Industrial policy choice during the crisis era

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Abstract Using an extensive database of non-macroeconomic state interventions implemented since the global economic crisis began, this paper provides quantitative evidence on the resort to selectivity by several major economic powers. The propensity to promote certain sectors, certain firms within sectors, and domestic over commercial interests is contrasted across jurisdictions. At least one prominent contention in the industrial policy literature is not borne out in the data, and certain cross-country and cross-sectoral variations found here could benefit from further analysis. A crisis-era shift towards selectivity and away from the ‘level playing field’ can be detected in the major trading nations.

Keywords: industrial policy, global economic crisis, discrimination

JEL classification: L52, L53

I. Introduction

Since the global financial crisis began in 2007, the governments of the world’s largest economic powers have implemented initiatives to stimulate their economies. These efforts have not solely been macroeconomic in nature. Rather, as Aggarwal and Evenett (2010) demonstrate, Asian state intervention during the crisis era has been both industry-specific and often discriminatory in nature. Yet those governments are not alone in the use of such measures. Governments in the US, UK, and other countries that for the most part have traditionally eschewed industrial policy have also resorted to selective interventions in the wake of the global financial crisis. The marked difference in performance of the rich Western economies as compared to large emerging markets such as China, India, and Brazil over the past decade has also led some analysts to reconsider the role of the state in promoting economic growth. Such considerations are now filtering into policy-making processes on both sides of the
Atlantic, with proposals by Sperling (2012) and Marzinotto (2012) for more active industrial policies.1

Our goal in this paper is to show empirically the lie of the land on the use of industrial policy (IP) during the crisis era. Remarkably this has not been the focus of much literature on industrial policy. Many studies have attempted to examine the question of whether IP has been successful, yet a decisive answer eludes us, owing in part to the inability to conduct counterfactual experiments in this domain. In general, the debate on IP has focused on three different positions. One view argues that intervention should be eschewed because it is generally unnecessary, and in any case is likely to be ineffective (Noland and Pack, 2003; Pack and Saggi, 2006). Others have argued that IP should focus on promoting sectors in which a country has a comparative advantage, with the emphasis on addressing market failures (see Rodrik, 2004). A third perspective suggests that IP can and should be used to promote sectors where countries will be able to reap the benefits of higher value-added products (see Lin and Chang’s (2009) exchange on the latter two approaches, as well as Wade (2010) and Singh (2011).) Another avenue of research contends that even if governments could intervene successfully in the past, developing countries are prevented from doing so now by the rules of the World Trade Organization (WTO) (Weiss, 2005).

Several other themes in industrial policy research are worth noting. Although economists have primarily concentrated on the raison d’être for intervention by focusing on different types of market failures that might justify sectoral policies, political scientists have long been concerned with the relationship between states and societies as a determinant of the varying ability of countries to undertake IP successfully (Katzenstein, 1978; Deyo, 1987). Others have attempted to provide a more refined analysis of intervention, by examining the differential success of states based on the sectors they are trying to promote (Zysman, 1977). A major question on the use of IP has been the concern that while strong states can develop and implement policies and escape regulatory capture, they may also be prone to become corrupt. David Kang (2002) examined the differential success of South Korea and the Philippines to consider whether concerns about crony capitalism are important, focusing specifically on how the external environment can drive states to be more or less effective in promoting industrial policy. Stephan Haggard (2004) summarized both the contributions of economists and political scientists on industrial policy interventions by East Asian states, showing that a variety of institutional configurations may be compatible with the pursuit of ‘successful’ industrial policies.2

As with some other questions in political economy, efforts to gauge policy effectiveness, while clearly a legitimate ultimate end of research, appear to have diverted researchers from the actual patterns of intervention, including the period since the onset of the recent global financial crisis. In this paper we are interested in ascertaining the extent to which the governments of the large economic powers—many of which are industrialized economies and are therefore subject to tighter multilateral trade rules than developing countries—have intervened during the crisis era in different sectors, the types of policy instruments used, and the extent to which they have discriminated

1 Sperling’s intervention is particularly noteworthy given his senior role in President Obama’s White House.
2 The claim by a well-known theorist of industrial policy B.-A. Lundvall (2007, p. 99) that ‘Modern social science has . . . had surprisingly little to say about nation states’ would appear to be rather puzzling.
against foreigners. Moreover, it is of great interest to ascertain if they have tried to engage in sectoral discrimination with the goal of picking winners—that is, favouring specific firms. Our goal in this paper, then, is to provide a systematic empirical treatment of these matters, employing the Global Trade Alert (GTA) dataset\(^3\) as well as stylized case studies that identify key features of non-macroeconomic crisis-era state intervention during the crisis era.

Throughout this paper reference is made to crisis-era rather than crisis-caused industrial policy choices of governments. Although some of the evidence presented supports the notion that the global financial crisis affected the frequency of industrial policy intervention, no claim is made here to definitively tackle how much of the crisis-era industrial policy is crisis induced. Our contribution is first and foremost to characterize the industrial policy choice in an informative, empirical manner. Readers of the GTA reports and users of its database will be aware of the numerous subsidy-, export promotion-, and government procurement-related measures\(^4\) during the crisis era and expansion of some pre-existing measures—facts which make it a challenge to defend effectively the proposition that crisis-era industrial policy is a mere carbon copy of pre-crisis industrial policy.

Our analysis begins in section II with a focus on a matched pair of cases in the wind turbine industry in China and the United States. We then turn in section III to an assessment of the trends we see in the use of industrial policy by a larger sample of key states in the wake of the financial crisis. Section IV concludes with the implications of our work and directions for future research.

II. Leaning against the wind? A case study of intervention in the wind power industry 2007–11

So as to better understand industrial policy choice during the recent global financial crisis it is helpful to describe the similarities and differences in approach taken by two leading governments (the US and China) in a sector that benefited from decision-makers’ desire to foster economic recovery through, among other steps, promoting commercial activities whose growth is environmentally friendly or supportive—frequently referred to as encouraging ‘green growth’. The following evidence sheds light on the form of intervention, against which commercial interests the intervention discriminates, and the apparent proponents of the intervention.

(i) US crisis-era policies towards the wind power sector

Compared with its European and Asian counterparts, the United States wind industry is less developed and less subsidized. Nevertheless, since 1995, total wind capacity in

\(^3\) This data set is available at www.globaltradealert.org. GTA provides information in real time on state measures taken during the current global economic downturn that are likely to alter the degree of discrimination against foreign commerce.

\(^4\) In particular. Of course, other types of state measures have been taken, too. See the latest summary table of measures taken since November 2008—the date of the first crisis-era G20 summit in Washington DC when governments of the world’s largest economies publicly committed to eschew protectionism—at http://www.globaltradealert.org/site-statistics/table/12
the United States grew 35-fold from 1,146 MW.\textsuperscript{5} Total installed capacity now stands at 40,181 MW, representing 21 per cent of global wind capacity, enough to power over 10 million households.\textsuperscript{6} In 2010, the United States wind industry capacity grew by 15 per cent from its 2009 level, installing an additional 5,116 MW of wind power and providing 26 per cent of all new electric generating capacity in the United States.\textsuperscript{7} Within the United States, wind power facilities are mainly located in the Great Plains and on the West Coast. Texas has the largest installed capacity with 10,135 MW, or about one-fourth of all US wind power capacity. Texas maintains a substantial lead over Iowa (3,675 MW), California (3,179 MW), Minnesota (2,432 MW), and Washington (2,356 MW).\textsuperscript{8}

Globally, Denmark’s Vestas, Spain’s Iberdrola and Gamesa, Germany’s Siemens and Enercon, India’s Suzlon, and even China’s Sinovel and Goldwind command significant market shares. GE Energy is the largest US manufacturer of wind turbines, and in 2010 it was the third largest wind turbine manufacturer in the world.\textsuperscript{9} The United States has primarily focused on the manufacturing of small wind turbines that produce less than 100 kilowatts of energy. Independent producers, such as farmers, rather than large wind farms, primarily use small turbines. American companies dominate this segment of the market. In 2010 these companies were responsible for 94 per cent of domestic sales of small wind turbines in the US.\textsuperscript{10}

Historically, the United States has provided limited financial assistance to the domestic wind industry. In the 1992 Energy Policy Act, Congress first enacted a production tax credit (PTC) that amounted to approximately 2.1 cents per kilowatt-hour (kWh) in subsidies beginning in 1994. However, the PTC had to be renewed by Congress every year, leading to a boom-and-bust cycle of wind power investments. For example, no tax credits were available in 1999–2000, 2002, and 2004, leading to precipitous drops in wind power investment (\textit{Wiser et al., 2007}). This is a sizeable disincentive for wind power projects since they normally require at least 2 years of planning. Noting also the expansion of European subsidies, the AWEA and the Union of Concerned Scientists (UCS) called US strategy ‘insufficient for sustaining the long-term growth of renewable energy’.\textsuperscript{11}

Throughout the 2000s the wind industry continued to benefit from extensions in the PTC in the Energy Policy Act of 2005 and the Tax Relief and Health Care Act of 2006. In the Emergency Economic Stabilization Act of 2008, not only was the PTC extended,


but an installation tax credit (ITC) was created that provides a 30 per cent subsidy for small wind turbines (usually for homes or businesses). The largest increase in wind subsidies came in the 2009 American Recovery and Reconstruction Act (ARRA). Within the ARRA was a 3-year extension of the PTC, the ability to claim an ITC (equivalent to 30 per cent of project cost) instead of a PTC (2.1 cent/kWh subsidy), a Treasury grant instead of an ITC, and an assortment of bonds and other incentives.12

These were large victories for the US wind industry. They provided stable government funding that was not reliant upon annual Congressional renewal. As a result, 2009 saw the largest increase in wind power, up 10,010 MW, or an additional 39 per cent capacity.13 In particular, the Treasury cash grant programme, which had no upper limit and gives wind farm developers cash instead of tax incentives, created a secondary boom in wind investment since its implementation in July 2009. The Treasury and Energy Departments awarded $4.7 billion worth of cash grants between them to the wind industry through 2010, the original termination date of the programme (the programme has been extended for a year until the end of 2011).14 AWEA CEO Denise Bode said, ‘The US wind energy industry shattered all installation records in 2009, chalking up the Recovery Act as a historic success in creating jobs, avoiding carbon, and protecting consumers.’15

Prior to 2009, arguments for intervention were mainly based on environmental grounds and energy independence. Since then, with the ongoing financial crisis, a larger focus has been placed on creating and preserving American jobs. For example, the AWEA said in its 2010 annual report that ‘the wind manufacturing sector has the potential to employ many more Americans in green jobs, but without a renewable electricity standard to provide a long-term market, the sector will be slow to grow.’16 CEO Andris Cukurs of Suzlon said ‘it is one of the few industries where you can absorb rust-belt workers’. The industry’s trade group said wind power added 35,000 jobs in 2009.17 The conversion of a former Maytag manufacturing plant to a wind turbine facility in Iowa bolstered those claims.18

Lobbying efforts have similarly reflected economic concerns. In early 2009, the Solar Energy Industry Association (SEIA) CEO Rhone Resch argued:

Congress must use the stimulus bill to move us away from our backwards-looking, recession-burdened economy and toward a new era of recovery and prosperity

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with solar and wind leading the way. Our industries have become powerful eco-
nomic engines in the US, each year creating tens of thousands of new jobs and
billions of dollars in economic investment.  

Implementing these steps also led to a backlash against foreign investors. An October
2009 study at American University found that of the approximately $1 billion spent
on wind power from the 2009 stimulus bill, more than 80 per cent went to foreign
wind manufacturers. In November 2009, Senator Chuck Schumer fought vehemently
against a $1.5 billion west Texas wind farm because most of the wind turbines pur-
chased by that farm were made in China: ‘The idea that stimulus funds would be used
to create jobs overseas is quite troubling.’ It should be noted that Spain’s Iberdrola
and Denmark’s Vestas have also taken advantage of the federal stimulus bill without
incident.

Fears have been expressed that once the extended cash grant programme expires at
the end of 2011, investments in wind power will decline further, just as they did at the
start of 2011 when companies first cut back on wind investments in anticipation of the
end of the programme. Therefore, the AWEA has been instrumental in pushing for a
Renewable Energy Standard (RES) that would federally mandate that the US attain a
certain percentage of its electricity from renewable resources. The AWEA has cited a
UCS report which found that a national ‘25 per cent-by-2025’ RES would add nearly
300,000 jobs to economy, assist with energy independence, and help the environment.
State governments have been active in legislating RESs, and so far 30 states have imple-
mented a renewable energy target. California currently has the most aggressive stand-
ard, aiming to reduce emissions by 33 per cent by 2020. Nearly all states have provided
some form of financial or tax incentive to promote renewable energy. Nationally,
an RES has been inserted into both a House Act (The American Clean Energy and
Security Act, H.R. 2454) and a Senate Act (The American Clean Energy Leadership

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Act), though only the House version passed and the bill died.\(^{28}\) The AWEA has lobbied so intently for the RES that in the first quarter of 2009 alone the organization spent $1.2m in lobbying efforts, more than any other renewable energy group.\(^{29}\)

As noted previously, the AWEA has been the most vocal proponent of the wind industry. In addition to the RES, top legislative priorities included extending the PTC and ITC under the 2009 ARRA for a longer term to provide greater consistency and market certainty.\(^{30}\) In August 2011, a coalition of 24 governors from both major parties and every region of the US asked the Obama administration to create a more favourable business climate for the development of wind energy, proposing a 7-year extension of the PTC and ITC.\(^{31}\) In addition, the AWEA advocated more favourable policies to increase the transmission capacity to connect more wind projects to the grid.\(^{32}\) The AWEA, in conjunction with the SEIA, produced a joint publication stating that linking the currently unconnected 300,000 MW of wind projects to the grid would supply more than 20 per cent of the electricity needs in the United States that the US Department of Energy has identified as desirable and also decrease energy costs for consumers.\(^{33}\)

Individual firms have been less vocal. GE Energy, the largest US manufacturer of wind turbines, has only played a limited lobbying role. This is most likely due to the presence of the AWEA. However, in late 2008 GE partnered with Google to argue for alternative energy at the national level.\(^{34}\) Other industry groups, such as the National Association of Manufacturers, have supported ‘green measures’ to the extent that they promote manufacturing jobs within the US, though they are against emissions requirements. Environmental groups, namely the Sierra Club and Union of Concerned Scientists, have also articulated support for wind energy.\(^{35}\)

Equally important to the private sector in the promotion of wind energy has been the government itself. Governments at state and federal levels have concentrated on providing financial incentives and backing and legislating RESs. President Obama has expressed continued support for the renewable energy sector, explaining ‘it’s the system we currently have that endangers our prosperity and prevents us from creating millions of new jobs’.\(^{36}\) In fact, at the beginning of

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his presidency he declared that the United States ‘will double the production of alternative energy in the next three years’. In the 2012 budget, $29.5 billion was allocated to the Department of Energy, with a key stated priority being investment in research at Energy Innovation Hubs to foster the growth of renewable energy sources including wind power.

There is no indication that the United States policies here directly violate WTO rules. In fact, the United States has been one of the leading proponents of greater trade liberalization of the renewable energy sector because of the opportunity to export more high-value-added manufactured products. The United States has endorsed the Environmental Goods and Services Agreement (EGSA), which is currently under consideration in the stalled Doha round of multilateral trade negotiations. Elsewhere, Article XX of the General Agreement on Tariffs and Trade (GATT), which provides exemptions on environmental grounds, has also been widely used as a justification for US initiatives in this sector.

The United States’ tariff and non-tariff barriers appear to be lower than in both the EU and China. In 2009, nearly 60 per cent of all countries in the WTO imposed a tariff on wind turbines, with an average rate of 7.4 per cent. Wind turbine tariffs were 10 per cent in Mexico, 8 per cent in South Korea and China, 2.7 per cent in the EU, and 1.3 per cent for the US. Tariff rates are also lower in developing nations. European nations have also heavily subsidized wind turbine manufacturers, especially during the take-off phase in the 1970s and 1980s. China has pursued protectionist measures affecting this sector. For example, many observers cite China’s export restrictions on certain rare earth metals, some of which are used in wind turbine magnets.

(ii) Chinese crisis-era policies towards the wind power sector

Faced with increasing pressure to curb greenhouse gas emissions and a growing need for energy, the wind turbine industry is seen together with other green industries as crucial for China. Global capacity has been rising rapidly, according to the Global Wind Energy

44 This discussion draws heavily on one of the cases in Aggarwal and Evenett (2010).
Council (2011), with total wind production capacity worldwide of 194.4 gigawatts (GW) at the end of 2010. In 2010, China became the country with the most installed wind power capacity, accounting for 42.3 GW (more than the US at 40.2 GW and Germany).\footnote{http://www.gwec.net/fileadmin/images/newsletter/Top\%2010\%20total\%20installed\%20capacity\%202010.jpg} China’s growth in capacity has been dramatic, rising by 250 per cent from 12.1 GW at the end of 2008. By 2020 China aims to have 200 GW of wind generation capacity (\textit{China Business Network}, 2011).\footnote{http://www.thechinabusinessnetwork.com/Channel-Index/Green-Development/General/General-2011/Number-1-in-Thermal,-Solar,-Nuclear,-Wind-and-Hyd.aspx} A Harvard–Tsinghua University study argued that China could meet all of its electricity demands by 2030 through the use of wind power (\textit{Fairley}, 2009). Another report—the China Wind Energy Development Roadmap 2050 (November 2011)—by the National Development and Reform Commission’s Energy Research Institute (NDRC–ERI) and the International Energy Agency (IEA) predicts that China could have 1,000 GW of installed wind turbine capacity by 2050 (\textit{Reve}, 2011).\footnote{http://www.evwind.es/noticias.php?id_not=14480}

In terms of industry suppliers, the number of domestic producers has risen from only six in 2004 to over 70 by 2009, and China became the number one world producer of wind turbines (\textit{Bradsher}, 2010). For the first time, Sinovel, China’s largest wind energy manufacturer, took a larger market share (11 per cent) than rival GE wind (9.2 per cent) (\textit{AOL Energy}, 2011).\footnote{http://energy.aol.com/2011/11/18/wind-rush-turbine-wars/} At the same time, prices have fallen sharply, dropping 12.5 per cent on the year in 2010 to US$463 per kilowatt, and profit margins have fallen, dropping from 25–30 per cent on average to only 10 per cent (\textit{Greenpeace International}; the Chinese Renewable Energy Industries Association, 2011; \textit{UPI}, 2010). Still, the drop in metal prices during the financial crisis helped lower costs by 10 per cent (\textit{China Energy Newswire}, 2008). Meanwhile, foreign producers have lost market share from 79 per cent of the market in 2004 to less than 49 per cent in 2008 and to 17 per cent at the end of the first half of 2009 (\textit{Zhe}, 2009).

China has devoted substantial resources to developing renewable energy sources like solar power and wind turbines. Of the ¥4 trillion ($586 billion) economic stimulus package that the government undertook in response to the global financial crisis, ¥210 billion ($31 billion) was devoted to energy-saving and carbon-reduction projects. And in June 2009 a Chinese official announced that the government would invest $14.6 billion to more than double its wind capacity from 2008 to 2010 (\textit{Liu}, 2009). According to the latest 2011 United Nations Environment Programme report, China is the world’s leading investor in renewable energy, spending US$49 billion in 2010. The report says that, overall, China is committed to spending US$468 billion over the following 5 years, more than double the previous 5 years on key industries, including renewable energy, clean technologies, and waste management (\textit{UNEP}, 2011).\footnote{http://www.ghanabusinessnews.com/2011/11/18/governments-businesses-push-for-green-future/}

In December 2009, the National People’s Congress passed new legislation that, as an amendment to the 2006 renewable-energy law, forced state-owned power grid companies to buy all the electricity produced from renewable sources even though it might be more expensive than electricity produced from coal (\textit{Oster}, 2009). This is part of
China’s ambitious plan to produce 15 per cent of its energy from renewable resources by 2020.

Although China’s installation of wind turbines to generate electricity is experiencing extraordinary growth, the Chinese government’s determination to promote domestic wind-turbine producers has made the Chinese market a hostile place for foreign producers. Sixty-five percent of China’s expanded wind power market is made up of ‘national-level concession projects’ taken up by domestic producers, leaving only the 35 per cent of the market for foreign firms to compete in. India’s Suzlon Energy Chief Executive for China notes that no turbine suppliers produced by foreign subsidiaries established in China have been selected for these projects. The Chinese government often argues that the prices charged by foreign firms are too high. But foreign firms are frustrated that the price expected by the government is so low that their wind turbines can only meet capacity targets at the expense of quality and performance.

Domestic turbines produced by firms such as Shenzhen-listed Goldwind are, indeed, cheaper, but are far below international quality standards. Furthermore, foreign firms have difficulties keeping up with regulatory changes. Other regulations that work against foreign firms include the government ban of any turbines with a capacity less than 1 MW—the most common size of their turbines. While foreign turbines with capacity of 850 KW are only 10–15 per cent more expensive than Chinese ones, that difference jumps to 30 per cent for turbines with a capacity of 2MW (Geoghegan, 2009).

In 2009, foreign wind-turbine manufacturers bid on a package of 25 wind turbines with a combined cost of $7 billion. Despite foreign companies having met domestic content regulations that 70 per cent of components for wind turbines must come from China (Geoghegan, 2009), no foreign company was awarded the contract and all were disqualified on ‘technical grounds’ (Bradsher, 2009). Joerg Wuttke, the president of the EU Chamber of Commerce in China noted, ‘It seems that the central government has decided that this must be awarded to Chinese manufacturers and not foreigners who have invested big in China’ (Zhong, 2009).

The Chinese government required that, by the end of 2009, renewable energy must account for at least 3 per cent of the generating capacity of a large power company (excluding hydroelectric power). But it does not specify how much power is actually generated from that capacity, giving companies the incentive to buy the cheapest possible wind turbines that leave foreign producers at a disadvantage. Financial regulations also make it difficult for foreign-owned wind farms to borrow money or to sell carbon credits (Bradsher, 2009).

Meanwhile, the government offers research subsidies to Chinese wind turbine firms. Producers can receive a sum of ¥600 (an 8.8 per cent subsidy per kW) for the first 50 units they produce of any new turbine with a capacity over 1 MW. Only turbine-makers with a majority Chinese ownership are eligible for this subsidy (China Energy Newswire, 2008).

In 2005, the National Development and Reform Commission (NDRC) introduced a cap that required Chinese wind farms to source at least 70 per cent of turbine parts from domestic producers. As a result, the market share of foreign turbine firms dropped from 75 per cent in 2005 to only 20 per cent in 2008. However, this regulation has recently been scrapped in government-promoted efforts to secure more advanced technology to meet its ambitious clean energy targets.
The success of the Chinese domestic turbine industry has led to forays abroad. In October 2009, a Chinese–US consortium announced that China would invest 49 per cent of a $15 billion project to build wind turbines in Texas (Balfour, 2009). Two hundred and forty of those turbines are to be produced by A-Power Energy Generation Systems based in Shenyang, China. As noted earlier, there was disapproval in American political circles that a project partially funded by US stimulus appropriations was accompanied by a ‘loss’ of American jobs. The Chinese wind turbine industry moved into Europe, too, but has received the opposite reception. In September 2011, Sinovel Wind Energy Group Co. signed a contract with the Greek utility to be an equity partner in a 200–300 MW onshore wind project in Northern Greece. Greece is struggling to cut its huge debt burden while seeking to meet Europe’s clean-energy target by 2020. Therefore, it welcomed Sinovel as co-investor because of the financing it will bring. China also signed wind energy agreements with India and Australia in the second half of 2011.

The extent of lobbying by firms in China is hard to gauge, but the activist role of the government and the ‘top down’ nature of industrial policy seems evident. In November 2009, the NDRC decided to designate the wind power equipment market as being subject to ‘overcapacity macro control and guidance’ because of the rapid influx of new players into the industry (HKTDC, 2009). It also expressed concern that too much of the technology used by Chinese producers was imported and encouraged firms to develop domestic technologies. Consistent with this, in the first 6 months of 2011, the Chinese government released a series of new regulations and rules in a bid to enhance its oversight over the entire wind power sector. It also issued a series of technical standards in response to a number of incidents of wind turbines being disconnected from the country’s power grid.

Despite criticism of its government-led policies to promote its domestic wind turbine industry, China has largely continued to maintain a WTO consistent policy—but only because it has refused to sign the Government Procurement Agreement in the WTO. At the time of its accession to the WTO in 2001, China agreed to access to this agreement ‘as soon as possible’ (Bradsher, 2009). And despite having agreed to treat American firms on a par with Chinese firms in the US–China Strategic and Economic Dialogue held in Washington, DC on 28 July 2009, in November 2009 China announced that it would give preferences to domestic firms in six areas including computers, clean power, communication, office equipment, software, and energy-efficient products (NBC News, 2010).

That said, China has recently been under pressure from the US for its flouting of the WTO’s Agreement on Subsidies and Countervailing Measures, and here China has shown a willingness to compromise. In October 2011, China ended its Special Fund for Wind Power Equipment Manufacturing that gave wind power equipment grants to manufacturers. The Obama Administration had charged that these grants were clearly prohibited

under the rules of the WTO rules because they promoted the use of local over imported content.53

(iii) Observations on US and Chinese policy choice

This case study is instructive for it reminds analysts that the form and proponent of state favouritism can differ along a number of dimensions even in the same sector. The available qualitative evidence is suggestive—but by no means conclusive—of differences in the principal proponent of industrial policy towards the wind power sector, with US private interests taking the lead in advocating state intervention. Meanwhile, in China the state seems to have been decisive—indeed, the expansion in the number of Chinese firms suggests that any early incumbents trying to secure favouritism may have done so, but also at the expense of considerably more domestic competitors.

When it comes to the form of intervention, neither government relied on the traditional forms of trade protectionism—tariff increases and unfair trade investigations. Instead, both governments offered subsidies and used government procurement policies to direct sales towards firms producing in their jurisdictions. Both governments took steps to ensure that wind power producers sourced locally as well. Discrimination against suppliers from abroad (that are neither eligible for the subsidies nor for competing for state contracts), therefore, was a common feature of both governments’ industrial policy. Chinese policies in some instances discriminated against foreign subsidiaries producing wind power in China in favour of wholly Chinese-owned firms. This highlights a feature, noted earlier, that discrimination among producers within a jurisdiction is a distinct policy choice from discrimination against producers located across the border.

As with any case study questions of generality arise. For this reason our analysis now turns to more systemic empirical evidence on certain characteristics of government intervention during the global financial crisis. Since evidence on motives is easily contested, the focus in the next section will be on measurable characteristics, such as the extent to which a government resorts to discrimination against producers located abroad as opposed to the extent to which government discriminates between producers located at home. Among other matters, it will be interesting to see if one form of discrimination tends to complement or substitute the other.

III. Non-macroeconomic state intervention by leading governments from November 2008 to May 2012

(i) Motivation and construction of the sample used here

This section characterizes industrial policy measures taken by governments of the world’s largest economies during the crisis era along a number of dimensions. Our

53 Chinese wind turbine manufacturers received individual grants ranging from $6.7m to $22.5m in exchange for using domestic parts and components instead of imported ones. Since 2008, China had provided several million dollars in such grants. See http://insidetrade.com/Inside-US-Trade/Inside-U.S.-Trade-06/10/2011/china-agrees-to-halt-wind-power-subsidies-rather-than-fight-us-in-wto/menu-id-710.html
goal is to ascertain whether state measures target certain sectors and, if so, how many. Moreover, we examine the resort to the different types of discrimination (by location and nationality), not least to see if there are patterns of complementarities or substitutability between the forms of discrimination—at both the national level and across economies in sectors that have been subject to lots of state intervention. Furthermore, having classified state measures into groups according to their coverage by restrictive WTO rules, we examine the degree to which countries have chosen a mix of interventions in markets that avoid policy instruments subject to tougher WTO rules. We also consider whether the tendency to circumvent tougher WTO rules is correlated with other aspects of policy stance, such as the propensity to discriminate against foreign commercial interests in the first place. In short, our goal is to break new ground by offering a systematic assessment of industrial policies, which might place subsequent discussions of effectiveness, WTO-compatibility, and the like on a firmer empirical foundation.

The analysis covers the three and a half years following the first crisis-era G20 summit in Washington DC in November 2008, at which the governments of the world’s largest economies officially eschewed protectionism. Our analysis covers non-macroeconomic state measures implemented between November 2008 and May 2012. In terms of jurisdictions covered, the analysis here includes Brazil, China, the European Union, Korea, Japan, Russia, and the United States. Every continent is represented in this sample, except Africa. The data for the European Union combines those measures taken by the European Commission and those taken by the 27 member states (the latter are by far the more active.) Likewise, data for Russia include measures taken in the context of its customs union with Belarus and Kazakhstan.

As there is no accepted definition of industrial policy, our analysis employs an independently collected dataset of state measures that are neither traditional monetary or fiscal policies but where there might be an effect on foreign commercial interests, taken to include not just importers, exporters, but also foreign investors, foreign owners of intellectual property, and foreign workers. State measures are included in this database—about which more is said below—if they favour as well as harm foreign commercial interests, so there is no inherent bias in the sample towards protectionism. Moreover, the criterion \textit{de jure} or \textit{de facto} ‘effect on foreign commercial interests’ is used to ascertain whether a measure includes policy instruments that discriminate against, favour, or are neutral towards foreign commercial interests. In principle any non-macroeconomic state measure that could have an effect on foreign commercial interests is included in the sample, not just tariffs and quotas (the traditional instruments of trade policy) and not just measures that favour any one sector (such favouritism being the definition of industrial policy by some). As a result, our analysis allows for non-conventional forms of discrimination and government measures that target specifically multiple sectors or no particular sector at all.

\footnote{However, government procurement policies including those requiring certain proportions of local content are included in the sample, as are government spending initiatives that target certain sectors. Central bank initiatives that select among firms and bailout policies that do so are included in our sample as well. Across-the-board fiscal and monetary policies with no apparent discrimination between firms are excluded from the sample used here.}
Data on the seven jurisdictions identified above were extracted from the GTA database.\textsuperscript{55} This database was assembled by independent researchers and trade policy analysts located in all the regions of the world. The unit of analysis in this database is a state measure implemented on or after November 2008 that could\textsuperscript{56} affect—positively or negatively—foreign commercial interests, the latter broadly defined as above.\textsuperscript{57} A state announcement may include several policy instruments and there are no a priori restrictions on the types of policy measures included in this database. This design choice reflects the fact that during economic crises governments often innovate and thereby alter the set of policies used.\textsuperscript{58}

Where possible, official sources (including official reports of international organizations) are used to document the details of each state measure, each of which forms a separate report that can be viewed on the GTA’s website. Moreover, attempts are made to identify the sectors, tariff lines, and trading partners potentially affected by each state measure using a very conservative methodology. Each state measure is classified according to a traffic light system whereby, as far as implemented measures are concerned, ‘green’ measures are neutral or beneficial towards foreign commercial interests, ‘amber’ measures probably discriminate on the basis of their nationality against some or all foreign commercial interests,\textsuperscript{59} and ‘red’ measures almost certainly discriminate on the basis of their nationality against some or all foreign commercial interests.

For our present purposes it is important to note that a measure can be classified as discriminatory (amber or red) in the GTA database even though it involves no direct effect on cross-border flows on trade or investment.\textsuperscript{60} Moreover, it is apparent from the entries in the GTA database that some government measures discriminate among firms—including domestic firms—within the borders of the jurisdiction in question. Therefore, it is possible for a measure to be classified as red or amber because it involves within-border as opposed to cross-border discrimination against some foreign commercial interests.\textsuperscript{61}

\textsuperscript{55} More information about this database is available at www.globaltradealert.org and in Evenett (2011). This database is available freely to researchers. As of May 2012 over 300 papers and reports have cited the work or data of the GTA. The GTA team has issued ten reports on resort to protectionism and the statistics page of the website allows researchers to collect country-specific, policy-instrument-specific, and other information.

\textsuperscript{56} ‘Could’ is the appropriate word as some measures may upon investigation not discriminate in favour or against foreign commercial interests, even though those measures have been subject to a great deal of press attention etc.

\textsuperscript{57} State measures in effect before November 2008 are not included in the GTA database. Only if the legislation or implementing regulations covering such pre-November 2008 measures change, are the changes then included in the GTA database. This feature has pros and cons. One advantage is that the GTA database can be used to analyse ‘crisis era’ changes in policy stance. This comes at the cost of not being able to assess the total extent of discrimination against foreign commercial interests during the crisis and not being able to compare changes in policy stance before and after November 2008, both of which are arguably interesting.

\textsuperscript{58} Irwin (2011) makes this point in the context of trade policy, namely, the prevalent forms of protectionism tend to vary from crisis to crisis, vitiating any historically informed, form-based definition of protectionism.

\textsuperscript{59} In the GTA database an amber designation is typically used when (a) the state measure involves several policy instruments only some of which are definitely discriminatory, or (b) when the evidence used to document the state measure comes only from the media or non-official sources, or (c) there are substantial concerns that the state measure is discriminatory but that cannot be documented as fully as one might like.

\textsuperscript{60} More restrictive visa regimes for foreign workers are an example of such a policy.

\textsuperscript{61} For example, changes in government procurement policy preclude de facto or de jure foreign subsidiaries located within the country in question from winning contracts to supply a government. This is not hypothetical as some of the claims reported in the Chinese case study on wind power make clear.
An important finding from the GTA is that there has been widespread resort to discriminatory subsidies and bailouts outside the financial sector during the crisis era. Such subsidies can include discriminatory conditions (including the repatriation of production) or conditions whose effects discriminate against foreign commercial interests because they distort trade flows—typically by lowering prices that subsidized firms can charge at home and abroad and by slowing down the rationalization of excess production capacity. Such subsidies shift the burden of adjustment on to non-favoured firms at home and abroad and, as such, are a form of beggar-thy-neighbour policy. Furthermore, less than two-fifths of all discriminatory measures found in the GTA database are tariffs or trade defence instruments, what some refer to as the traditional forms of protectionism that are covered by tough or fairly tough, enforceable WTO rules. During the period November 2008–May 2012 there was considerable resort to less transparent policy instruments (so called ‘murky protectionism’) and to policy instruments that are not covered or are weakly covered by WTO rules. Overall, such evidence supports the contention that WTO rules have affected the composition of crisis-era discrimination rather than its quantum (Evenett, 2011).

(ii) Analysis of the sample: characterizing policy stance

The sample assembled here covers seven leading jurisdictions for 3 years of the crisis era (starting November 2008) and includes 869 state measures (out of a worldwide total of over 1,969 implemented state measures in the GTA database in May 2012). Taken together, the European Union member states and the European Commission implemented the most measures (335) and Japan the least (28). In terms of a pure count of measures taken, Brazil has the highest percentage of liberalizing or commercially neutral measures (46 per cent), whereas Japan and the EU have the least (8 and 7 per cent, respectively.)

Each state measure can target no, one, or two or more sectors. Figure 1 shows that the resort to sectoral targeting varies across the seven jurisdictions. Outside of the EU, very few measures target no particular sector. In all seven jurisdictions, 80 per cent or more of measures target one or more sectors. Targeting single sectors is very common, except in Korea. In fact, in the other six jurisdictions targeting of a single sector accounts for 40 per cent of more of new government non-macroeconomic interventions implemented from November 2008 to May 2012. Sectoral targeting, then, is very much a feature of crisis-era policy stance.

Next we examine the propensities of each government to undertake discrimination against foreign commercial interests in all its forms and to engage in within-border discrimination. Is there any correlation between the associated policy choices? For the jurisdictions in our sample, each discriminatory state measure (red and amber) was checked to see if the associated policy instruments deliberately sought to discriminate among firms inside the jurisdiction in question. Therefore, for each jurisdiction the discriminatory measures were separated between those that involved firm-specific within-border discrimination and those that did not.

62 In the GTA database the term ‘protectionist’ is applied to an implemented state measure classified as amber or red.
As jurisdictions may differ in the number of state measures announced (for example, a budget could include many changes in policy instruments, whereas a presidential decree may contain only a tariff change for a single product line), for each of the seven jurisdictions the proportion of total implemented measures that were classified green (neutral or liberalizing in the GTA database) was plotted against the proportion of discriminatory measures that deliberately introduced selectivity among firms. Furthermore, as an (imperfect) attempt to account for the different amounts of economic activity affected by different measures, each proportion is calculated with each related state measure being weighted by the number of two-digit sectors affected as determined by the UN CPC classification. The weighted proportions are plotted in Figure 2.

Figure 2 shows that among the largest economies those governments that resorted less to discrimination in general also resorted to less selectivity among firms based in their economy. There is greater cross-country variation in within-sector selectivity than in discrimination against foreign commercial interests. Moreover, four groups of jurisdictions can be identified. Japan and the European Union combine high levels of discrimination and selectivity, while Brazil does far less of both. The USA, Russia, and Korea combine intermediate levels of discrimination and selectivity—and, for what it is worth, between these three jurisdictions the two policy choices are inversely correlated. Generally, China engages in more discrimination than within-sector selectivity.

Rather than compare across jurisdictions, it is also possible to examine for each major jurisdiction the cross-sectional variation in selectivity and discrimination. In particular,

63 Weighting does not fundamentally alter the cross-country findings that follow. If anything weighting increases both reported proportions for Brazil, Japan, Korea, and the United States.
for each two-digit sector in each major jurisdiction considered here, we calculated the proportion of measures affecting a sector that do not discriminate against foreign commercial interests, and the proportion of measures discriminating against foreign commercial interests that also involve within-border firm-specific discrimination. For each such jurisdiction, we plotted the equivalent of Figure 2 for all affected sectors and for the ten sectors affected by the most discriminatory state measures using these two proportions. Not much can be gleaned from the plots for all affected sectors. However, some interesting patterns emerge from the plots of the sectors subject to the largest number of interventions in these jurisdictions. In Brazil, in sectors where there was less resort to cross-border discrimination, there was also more within-border firm-specific discrimination. In Korea the opposite is the case. In China the plot of the top ten affected sectors reveals high levels of cross-border discrimination but low levels of within-country firm-specific discrimination. For the other jurisdictions (the EU, Japan, Russia, and the USA) Japan’s top ten sectoral plot reveals very high levels of both discrimination against foreign commercial interests and within-country firm-specific discrimination. The EU, Russia, and USA’s top ten sectoral plots show high resort to discrimination against foreign commercial interest but a wide variation in within-country firm-specific selectivity. Overall, then, policy stance along these two dimensions varied considerably across the leading economic powers—highlighting the importance of differentiating among options for implementing selectivity in industrial policy and the need for further analysis of the reasons underlying these apparent cross-country differences in crisis-era policy choice.

Much has been made in the literature of the apparent constraints imposed by WTO membership on the ability of governments to engage in industrial policy (see, for example, Wade (2003) and Weiss (2005)). The sample assembled here can be used to examine
an often overlooked option available to governments—namely, substitution between policy instruments. Given that not every policy instrument is covered by WTO rules and that some policy instruments are arguably covered by stricter WTO rules than others, we explored whether there were any relationships between a propensity to discriminate against foreign commercial interests and the propensity to employ policy instruments less strictly or to employ those not governed by WTO rules.

The policy instruments in the GTA database were thus classified into three groups (low, medium, and high) according to how restrictive the WTO rules are on the application of those instruments. Tariffs and trade defence measures were classified as being subject to a high level of constraint, as were import bans. Export subsidies in agriculture, intellectual property rights measures, and government procurement policies were the major public policy measures classified as being subject to medium constraint. Migration, bailouts and state aids, competitive devaluations, investment incentives, export taxes, trade finance, and steps by subnational governments and state-owned enterprises were classified as being subject to no, or weak, WTO rules.

Cross-country variation in resort to measures constrained by WTO rules is reported in Figure 3. The resort to weakly WTO regulated measures ranges from 11 per cent of measures in the case of Brazil to a high of 84 per cent in the case of the European Union. Various forms of subsidies (outright bailouts, trade finance, and investment incentives) account for the high proportions of weakly regulated measures employed by Russia, Japan, Korea, and the EU—although the policy mixes in these jurisdictions vary. Figure 4 plots the cross-country variation in the proportion of state measures that favour foreign commercial interests and the proportion of state measures weakly regulated by the WTO. There is a clear negative correlation between the two proportions, suggesting that governments keen on discriminating substitute towards less regulated WTO rules. Such a correlation casts doubt on some of the strong claims in the industrial policy literature that WTO rules impose substantial constraints on government intervention, at least during the crisis era.

The goal of this section has been to provide evidence on various observable characteristics of the interventions by leading governments in their economies during the crisis era. As there is no accepted definition of industrial policy, we have employed a large database of state interventions during the crisis to examine the degree to which governments engaged in sector-specific intervention. Moreover, evidence from this database was collected on the propensity to resort to discrimination against foreign commercial interests and to resort to different forms of discrimination during the crisis era, namely, between firms located within a jurisdiction’s borders. Interestingly the major economic powers differed markedly in their resort to different types of discrimination, a topic surely worth further research. These powers also differed in their resort to policies that sought to circumvent stricter WTO disciplines on more traditional forms of trade policy, but such a resort is positively correlated with the overall resort to discrimination

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64 We also produced the same calculations and plot for the ten sectors worldwide that were most affected state measures. There is a clear positive correlation between the resort to discrimination and the resort to state measures weakly regulated or not regulated by the WTO.

65 The set of WTO rules are so incomplete—as compared to the range of possible state measures—that only a poorly advised government intent on engaging in cross-border and within-country firm-specific discrimination would be constrained by existing multilateral trade rules.
against foreign commercial interests. The evidence presented here will hopefully enrich the factual basis of discussions on contemporary industrial policy at a time when many governments are under enormous pressure to improve the performance of their economies.

IV. Conclusion

Recent years have seen a revival of interest in industrial policy, seen by some as potentially contributing to faster economic growth and employment generation made necessary by the sub-par performance since the global financial crisis began in 2007. Moreover, the revival has been led not just by policy-makers but also certain analysts who have made the case for more selective government intervention. Ultimately, such discussions should turn to the efficacy of industrial policy measures, what forms of discrimination, if any, are absolutely necessary and what binding multilateral trade rules and other international best practices are needed in the light of crisis-era experience. However, surely an important prior step is to understand the characteristics of the state measures governments have taken during the crisis era that have sought to promote selective economic activities.

This paper has sought to shed light on what governments have actually done during the crisis era by combining evidence from a detailed case study of the wind turbine

**Figure 3**: The major economic powers vary in their resort to policies covered by tight, moderate, and weak or no WTO rules.
industry with a detailed database on state intervention. Selectivity—in all of its forms—in state intervention during the crisis era is alive and kicking. If selectivity is the hallmark of industrial policy then, as far as the leading economic powers are concerned, governments have hardly preserved the level playing field during the crisis era, rhetoric and G20 pronouncements to the contrary notwithstanding. It is too soon to say whether such selectivity will be reversed, although in 2011 and 2012 some of the state financial support for certain sectors was reduced in response to fiscal austerity measures.

Discrimination across sectors, against foreign commercial interests, and between domestic firms are important features of crisis-era policy choice—although resort to them by the economic powers considered here differed. While protectionism has received considerable attention throughout the crisis era, it would be wrong to think of discrimination as being solely on nationality grounds. Considerable discrimination between firms has been an important feature of crisis-era policy choice. For many firms on the brink of collapse during the worst of the global financial crisis, referring to such discrimination as ‘picking winners’ seems incongruous. Rather such measures probably shifted the burden of adjustment—which largely amounts to contraction of output and shedding of excess capacity—from the favoured firms to their domestic and foreign

Figure 4: Major powers that discriminated more against foreign commercial interests also tended to resort to policies covered by weak or no WTO rules
rivals. Triage might be a better metaphor. That so much of this favouritism came in different forms of subsidies—rather than in import-reducing measures such as tariffs and antidumping measures—highlights how governments can publicly proclaim to maintain ‘open borders’ to commerce while still providing strong incentives to reallocate resources across and within borders.

Significantly more thought will be needed to understand the factors responsible for the patterns uncovered here. Some tendencies do seem clear, however. Governments that resorted to more protectionism also tended to resort more often to employing policies that discriminated between firms within their jurisdictions, as well as to policies weakly regulated or unregulated by WTO rules. One conclusion can be drawn, however. The combination of a strong intellectual consensus before the crisis among mainstream economists and policy-makers as to the flaws in industrial policy (at least in the Anglo Saxon world), the spread of pro-competition principles as manifested by the number of jurisdictions adopting and upgrading their competition laws, binding multilateral trade rules, hundreds of so-called free trade agreements, literally thousands of bilateral investment treaties, and a profound tendency towards unilateral trade reform in the developing world was unable to prevent extensive discriminatory and selective state intervention during the crisis era. Policy-makers’ commitment to the level playing field was tested during the crisis era and found wanting.

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