Policy Stability).\footnote{Complete results for all estimations presented in part in Table 5 are available from the authors.}

Investment risk reduction differs across windows and within windows across differing levels of Policy Stability. Recall that when Policy Stability is near zero, as for investment projects located in Algeria and Indonesia during the 1990s, then estimates of Minority State Ownership alone determines how much state ownership diminishes the risk-increasing impact of low policy stability. It diminishes the increase most when state ownership is in the 21-30% window of Table 5. For estimations of Equation 1 based on 0-100% state ownership sub-samples, Investment Risk decreases by nearly 21 percentage points ($\beta_2 = -20.58, p <0.01$). When re-estimated based on the 1-100% state ownership sub-samples, Investment Risk decreases by more than 19 percentage points ($\beta_2 = -19.07, p = 0.125$). Going from near zero to the sample mean value of Policy Stability negates most of the risk-mitigating effects of minority state ownership in the full sample of 1373, but not in estimations of the 167 projects with some state ownership. Thus, we surmise that the 21-30% state ownership
window yields the greatest investment risk-diminishing effect for private co-investors announcing projects in host countries with low policy stability.\textsuperscript{13}

Results in Table 5 also suggest that crossing the 50\% state ownership threshold and thus moving to Quadrant 4’s Interfering State Ownership scenario changes investment risk trends. Setting the (majority) state ownership dummy to take the value of one when in the 50-60\% range implies an increase in Investment Risk of nearly 12 percentage points ($\beta_2 = 11.77$, $p < 0.10$). This trend continues at higher percentages of majority state ownership.\textsuperscript{14} In terms of our credible model, the signal of initial policy maintenance has been drowned out by a signal of interference by the controlling state owners under those same initial policies.

**Discussion and Conclusion**

**Key Findings and Implications**

We set out to understand whether and how minority state ownership might play a risk-reducing role for private co-investors involved in large projects. State ownership may play that role where host-country policy stability is low, that is, where initial policies favorable to private co-investors are vulnerable to change. State ownership does play that role when state ownership is substantial but not controlling. These minority rules derive from a theoretical model grounded in IE, TCE, and perhaps most importantly, signaling theories. We find broad-based statistical support for these minority rules in analyses of 1373 investment projects announced in 95 host countries from 1990-2012. Investment risk in the form of equity as a percentage of total capital funding for an announced investment project increases in host countries with low policy stability, but minority state ownership diminishes that risk-increasing effect, with 21-30\% state ownership yielding the most investment risk diminishment. These findings prove robust to reasonable variation in sampling, model specification and estimation strategies.

Our study has implications for management and organization theories about investment risk and the role of states as regulators and occasionally as co-investors. We challenge more conventional principal-agent perspectives (e.g., Boycko et al. 1996) assuming that public policy-makers and private investors are naturally at odds with each other and that complete divestment of one or the other from projects reduces conflict and risk. In certain contexts, the two instead may be complementary partners. In host countries with low policy stability,

\textsuperscript{13} The apparently optimal 21-30\% minority state ownership range also comports with current experience of successful firms in the mining industry—for example, the Gem Diamonds Letšeng project which allocates a 30\% minority ownership stake to the Lesotho government.

\textsuperscript{14} Results from analysis of windows in the 60-100\% range of majority state ownership are available from the authors.
investment risk is reduced when private co-investors have a controlling equity interest like a senior partner, and
the state has a non-controlling but still substantial minority stake like a junior partner. With such arrangements,
state ownership sends a signal of initial policy maintenance in the near term lest the state suffer losses along
with private co-investors when policies change. Our credible model of state ownership defines particular host-
country and project conditions when that signal and its investment risk-diminishing effects will be strongest,
when they will weaken, and when they will disappear altogether. Our model defines those conditions for
public-private investment projects generally, and thus extends the research domain of credible state ownership
models well beyond their more limited historical domain of enterprise privatization and deregulation (Perotti
1995; Vaaler and Schrage 2009).

Our study extends and refines related findings by Inoue and colleagues (2013), who documented
positive performance effects associated with minority state ownership in public-private partnerships domiciled
in one developing country with lower policy stability: Brazil. We extend their research in finding that minority
state ownership diminishes increased investment risk for projects located in Brazil and other developing
countries with low policy stability. We refine their research in finding that minority state ownership is
superfluous and only tends to interfere with rather than enhance organization efforts to reduce risk in many
other host countries with high policy stability (e.g., Canada). In highlighting these contingencies we help guide
current research debates about when minority state owners are more likely to intervene helpfully from the
perspective of private co-investors (Musacchio and Lazzarini 2014; Musacchio, Lazzarini and Aguilera 2015).

Our study also has implications for organizational research methods measuring and analyzing
investment risk. Researchers tend to study investment risk in the context of large, well-established, multi-
business firms with subsidiaries operating in several countries (e.g., Zaheer 1995). We suggest a different context.
We use single-business project investment companies and exploit their distinctive capital structure characteristics
when first announced. When Esty (2004) poses the rhetorical question about why we should study large projects,
a substantial part of the answer relates to the greater transparency and increasing frequency of project investment
companies as a preferred foreign direct investment mode, particularly in developing countries.15 The future of
empirical research on investment risk management abroad almost certainly includes a larger role for project

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15 In some developing countries, such as the Philippines and Indonesia, more than 75% of inward foreign direct
investment in the 1990s came through project investment companies (Vaaler 2008).
investment companies in broad-sample statistical studies like ours and in more detailed case studies of individual project companies and their risk-mitigation practices by management scholars (e.g., Sawant 2010a).

Implications extend to project executives and state policy-makers. We documented the investment risk-diminishing effects of minority state ownership in projects located in host countries with low policy stability, and identified an optimal 21-30% window of minority state ownership. This window corresponds closely to a 15-30% window of state ownership providing the greatest initial financial performance enhancement to partially-privatized telecommunications enterprises located in states with low policy stability (Vaaler and Schrage 2009). Such findings may guide project executives and public policy-makers mulling over the practical meaning of substantial yet non-controlling state ownership and its potential benefits for private co-investors.

Policy makers may conclude from our study that greater willingness by states to co-invest with private players will help attract more projects with less investment risk and a better likelihood of business success also contributing to broader national economic development. Perhaps, but a state co-investment strategy can become expensive quickly. This strategy also implies that states have some special insight about which projects and private players to include. Minority state ownership might be net risk-reducing for private co-investors, but at great cost to state finances. As Wells (2014) has noted, host-country governments might do better by investing in better-trained, better-paid, and better-resourced legislators and regulators to build institutional capacity.

**Limitations and Future Research**

Like any study, ours has limitations. We developed and tested theory about the investment risk effects of minority state ownership for projects in host countries where the rules of the investment game are more vulnerable to change. Of course, ownership represents but one means for states to participate in projects. States might prompt the same risk-diminishing dynamics through other non-equity interventions. Our SDC data include information on different types of non-equity investment participation in projects: state loans to projects, state letters of support for projects, tariff subsidies for imported goods vital to project success. Re-estimation of Equation 1 after adding variables related to various non-equity state support does not change our core findings about state ownership and investment risk for projects in low policy stability environments. Future research will benefit from closer scrutiny of these alternative sources of substantial but non-controlling state support and the signal they send to private investors.

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16 Complete results are available from the authors, who thank an anonymous reviewer for suggesting this analysis.
Private investors can also engage states by lobbying elected and appointed policy makers, providing financial support to local political parties, and initiating media campaigns in local communities. These strategies may also foster conditions decreasing investing risk, but they are not readily observed in our study. Future research can and should account for such non-market strategies individually and in interaction with state ownership practices we did study in depth.

Our theory focuses on the investment risk impact of project ownership by host-country states with incentives to alter policies relevant to private co-investors. But other non-host-country states may be project investors, too. Think, for example, of a private co-investor's home-country state agency taking an equity stake in an investment project located abroad. Re-estimation of Equation 1 after inclusion of additional controls for other non-host-country state ownership does not change our core results. Future research on state ownership and investment risk might benefit from investigation of scenarios where non-host-country state ownership is reinforced with some transnational connection such as a bilateral investment treaty.

We investigated the impact of state ownership on investment risk for projects in states with low policy stability but we did not ask after the source of that low policy stability. The source might matter. Change in policies relevant to private co-investors could follow from the constitutionally-mandated to and fro of parties vying for office in competitive elections (Vaaler 2008), from extra-constitutional coups (Fosu 2002), and from the violence that may accompany either type of event (Hiatt and Sine 2014). Future research should investigate when and how state ownership affects investment risk depending on the state source of low policy stability. Emerging research from Hiatt, Carlos and Sine (forthcoming) suggests that investments from military branches of the state provide long-term assurances to private co-investors, particularly when projects have dual civilian and military uses such as with air transport projects.

We showed that minority state ownership diminishes increased investment risk associated with low policy stability. We also showed that such risk-diminishing effects are most pronounced in the 21-30% range of state ownership. But those are general tendencies that might differ markedly in certain industries, such as in mining versus power generation, and at different times, such as during election years. Future research should explore such contingencies to improve our understanding about when, where and how much our minority rules apply.

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17 Complete results are available from the authors, who thank an anonymous reviewer for suggesting this analysis.
We showed that our core regression results in Table 3 were robust to reasonable variation in sampling, model specification and, perhaps most importantly, estimation strategies. That said, we make no claim to the comprehensiveness of these strategies, especially as they relate to potential sample selection and endogeneity issues. State ownership in the 1373 projects we analyzed was well-dispersed across all four combinations of host-country policy stability and state ownership. But we studied projects across a range of industries and years. Future research should investigate whether the likelihood of state ownership increases with lower policy stability for projects in, say, power generation or during periods of financial crisis as in the late 2000s. If assignment of these two conditions is less than random as we suspect, then future research should account for that possibility with appropriate empirical methods such as Heckman two-stage estimators with Policy Stability as RHS terms in equations at both stages.

Private investors need not balk from moving ahead with projects around the world just because states may take an equity stake. The disadvantage of state investment is not from ownership itself but from the interference state ownership sometimes prompts. We demonstrated when and how private co-investors might include state ownership with less interference and more risk-reducing assurance. Adroit application of these minority rules for engaging states as investment project owners is part of a broader study of corporate diplomacy (Henisz 2014) promising graduates advantages in a world often vulnerable to substantial and unexpected change.
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1. **Superfluous State Ownership**
   - Future State Regulation More Likely to Support Initial Project Investment Terms.
   - State Ownership Provides Some Alternative But Unnecessary Additional Assurance of Support.
   - State Ownership Is Non-Controlling: Less Likely to Interfere Under Initial Project Investment Terms.
   
   Project Investment Example: Botany Co-Generation Power Project, Australia. Funded with 72% Debt, 28% Equity. State-Run Enterprise, Energy Australia, Holds One Fifth of Equity (Minority State Ownership).

2. **Ideological State Ownership**
   - Future State Regulation More Likely to Support Initial Project Investment Terms.
   - State Ownership Provides More Alternative But Unnecessary Additional Assurance of Support.
   - State Ownership Is Controlling: More Likely to Interfere Under Initial Project Investment Terms.
   
   Project Investment Example: Gardanne Power Station, France. Funded with 90% Debt, 10% Equity. State-Run Enterprise, EDF, Holds Just Over Half of Equity (Majority State Ownership).

3. **Credible State Ownership**
   - Future State Regulation Less Likely to Support Initial Project Investment Terms.
   - State Ownership Provides Some Alternative Assurance of Support.
   - State Ownership Is Non-Controlling: Less Likely to Interfere Under Initial Project Investment Terms.
   
   Project Investment Example: Termobarranquilla Power Project, Colombia. Funded by 60% Debt, 40% Equity. State-Run Enterprise, CORELCA, Holds About One Third of Equity (Minority State Ownership).

4. **Interfering State Ownership**
   - Future State Regulation Less Likely to Support Initial Project Investment Terms.
   - State Ownership Provides More Alternative Assurance of Support.
   - State Ownership Is Controlling: More Likely to Interfere Under Initial Project Investment Terms.
   
   Project Investment Example: Zhujiang Power Project, China. Funded with 55% Debt, 45% Equity. State-Run Enterprise, GECDC, Holds Over Half of the Equity (Majority State Ownership).

**Hypotheses Derived from Model**

1. **Hypothesis 1:** Investment risk is higher for projects in host countries with low policy stability.
2. **Hypothesis 2:** Minority state ownership diminishes higher investment risk for projects in host countries with low policy stability.
3. **Hypothesis 3:** Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with low policy stability and majority state ownership.
4. **Hypothesis 4:** Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with high policy stability and majority state ownership.
5. **Hypothesis 5:** Investment risk is lower for projects in host countries with low policy stability and minority state ownership than for projects in host countries with high policy stability and majority state ownership.

**Figure 1. Credible state ownership model and related hypotheses for empirical investigation**
Figure 2. Results from linear trend-line analysis of investment risk and policy stability, 1990-2012
Figures 3a-b. Results from linear trend-line analyses of investment risk for projects in host countries with high (●) and low (x) policy stability and differing levels of minority state ownership (3a) and majority state ownership (3b), 1990-2012.
Table 1. Variable names and descriptions, data sources, descriptive statistics, and expected impact on investment risk, 1990-2012

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Description and Data Sources</th>
<th>Descriptive Statistics</th>
<th>Expected Impact on Investment Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Risk</td>
<td>Percentage of equity-based (not debt-based) capital funding an investment project. Source: SDC (2013)</td>
<td>Mean ($\mu$) = 19.52 Min = 0 S.D. ($\sigma$) = 19.27 Max = 100</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>Project Size</td>
<td>Natural log of the total investment project cost in millions of US dollars. Source: SDC (2013)</td>
<td>Mean = 5.58 Min = 1.36 S.D. = 1.33 Max = 9.22</td>
<td>Positive</td>
</tr>
<tr>
<td>Syndicate Ownership</td>
<td>Herfindahl index of equity stakes by all investment project sponsors. Higher scores indicate greater</td>
<td>Mean = 0.75 Min = 0.13 S.D. = 0.28 Max = 1</td>
<td>Negative</td>
</tr>
<tr>
<td>Minority State Ownership</td>
<td>Percentage of project equity ownership held by individuals in the same country where the investment project is located. Source: SDC (2013)</td>
<td>Mean = 57.47 Min = 0 S.D. = 43.22 Max = 100</td>
<td>Negative</td>
</tr>
<tr>
<td>Offtake Contract</td>
<td>0-1 Dummy that equals one (and zero otherwise) if there is a specified buyer (“off-take”) contract associated with the investment project whereby the buyer agrees to purchase the project output at preset prices and quantities. Source: SDC (2013)</td>
<td>Mean = 0.36 Min = 0 S.D. = 0.48 Max = 1</td>
<td>Negative</td>
</tr>
<tr>
<td>Project Bid</td>
<td>0-1 Dummy that equals one (and zero otherwise) if the state solicited a bid for the investment project. Source: SDC (2013)</td>
<td>Mean = 0.13 Min = 0 S.D. = 0.33 Max = 1</td>
<td>Negative</td>
</tr>
<tr>
<td>Lead Sponsor Experience</td>
<td>Number of previous investment projects in the same host country and industry where the lead sponsor was a project owner. Source: SDC (2013)</td>
<td>Mean = 1.10 Min = 0 S.D. = 3.64 Max = 46</td>
<td>Negative</td>
</tr>
<tr>
<td>Industry Demand</td>
<td>Aggregate standardized score (Mean = 0, S.D. = 1) of industry demand for such investment projects in host country.</td>
<td>Mean = 0.00 Min = -10.66 S.D. = 0.99 Max = 17.58</td>
<td>Negative</td>
</tr>
<tr>
<td>Country Rating</td>
<td>Annual average sovereign ceiling rating by Moody’s, S&amp;P, Fitch, Duff Credit Rating, Thomson Bank Watch and Investment Bank Credit Analysis of long-term foreign currency-denominated debt converted to a 0-16 scale (AAA = 16, AA+ = 15, ..., B- = 1, Below B- = Default) or No Rating = 0. Source: Bloomberg (2016).</td>
<td>Mean = 10.80 Min = 0 S.D. = 5.29 Max = 16</td>
<td>Negative</td>
</tr>
<tr>
<td>Policy Stability</td>
<td>Natural log of 1-18 “checks and balances” score (1 = no/minimal checks to 18 = substantial checks on political authority) assessing the number of relevant policy veto holders in national polity. Source: World Bank’s DPI (Beck et al. 2001)</td>
<td>Mean = 1.32 Min = 0 S.D. = 0.62 Max = 2.89</td>
<td>Negative (see H1)</td>
</tr>
<tr>
<td>Minority State Ownership</td>
<td>0-1 Dummy that equals one (and zero otherwise) if the state owns greater than 0% and less than 50% of an investment project. Source: SDC (2013)</td>
<td>Mean = 0.06 Min = 0 S.D. = 0.23 Max = 1</td>
<td>Conditional on Policy Stability (see H2)</td>
</tr>
<tr>
<td>Superfluous State Ownership</td>
<td>0-1 Dummy that equals one (and zero otherwise) if policy stability is above the sample average (i.e., &gt; 1.32) and state ownership is less than 50%. Source: SDC (2013)</td>
<td>Mean = 0.02 Min = 0 S.D. = 0.15 Max = 1</td>
<td>Positive relative to Credible State Ownership scenario (see H4)</td>
</tr>
<tr>
<td>Ideological State Ownership</td>
<td>0-1 Dummy that equals one (and zero otherwise) if policy stability is above its sample average (i.e., &gt; 1.32) and state ownership is greater than 50%. Source: SDC (2013)</td>
<td>Mean = 0.03 Min = 0 S.D. = 0.18 Max = 1</td>
<td>Positive relative to Credible State Ownership scenario (see H5)</td>
</tr>
<tr>
<td>Interfering State Ownership</td>
<td>0-1 Dummy that equals one (and zero otherwise) if policy stability is below its sample average (i.e., &lt; 1.32) and state ownership is greater than 50%. Source: SDC (2013)</td>
<td>Mean = 0.02 Min = 0 S.D. = 0.14 Max = 1</td>
<td>Positive relative to Credible State Ownership scenario (see H3)</td>
</tr>
</tbody>
</table>

a. Table 1 presents data sources and sampling characteristics, descriptive statistics and hypothesized relationships for primary dependent, control, and explanatory variables used empirical analyses. Estimated models also include 0-1 year dummies for 21 of 22 years and five of six industries represented in analysed samples. Additional variables used in analyses are described in the study’s text.

b. Industry Demand is a standardized (Mean = 0, S.D. =1) industry measure for host countries assessed in the year of an investment project announcement. For a project in the mining industry, the standardized value is based on the dollar value of all country ores and metals exports as a percentage of all merchandise exports (WDI 2015) multiplied by the average annual world commodity metals price index value (Index Mundi 2015). For a project in the oil and gas industry, the standardized value is based on the dollar value of all country fuels exports as a percentage of all merchandise exports (WDI 2015) multiplied by the inflation adjusted annual average crude oil price in the US (InflationData.com 2015). For a project in the water and sewage or in the waste and recycling industries, the standardized value is based on the percentage of a country's population without improved residential water source of GDP (WDI 2015). For a project in the telecommunications industry, the standardized value is based on country per capita growth in electricity consumption divided by the natural log of GDP (WDI 2015). Higher standardized values imply greater demand for projects in that industry leading to lower investment risk for a given project in that industry.
Table 2. Results from pair-wise correlational analysis of investment risk, policy stability, state ownership, and related variables, 1990-2012a

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Investment Risk</td>
<td>1.00</td>
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<td></td>
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<tr>
<td>2. Project Size</td>
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aN = 1373. Correlations greater than 0.07 or less than -0.07 are significant at p < 0.01. Correlations greater than 0.06 or less than -0.06 are significant at p < 0.05. Correlations greater than 0.05 or less than -0.05 are significant at p < 0.10.
Table 3. Results from regression analysis of investment risk on policy stability, state ownership, and related variables, 1990-2012

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<tr>
<th>Equation Independent Variables</th>
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<th>(3) GLS</th>
<th>(4) GLS</th>
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a. Columns 1-6 of Table 3 report coefficients and robust standard errors (in parentheses) from GLS regression of investment risk ($Investment Risk$) on right-hand side variables in Equation 1 (Columns 1-5) and Equation 2 (Column 6). GLS refers to generalized least squares regression estimation with clustering on host countries. *** p < 0.01, ** p < 0.05, *p < 0.10
Table 4. Results from regression analysis of investment risk on policy stability, state ownership, and related variables 1990-2012a

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<td>Percent State Ownership (β₂Α)</td>
<td>-0.44***</td>
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<td>(0.12)</td>
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<td>Percent State Ownership*Policy Stability (β₃B)</td>
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<tr>
<td>Competitive Legislature (ω₁)</td>
<td>-0.56***</td>
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<td>African Country (ω₂)</td>
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<tr>
<td>Constant (α)</td>
<td>17.59***</td>
<td>17.48***</td>
<td>27.50</td>
<td>-5.61***</td>
<td>-0.47</td>
<td>0.21**</td>
<td>-2.41***</td>
<td>0.21</td>
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<td>(6.59)</td>
<td>(6.61)</td>
<td>(24.82)</td>
<td>(0.56)</td>
<td>(9.03)</td>
<td>(0.08)</td>
<td>(0.727)</td>
<td>(0.379)</td>
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<td>Year Dummies (τ₁-τ₁₀)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td>Industry Dummies (π₁-π₅)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Observations (N)</td>
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<td>1282</td>
<td>1373</td>
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<td>R²</td>
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</table>

a. Table 4 reports coefficients and robust standard errors (in parentheses) from GLS, two-stage Heckman, two-stage Instrumental Variables (IV), and two-stage Heckprobit regression of investment risk (Investment Risk) on right-hand side variables in Equation 1. GLS refers to generalized least squares regression estimation with clustering on host countries. Heckman refers to Heckman two-stage estimation in which the first-stage probit estimation is based on a 0-1 dependent variable (DV) that equals one when the state has any equity interest in an investment project. In the second-stage GLS estimation, Investment Risk is the DV in the second-stage GLS, which also includes a term for non-selection hazard, the Mills lambda, which has coefficient estimate (standard error) of -8.61(10.83). For the IV regression, state ownership is limited to 0-49% and occurring only in host countries with below sample-mean Policy Stability. Minority State Ownership is treated as endogenous and is the DV in the first stage. In the second stage GLS, this estimated term enters as a right-hand side term with Investment Risk as the DV. In the study’s text, we describe several IV post-estimation tests to assess the strength and exogeneity of the IVs. Heckprobit refers to a two-stage probit-probit estimation in which the first-stage probit estimation is based on a 0-1 dependent variable (DV) that equals one when the state has any equity interest in an investment project. The second-stage probit estimation is based on a 0-1 dependent variable taking the value of 1 when the foreign-led PIC’s financing is substantially delayed (Delayed Financing). *** p < 0.01, ** p < 0.05, *p<0.10
Table 5. Selected results from regression analysis of investment risk on policy stability, state ownership, and related variables, 1990-2012:

<table>
<thead>
<tr>
<th>State Ownership Windows and Number of Projects</th>
<th>Variables</th>
<th>Investment Projects with 0-100% State Ownership</th>
<th>Investment Projects with 1-100% State Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10% 19 projects</td>
<td>Minority State Ownership</td>
<td>-7.56 (7.84)</td>
<td>0.86 (10.95)</td>
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<td></td>
<td>Minority State Ownership*Policy Stability</td>
<td>7.16 (7.49)</td>
<td>-2.13 (8.36)</td>
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<tr>
<td>11-20% 21 projects</td>
<td>Minority State Ownership</td>
<td>-11.01** (5.03)</td>
<td>-7.26 (8.43)</td>
</tr>
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<td>Minority State Ownership*Policy Stability</td>
<td>10.41** (4.89)</td>
<td>7.23 (6.34)</td>
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<tr>
<td>21-30% 14 projects</td>
<td>Minority State Ownership</td>
<td>-20.58*** (6.37)</td>
<td>-19.07† (12.16)</td>
</tr>
<tr>
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<td>Minority State Ownership*Policy Stability</td>
<td>11.78** (4.58)</td>
<td>5.60 (8.56)</td>
</tr>
<tr>
<td>31-40% 14 projects</td>
<td>Minority State Ownership</td>
<td>-24.64*** (4.62)</td>
<td>-44.08*** (11.13)</td>
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<td>Minority State Ownership*Policy Stability</td>
<td>30.18*** (6.24)</td>
<td>35.53*** (8.47)</td>
</tr>
<tr>
<td>41-49% 8 projects</td>
<td>Minority State Ownership</td>
<td>-10.16** (5.05)</td>
<td>-9.08 (10.58)</td>
</tr>
<tr>
<td></td>
<td>Minority State Ownership*Policy Stability</td>
<td>6.53* (3.34)</td>
<td>0.52 (6.83)</td>
</tr>
<tr>
<td>50-60% 37 projects</td>
<td>Majority State Ownership</td>
<td>11.77** (6.44)</td>
<td>26.90*** (8.52)</td>
</tr>
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<td></td>
<td>Majority State Ownership*Policy Stability</td>
<td>-5.80 (3.92)</td>
<td>-16.13*** (5.78)</td>
</tr>
</tbody>
</table>

a. Table 5 reports selected coefficients and robust standard errors (in parentheses) from GLS regression of investment risk (Investment Risk) on right-hand side variables in Equation 1. We report only coefficients, and robust standard errors for Minority State Ownership and the related interaction term, Minority State Ownership*Policy Stability or Majority State Ownership*Policy Stability based on alternative ‘windows’ (i.e., 1-10%, 11-20%, 21-30%, 31-40%, 41-49% and 50-60% state ownership). The numbers of observations and projects with state ownership differ with each window. For regressions with minority state window (<50%), Minority State Ownership and Minority State Ownership*Policy Stability are based on a 0-1 dummy taking value of 1 in the window and 0 for no state ownership or majority state ownership. For the regression with the 50-60% window, Majority State Ownership and Majority State Ownership*Policy Stability are based on a 0-1 dummy taking value of 1 in the window and 0 for no state ownership or minority state ownership. Results for other terms used in these estimations are available from the authors. ***p < 0.01, **p < 0.05, *p < 0.10, †p = 0.125