



asociación Española de historia Económica

DOCUMENTOS DE TRABAJO

ISSN 2174-4912

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THE ROLE OF THE US FINANCING THE SPANISH NUCLEAR PROGRAM**

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DT-AEHE N°1603

www.aehe.es



asociación española de historia económica

Febrero 2016



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DT-1603, February 2016

JEL: N2, N4, N5, N7, Q43, Q48

ABSTRACT

In 1972, Henry Kearns, President and Chairman, Export-Import Bank of the United States (Eximbank) visited the Official Chamber of Commerce and Industry in Madrid. The title of his speech “Spain—Eximbank’s Billion Dollar Client” gave notice of the important role that the public American bank had for financing the Spanish purchases of capital equipment: aircrafts, steel mills, satellite grown stations, power plants, etc. The heavy concentration on new power facilities at the time made Spain the fastest growing nuclear power developer in Europe, and the largest nuclear power buyer from the US with Eximbank’s support head-to-head with Japan. No other nation approached these two in that respect.

Investigating archival materials from the Eximbank and the National Archives and Record Administration of the United States (NARA), we explore the financial facilities the US provided to the Spanish nuclear program, the size of the authorised credits and its evolution over time. It became apparent that the role of the US in pumping public money for exporting nuclear facilities to the world explain a great deal of the US quasi-monopoly of global nuclear market before the 1980s, and in particular for turning Spain into an early adopter and champion adopter of nuclear technology.

Keywords: Nuclear energy, Eximbank, export subsidies.

RESUMEN

En 1972, Henry Kearns, presidente y director del Export-Import Bank de los Estados Unidos (Eximbank), visitó la Cámara Oficial de Comercio e Industria de Madrid. El título de su discurso "España – el cliente del billón de dólares del Eximbank" daba cuenta del importante papel que el banco público estadounidense jugaba en la financiación de las compras españolas de bienes de equipo, como aviones, fábricas de acero, estaciones satelitales y plantas eléctricas, entre otros. La concentración en nuevas instalaciones de generación eléctrica convertía a España en aquel momento en el país con el más rápido desarrollo de energía nuclear de Europa, y el mayor comprador de tecnología nuclear de los EE.UU. mano a mano con Japón. Ninguna otra nación se acercó a estos dos en ese sentido.

Utilizando materiales de archivo del Eximbank y la Administración Nacional de Archivos y Registro de los Estados Unidos (NARA), exploramos las facilidades financieras que los EE.UU. proporcionaron al programa nuclear español, el tamaño de los créditos autorizados y su evolución en el tiempo. Se hace evidente que el bombeo de dinero público norteamericano para la exportación de las instalaciones nucleares en el mundo explica en gran medida el cuasi-monopolio del mercado nuclear mundial que los EE.UU. tuvieron antes de la década de 1980, y en particular su importancia para convertir a España en uno de los pioneros y líder en la adopción de la tecnología nuclear.

Palabras clave: Energía nuclear, Eximbank, subsidios, exportaciones.

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“SPAIN—EXIMBANK’S BILLION DOLLAR CLIENT”: THE ROLE OF THE US FINANCING THE SPANISH NUCLEAR PROGRAM¹

1.- Introduction

In 1972, Henry Kearns, President and Chairman of the Export-Import Bank of the United States (Eximbank) visited the Official Chamber of Commerce and Industry in Madrid.² The title of his speech “Spain—Eximbank’s Billion Dollar Client” gave notice of the important role that the public American bank had for financing the Spanish purchases of capital equipment: aircrafts, steel mills, satellite ground stations, power plants, etc. The heavy concentration on new power facilities at the time made Spain the fastest growing nuclear power developer in Europe, and the largest buyer of nuclear power technology from the US, with Eximbank’s support, head-to-head with Japan. No other nation approached these two in that respect.

Spain achieved that leading position, as first nuclear client of the US, as a result of the confluence of interests of the two countries on their bet and deployment of nuclear energy. Ten years before Kearns's visit to Madrid, the American administration sought to solve its balance of payments problems by promoting a program supporting US industrial exports. Exim Bank became the appropriate instrument for such purpose. For the US manufacturers, that had developed a whole new sector out of the war effort –the civil uses of the atom-, the moment had arrived to begin monetizing their previous investments by selling nuclear plants to America's allies, before competition rose. By 1962 Franco's Spain was closing the design of one of the most ambitious programs in the world to produce electricity from nuclear sources. The access to nuclear knowledge had been one of the major objectives of the dictatorship from early on. Between 1948 and 1960 the state had led to the institutional framework for the development of research and training of experts. Permanent contact existed with Germany and Italy at first, but then with the US, France, Canada and the UK. And yet the local business elite drove the nuclear strategy from the early 1960s, when the autarchic dream of a reactor manufactured in

¹ We would like to thank the research assistantship of Luis Álvarez, Álvaro Arana Beatriz Argüelles Lebrón and Guillermo Uriz Uharte, and the extensive collaboration of the FOIA Public Liaison Export-Import Bank of the United States, Dawn Kral, and the archivist Dara Baker in finding and retrieving documents for this research. Financial support from the Bank of Spain (grant agreement 30/6/2012) and the Spanish Ministry of Economics and Competitiveness (project ref.: HAR2014-53825-R) is dully acknowledged. We would also like to thank the participants in Mondes électriques/Electric Worlds conference held in Paris in December 2014 and the XVIII World Economic History Congress held in Kyoto in August 2015 for their feedback and comments. All remaining errors are solely ours.

² Press Release, May 29, 1972, Bound Press Releases, July 2, 1971-June 30, 1972, J6i, 2277, Ex-Im Bank Archives, College Park, Maryland, US.

Spain waned. The Spanish electricity oligopoly managed to impose their claim that this new source of energy, with its high technological complexity, provided a business opportunity that had to be managed by the private sector. To ensure success, the reactors had to be imported from the country that led that industry.³

Until the seventies the US quasi-monopolized the world atomic market. The Spanish business and industrial capabilities required strategic alliances with major US firms in order to learn how to create a sector virtually from the scratch. Besides the knowhow and the industrial support, the Spanish nuclear program necessitated the financial means, which could only come from abroad. The size of the portfolio reactors and nuclear material imported resulted proportional to the credit received from the Exim Bank and the largest US industrial banks. An energy policy designed by the interest groups justified a foreign dependent program, technologically and financially. The rapid growth of the years of developmentalism, first, and the threat of the end of cheap oil, later, led to electricity demand forecasts well above the Spanish economic reality.⁴

The literature on the Spanish nuclear program can be divided between the contemporary works published as the program developed and the historiographical revisions of the nuclear program. The former closely follows the nuclear debates that lingered in the Western world as atomic energy evolved.⁵ Technology historians pioneer the latter with contributions about technology transfer, the institutional scientific setting and the introduction of atomic technology in different sectors (eg. Medicine, agriculture, industry).⁶ The first approaches to the Spanish nuclear program with an economic focus, however, emerged in historical accounts of the Spanish electricity sector and of specific nuclear plants.⁷ Yet the economic history of the Spanish nuclear program is just emerging in the historiography and many issues remain unknown.⁸ Understanding the role of the US in financing the Spanish nuclear program is crucial given Spain placed the vast majority its nuclear orders with the US. All Spanish nuclear orders from the US came with an Eximbank's financial package offering below market interest rates and additional guaranties to obtain further funding from private financial institutions. That was the major role of the Eximbank: financing the export of US manufactures and services which private lenders were reluctant to adopt due to either their size, risk or long maturity.⁹ While the literature on the Eximbank stretches over its long and controversial history, no study focuses on the effects that its financial facilities had on the beneficiary countries.

In this paper we make use of archival materials from the Eximbank and the National Archives and Record Administration of the United States (NARA), in order to explore

³ De la Torre & Rubio-Varas (2015b).

⁴ De la Torre & Rubio-Varas (2015a).

⁵ For instance Muñoz and Serrano, (1979), pp. 63-66;

⁶ On the history of the Spanish nuclear program see Rafael Caro (1995). On the institutional scientific research and development networks see Presas i Puig (1998, 2000 and 2005), Romero de Pablos and Sánchez Ron (2001), Romero de Pablos (2000), Ordóñez and Sánchez Ron (1996), and Sánchez Ron, (2002). For industry applications, see Barca Salom (2005) y (2010).

⁷ Garrués (2006), pp. 497-575; Sánchez Sánchez (2000, 2006 y 2010).

⁸ Rubio-Varas (2011), pp. 71-94; De la Torre and Rubio-Varas (forthcoming).

⁹ Rendell (1976-1977), Baron (1983), Becker and McClenahan (2003).

the financial facilities the US provided to the Spanish nuclear program, the size of the authorised credits and their evolution over time. The paper opens with the description of the global nuclear market from 1959 to 1980. The choice of dates relates to the changing role of the principal financial source for nuclear exports from the US: the Eximbank. The year 1959 signals the start of the nuclear sales supported by Eximbank financial assistance. By its part in 1980 the US Congress delayed the provision of a budget for the Eximbank for that fiscal year. Although Eximbank total credit authorizations for all sectors were at their peak in 1981, the Reagan Administration made clear that authorizations would be reduced and limited from there onwards.¹⁰ For nuclear direct loans and guarantees implied its progressive disappearance from Eximbank lending programs. Between 1955 and 1965 the US monopolised the world market of nuclear reactors and still by 1974 their share remained at 60%.¹¹ Adding those manufactured under General Electric [GE] and Westinghouse [WH] licences, the US share in reactors completed and under construction in the world amounted to 84% at the time.¹² The US also monopolized the supply of uranium enrichment services for ‘free-world’ (i.e. non-communist) reactors.¹³ The second section focuses on the role of the Eximbank as chief financial instrument supporting US nuclear exports to the world. From these two sections Spain emerges as an early adopter and champion importer of commercial nuclear infrastructure. In fact, Spain became the largest client of the world nuclear leader. The third section of the paper enters into the Spanish nuclear program and the financial linkages with the US. In Spain, nuclear development outpaced economic growth.¹⁴ Both internal and external forces contributed to it. Internally, the dictatorship combined with a strong lobbying electricity sector -that influenced without opposition the decisions made by officials in the government and regulatory agencies.¹⁵ On the foreign front, the US nuclear industry, with Congress support, and Eximbank funding made the difference. This paper concentrates on these external forces, and in particular on the role of the Eximbank. The final section recapitulates the findings and the questions that remain open for further research.

2.- The global market for nuclear reactors 1950s-1980s

Nuclear power plants rank among the largest export transactions in world commerce.¹⁶ Yet the global sales of nuclear reactors constitute a tight market. Just about one hundred reactors were sold internationally between 1955 and 1980 (excluding sales by the Soviet Union), the rest were built domestically. By the early 1950s it was clear that nuclear science could not remain an American monopoly and that its spread was inevitable. By taking an active role in assisting foreign nuclear programs, the US influenced the nuclear

¹⁰ Baron (1983), p. 242.

¹¹ Export-Import Bank (1976), p. 9.

¹² Bupp and Derian (1975), p. 88.

¹³ Comptroller General’s Report to the Congress (1980), p. 8 (parenthesis added to the original quote).

¹⁴ De la Torre, J. y Rubio-Varas (2014), p. 5.

¹⁵ De la Torre and Rubio-Varas, (forthcoming).

¹⁶ Comptroller General’s Report to the Congress (1980), p. 38.

policies of other nations, shared their technological developments, obtained guarantees on safeguarding nuclear materials and hastened the adoption of broader disarmament measures.¹⁷ The light-water reactor, fuelled by low-enriched uranium and cooled and moderated by ordinary water, was the US alternative to the more expensive gas-cooled reactors built by the Europeans in the 1950s.¹⁸ Two US manufacturers, WH and GE became major developers of light-water reactors, specializing in pressurized and boiling-water reactors, respectively. By the early 1960s, demonstration power reactors were in operation in all leading industrial countries, and expectations were high. In December 1963, the idea of “turnkey” plants was introduced in the US, with a bid for the construction of a plant at Oyster Creek, New Jersey.¹⁹ The main advantage is that turnkey plants were offered at a guaranteed fixed price, set in advance, that was clearly competitive with coal and oil fired alternatives. The turnkey plants successfully attracted utilities to nuclear power and gained their manufacturers a strong domestic foundation from which they then expanded internationally. In fact, before turnkey projects came about international nuclear sales only came drop by drop. Up to 1964 the US received 7 international orders for nuclear reactors, the UK sold two (to Japan and Italy²⁰) and the USSR one to East Germany (see Table 1).²¹

Table 1
Global Nuclear Export Orders (N° of reactors) 1955-1980

	1955-1964	1965-1970	1971-1973	1974-1980	Total exports orders
Global Nuclear Export Orders*	9	23	27	36	95
Suppliers:					
Canada		3	2	1	6
France		1		9	10
Germany		2	2	8	12
Sweden			1	1	2
UK	2				2
USA	7	17	22	17	63
<i>Of which EXIM financed</i>	3	11	20	16	50
USSR	1	8		28	37
Ratios (%)					
US/World*	78%	74%	81%	47%	66% (48% incl. USSR)
EXIM/US	43%	65%	91%	94%	79%

Notes: (*) Global and World totals refer to ‘free-world’ excluding USSR sales, which cannot be disaggregated for all the periods.

Sources: Free world data from “Nuclear Power Plants—Export Orders Since 1974.” Box H 116, Folder 524. Ex-Im Bank Archives, College Park, Maryland, US; USSR export data from Comptroller General’s Report to the Congress (1980), pp. 8-9.

¹⁷ Comptroller General’s Report to the Congress (1980), p. 4.

¹⁸ Comptroller General’s Report to the Congress (1980), p. 8-9.

¹⁹ International Atomic Energy Agency (2004).

²⁰ Elli (2011a) and (2011b), pp. 27-42.

²¹ The US sales went to Belgium, Italy, Japan, West Germany, India, France and Spain. The latter was the first turnkey project exported that connected to the grid. See table 2.

The first US turnkey project export of a nuclear reactor to be eventually plugged to the network took place in 1964. It was a 153 MW reactor bought by a Spanish utility for José Cabrera nuclear power plant (later known as ‘Zorita’).²² It was a game changer. WH and GE sold 17 reactors in the second half of the 1960s alone, while other countries sold 14 (including the 8 sold by the Soviet Union). Before the oil crisis hit, the US companies captured most of the international sales of nuclear reactors to the so-called ‘free world’, but US share declined dramatically from 1974 to 1980 as other Western manufacturers came into play (particularly Kraftwerk Union, Framatome and AECL). Also the virtual US monopoly on enrichment services ended abruptly in 1974 with the Soviet Union decision to sell enriched uranium to non-communist countries.²³ By 1975, the curve of orders had already passed its peak. Furthermore over two-thirds of all nuclear plants ordered after January 1970 were eventually cancelled.²⁴ On the other side of the iron curtain, the Soviet Union received export orders for 28 reactors over the 1970s, most of the orders were from East European countries, but customers included Finland, Cuba and Libya.²⁵

Which countries were placing nuclear reactors orders with the US and the rest of the ‘free world’ suppliers? Table 2 provides the answer. Two countries stand out as major clients for power reactors sold internationally from 1955 to 1980: Spain with 19 reactors and Japan with 15 reactors. Both were early adopters too. After them, South Korea ordered in the same period 9 reactors, while Switzerland ordered 8 reactors. These four countries concentrated over half of the international sales of the free world. Spain alone 20% of them.

The inner working of the Spanish market for nuclear reactors was well known to the US stakeholders.²⁶ Spanish electrical utilities, privately owned and organised as lobby, managed to manoeuvre within the dictatorship in order to play a dominant role in the ordering of nuclear power plants.²⁷ Utilities conducted the bidding process and selected the specific reactor supplier and engineering firms. New nuclear plants had to obtain a site authorization from the government before any actual contract could be signed. In many cases, bid negotiations were well advanced before such authorization was granted. Most of the third generation reactors with contracts granted during the mid-1970s, did so before having government pre-authorization. At the end, some of the projects never obtained preliminary authorization, being postponed indefinitely. By the late 1970s, the over commitment of Spain to nuclear power began to emerge in the middle of the turmoil of the political transition to democracy and the rampant economic crisis triggered by the oil crisis. Soon after, it proved simply impossible to bring to conclusion all nuclear power

²² De la Torre, and Rubio-Varas (2015a).

²³ Later two consortia formed for the same purpose France, Italy, Belgium, Iran and Spain formed EURODIF; the United Kingdom, The Netherlands and West Germany formed URENCO. Comptroller General’s Report to the Congress (1980), p. 10.

²⁴ Cohn (1997), p.127.

²⁵ Comptroller General’s Report to the Congress (1980), p. 10.

²⁶ Comptroller General’s Report to the Congress (1980), pp. 44-45.

²⁷ Private utilities won the challenge to build nuclear plants to the Government in the early 1960s. See chapter 5 in De la Torre and Rubio-Varas (2015b, *forthcoming*).

plants that had been authorized.²⁸

Table 2
Global* import orders of nuclear reactors (by n° of reactors and importing country)

Buyer country	1955-1964	1965-1970	1971-1973	1974-1980	Total Orders
Spain	1	2	7	9	19
Japan	1	6	6	2	15
South Korea		1	1	7	9
Switzerland		3	3	1	7
India	2	2	1		5
Italy	3		1	1	5
Taiwan		2	2	1	5
Belgium		2		2	4
Brazil			1	3	4
Iran				4	4
Argentina		2			2
Finland			1	1	2
Mexico			2		2
South Africa				2	2
Sweden		1	1		2
Austria			1		1
France	1				1
Iraq				1	1
Luxembourg				1	1
Netherlands		1			1
Pakistan		1			1
Philippines				1	1
West Germany	1				1
Total	9	23	27	36	95

Notes: (*) Global totals refer to 'free-world' excluding USSR sales, which cannot be disaggregated by importing country.
Sources: Free world data from "Nuclear Power Plants—Export Orders Since 1974." Box H 116, Folder 524. Ex-Im Bank Archives, College Park, Maryland, US.

The success of the US nuclear industry in the world market, as its quasi-monopoly of the Spanish market, had one more propelling source besides the US technological edge in plant design and the offering of turnkey projects. The financial support of the US to nuclear exports was also crucial. In fact, by the mid-1970s, financing by the supplier's government became more important to customers than the overall cost evaluation of the project.²⁹ The last row in Table 1 shows the increasing importance of the Eximbank in US nuclear exports: by the late 1970s all but one (sold to Switzerland) US reactor exports came with an Eximbank financial package. For the whole period the Eximbank financed more than half of the free world sales of nuclear reactors. In the case of Spain, all the

²⁸ See De la Torre and Rubio-Varas (forthcoming).

²⁹ Comptroller General's Report to the Congress (1980), p. 10.

successful bids from US manufacturers included financial support from the Eximbank. Next, we enter into the issue of financing nuclear power plants and the role played by the Eximbank in the US exports of nuclear technology.

3.- Financing nuclear power plants in early days of the industry

It was ‘simply impossible during the, 1960s and 1970s, for utilities in countries such as South Korea, the Philippines, Spain, and Yugoslavia to rise, in the private market, the \$500 million or more required for a single nuclear plant’.³⁰ With only a few exceptions, national export financing institutions of the principal supplier nations undertook external financing of nuclear power projects.³¹ In the US, the Eximbank played this role. Established by President Franklin D. Roosevelt in 1934, throughout its history to the present, Eximbank provides official credit assistance to US exporters in order to improve their ability to compete in international markets. Such assistance contested those offered by other government sponsored export financing institutions.³² Eximbank accepts the responsibility in situations where there is an unwillingness or inability of private institutions to assume the political and/or commercial risks of large and long-term credits. Such situation applies to exports from sectors that are not perfectly competitive - notably aircraft, conventional and nuclear power plants, telecommunications equipment, and construction and mining machinery.³³ Eximbank facilitates exports by providing a subsidy to foreign purchasers of US goods and services. The subsidy element derives from the fact that foreign borrowers receive credit terms that are more favourable than would be otherwise available (or even feasible) in private capital markets.³⁴

According to official documentation, the Eximbank offered for nuclear projects a standard financing package. With slight modifications over the years, it offered provisions for a direct loan to cover 45% of US content of the project, guarantees for an additional 30% – so private banks would join in –, and a 10% cash down payment.³⁵ Interest rates offered by the Eximbank ranged from 6% in the late 1960s to 8.75% a decade later.³⁶ This ‘blending’ of an Eximbank direct credit with privately supplied funds, at the commercial rate of interest, moderated considerably the effective rate of interest

³⁰ Speech Outline for Rees Nuclear Testimony [may be Congressman Thomas R. Rees, California but this needs to be confirmed by additional research], (1982). Ex-Im Bank Archives Box H128, Folder 705, College Park, Maryland, US.

³¹ *Eximbank Programs in Support of Nuclear Power Projects* (Washington, D.C., 1970), p. 3. Box J11, Folder 2347. Ex-Im Bank Archives, College Park, Maryland, US.

³² Eximbank, Press Release, February 17, 1970, Bound Press Releases, January 6, 1970-June 30, 1970, J6g, 2275, Ex-Im Bank Archives, College Park, Maryland, US.

³³ Non perfectly competitive sectors refers to those in which market competition is restricted either because there are very few suppliers (oligopoly) - in the extreme with only one supplier it becomes a monopoly- or because there are very few buyers (monopsony).

³⁴ Holliday, George. *Eximbank's Involvement in Nuclear Exports. Congressional Research Service* (Congressional Research Service, GPO: Washington D.C., March 2, 1981), p. 4. Box L1, Folder 277. Ex-Im Bank Archives, College Park, Maryland, US. See also, Seiler (1990), p. 8

³⁵ Comptroller General's Report to the Congress (1980), p. 46.

³⁶ *Authorizations for Nuclear Power Plants and Training Center from Inception thru March 31, 1983*, Exhibit B. [1959-1983], Box H128, Folder 705. Ex-Im Bank Archives, College Park, Maryland, US.

that the customer must pay for the total financing of the transaction. Furthermore, Eximbank was prepared to finance through its direct lending the later maturities of the total credit. This allowed the private lenders to obtain repayment of their loans in a shorter period of time, reducing further the effective rate of interest to the borrower.³⁷ While the average payment period for an Eximbank loan was 8 to 10 years, for nuclear loans the usual repayment period was 18 to 20 years.³⁸

By principle, the financing of local costs (i.e. costs directly generated in the importing country) was excluded from Eximbank packages. The only assistance Eximbank provided in financing costs in the host country incident to the completion of a nuclear power project took the form of guarantees of loans made by non-US financial institutions to cover those cost.³⁹

Figure 1 shows the total value of US nuclear exports together with direct loans and guarantees by the Eximbank financing those exports from 1959 to 1982. The data shows the slow beginning of nuclear exports and its outburst in the early 1970s. It also shows that the first power plants obtained almost total financial support from the Eximbank. In a way, the cycles of the Eximbank credits also reflects the cycles of the US economy, which entered recession in 1969-1970. Faced with unemployment, inflation and gold reserves at record low, on the evening of 15 August 1971, President Nixon announced to the world the end of the convertibility of the dollar into gold. The dollar devaluations of the Nixon's Administration made the prices of US goods and services competitive in world markets for the first time in a decade.⁴⁰ Fostering US exports became a major mantra of the Nixon's Presidency, as in 1971 for the first time in decades imports exceeded exports. In this vein, the Eximbank nuclear power support policy was reinforced under President Nixon presidency to assist in the sale of US made nuclear power production facilities. The program included assurance of the continued availability of financing for fuel charges, of key importance in maintaining the competitive advantage of American exporters. The oil crisis of 1973-1974 cut the expansionist cycle of nuclear exports, but also implied an opportunity to foster them in 1975-1976. By the end of the decade, three categories of exports – jet aircrafts, nuclear plants and fuel, mining and refining equipment – comprised over two thirds (69.1 per cent) of Eximbank's total exposure.⁴¹

³⁷ *Eximbank Programs in Support of Nuclear Power Projects*, (Washington, D.C., 1970), pp. 6-7. Box J11, Folder 2347. Ex-Im Bank Archives, College Park, Maryland, US.

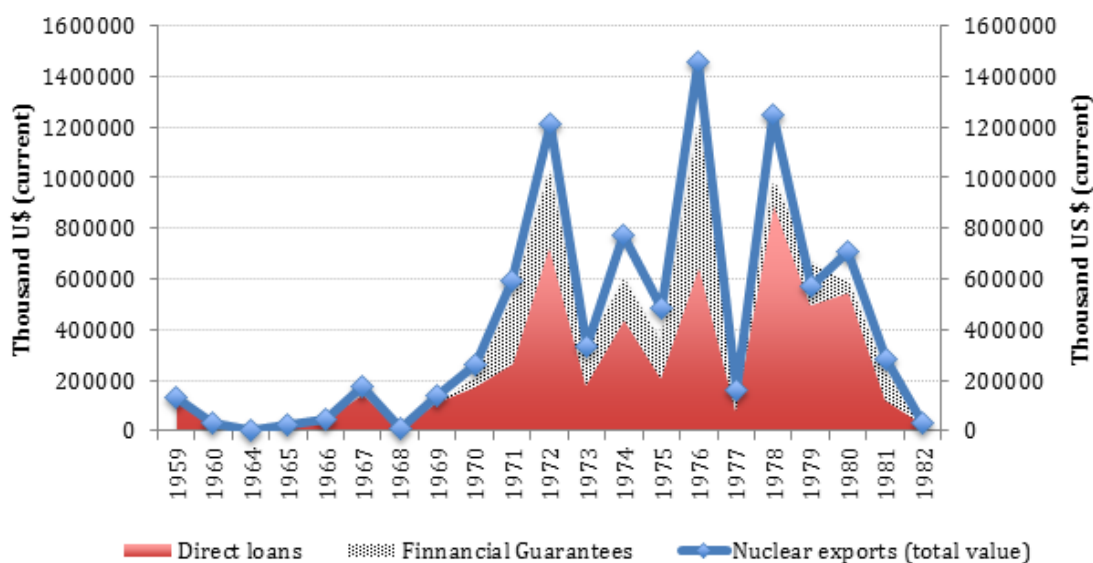
³⁸ Holliday (1981), p. 20.

³⁹ The guarantees for local costs were limited to 15 per cent of the US cost. *Eximbank Programs in Support of Nuclear Power Projects*, (Washington, D.C., 1970), p. 4. Box J11, Folder 2347. Ex-Im Bank Archives, College Park, Maryland, US.

⁴⁰ Press Release, May 29, 1972, Bound Press Releases, July 2, 1971-June 30, 1972, p.5 J6i, 2277, Ex-Im Bank Archives. College Park, Maryland, US.

⁴¹ Holliday (1981), p. 3.

Figure 1
Eximbank Financial Authorizations for Nuclear Power Plants Exports and Total Nuclear Export Value from the US (from inception thru March 31, 1983)



Sources and notes: elaborated from *Authorizations for Nuclear Power Plants and Training Center from Inception thru March 31, 1983*, Exhibit B. [1959-1983], Box H128, Folder 705. Ex-Im Bank Archives, College Park, Maryland, US. The US export value was below the financial support provided in 1979 due to financial guarantees exclusively for local cost for a South Korean power plant.

However, from the mid-1970s, and even more after Three Mile Island incident in 1979, critics of nuclear power questioned the environmental, developmental and diplomatic consequences of Eximbank’s assistance to exporters of nuclear power plants. Investigations were launched within the bank but also in other governmental agencies, the Senate and the Congress.⁴² Nuclear loans by the Eximbank became more exceptional until their total obliteration by 1985.⁴³ We can only adventure some of the reasons behind such a decision. On the one hand, it was the political change in the US government with its opposition to subsidies in general. On the other hand, the loss of markets by US manufacturers added to the realisation that the US share on nuclear foreign projects has progressively lost weight. Some countries started to erect their own nuclear power plants, while some of the most significant importers in this market had pushed hard for increasing local participation in nuclear projects.⁴⁴ The direct implication for US policy was that overtime fewer US companies benefited from building nuclear plants abroad. By the early 1980s, a policy that was supposed to benefit large parts of the US manufacturing sector – subsidising exports-, was perceived as benefiting just two large multinationals such as GE and WH.

⁴² Holliday (1981). In 1975 the role of Eximbank was already under scrutiny see Laffer, Arthur B. “Testimony of the Export-Import Bank, prepared for the Subcommittee on International Security and Scientific Affairs on Nuclear Proliferation of the Committee on International Relations, October 28, 1975.” Box G26, Folder 991. Ex-Im Bank Archives.

⁴³ Becker and McClenahan (2003), Appendix B. No nuclear credit was authorized in 1986 and a tiny credit of \$8,900 was authorized in 1987. None thereafter.

⁴⁴ Comptroller General’s Report to the Congress (1980), p. 34.

Returning to the rest of the world, who were the major beneficiaries of US financial support for nuclear power purchases? Table 3 provides the answer. In terms of number of power plants exported, the major beneficiaries were Spain with 15 reactors financed by the Eximbank, followed by Japan with 11 nuclear plants exported and financed from the US. In terms of total nuclear purchases value, measured in current US dollars, however, South Korea took the lead over Spain as the largest buyer in value of US reactors (but only bought 6 plants). The different timing explains the differences between the ranks by number of plants and the rank by total value exported. Both Spanish and Japanese purchases took place earlier than the South Korean contracts, the former at lower current value. South Korean purchases had to deal with the high inflation of the late 1970s. A similar thing happened with Taiwan, which with 6 plants bought ranks third by total value of nuclear purchases.

If we turn to analyse the actual support provided by the Eximbank shown in Table 3, the picture changes somehow but not greatly. In current dollars, South Korea was the country with the largest financial support to buy nuclear reactors from the US, including very large financial guarantees for covering local costs in excess of US export value by 1979 (see Figure 1 above) for the one and only time in history. Spain ranks second, followed by the Philippines (for just 1 nuclear power plant!), Taiwan and Japan. These five countries received almost 85% of the financial support granted by the Eximbank to the purchases of nuclear technology if we take into account direct loans plus financial guarantees to finance nuclear reactors for power plants, fuel and training centres.

From the preceding sections, Spain emerges as an early adopter and champion importer of commercial nuclear infrastructure. In fact, Spain became the largest client of the world's largest provider of nuclear technology. The last section of the paper depicts the Spanish nuclear program and its financial linkages with the US.

Table 3

**Export-Import Bank of the United States, Authorization for Nuclear Power Plants and Training Center
Summary by Country (sorted by number of plants) from Inception thru March 31, 1983 (\$ Thousands)**

Country	Export Value				Eximbank direct Loans				Financial Guarantees			
	Equipment	Fuel	Total	No. of Plants Financed	Equipment	Fuel	Total	No. of Loans	Equipment	Fuel	Total	No. of Guarantees
Spain	1,524,174	358,602	1,882,776	15	831,278	160,292	991,570	18	379,037	75,482	454,519	12
Japan	634,915	327,846	962,761	11	362,096	135,055	497,151	20	124,988	74,384	199,372	7
South Korea	2,216,282	447,756	2,664,038	6	1,621,201	329,984	1,951,185	7	436,273	54,042	490,315	6
Taiwan	993,142	285,126	1,278,268	6	438,960	156,269	595,229	6	275,925	32,400	308,325	5
Italy	75,759	26,796	102,555	2	70,851	24,849	95,700	2	-	-	-	-
Mexico	202,663	37,000	239,663	2	111,528	24,930	136,458	5	53,145	8,370	61,515	3
Sweden	44,700	37,935	82,635	2	20,115	20,070	40,185	4	-	6,570	6,570	1
Brazil	263,162	27,572	290,734	1	185,153	17,527	202,680	2	16,996	3,644	20,640	1
France	11,220	5,030	16,250	1	11,220	5,030	16,250	1	-	-	-	-
Germany	27,200	30,948	58,148	1	22,860	30,448	53,308	5	-	-	-	-
Israel	650	-	650	1	485	-	485	2	135	-	135	1
Philippines	691,400	47,600	739,000	1	255,800	21,400	277,200	1	654,510	21,400	675,910	4
Yugoslavia	198,577	22,000	220,577	1	248,906	19,800	268,706	2	29,337	-	29,337	1
Argentina	-	18,853	18,853	-	-	13,466	13,466	1	-	-	-	-
Greece	8,295	-	8,295	-	5,776	-	5,776	2	1,275	-	1,275	1
Indonesia	22,734	-	22,734	-	17,050	-	17,050	1	-	-	-	-
Romania	146,170	515	146,685	-	122,288	219	122,507	2	1,545	219	1,764	1
Other	90,250	-	90,250	-	90,250	-	90,250	1	-	-	-	-
Total	7,151,293	1,673,579	8,824,872	50	4,415,817	959,339	5,375,156	82	1,973,166	276,511	2,249,677	43

Sources and notes: Elaborated from data in *Export-Import Bank of the United States, Authorizations for Nuclear Power Plants, and Training Center from Inception thru March 31, 1983*, Exhibit A [1959-1983], Box H128, Folder 705. Ex-Im Bank Archives, College Park, Maryland, US. Other countries include only European nations.

4.- Spain's nuclear project under the EXIMBANK auspices

The Eximbank's relationship with Spain began in 1934, the first year of the bank's operation.⁴⁵ During the following five years, loans of about \$14 million were authorized to finance the purchase by Spain of US agricultural products. There would be no more Eximbank credits to Spain until 1950, when Franco's Dictatorship began its slow reinsertion back into the international economy with the backup of the US diplomacy, endorsed by the Pacts of Madrid in 1953.⁴⁶ This modest beginning progressed to major proportions during the 1970s when Spain became the single largest nuclear power buyer from the US with Eximbank's support.

Altogether from 1934 through January 1970, Eximbank authorized more than \$700 million in direct loans to Spain. Of this total, about 42% (\$295 million) was for electric power installations, 26% (\$181 million) for Spain's steel industry, and 19% (\$131 million) related to jet transport aircraft. Two years later, by March 31 of 1972, the total amount had more than doubled to \$1,644 million authorized to provide credits to Spain. This was as much support as the Bank had authorized for either Canada or Mexico, the US next-door neighbours and natural trading partners.⁴⁷ But the largest loans were still ahead: between 1972 and 1980 the Eximbank authorized over \$1,456 million direct loans to Spanish companies, almost matching the full amount lent in the previous 38 years of relationship. Behind the sums lent by the US public Bank to the Spanish economy lay the Spanish nuclear program. In fact, 900 millions of direct credits authorized from 1972 to 1981 were nuclear related.⁴⁸

Table 4 details the Spanish nuclear project and its links to the Eximbank financial facilities (only reflects the first loan to each plant but not subsequent ones). We differentiate between the loans directly approved by the Exim (direct loans) and the amounts guaranteed by the Exim but lent by third parties (guarantees). The last column reflects the expected dates of operation versus the historical reality, including the cancelled projects. Between October 1971 and August 1976, the Spanish government pre-authorized 18 nuclear projects, while it had pre-authorized only 4 in the previous decade. Spain became then the fastest growing nuclear power developer in Europe and the largest nuclear power buyer from the US with Eximbank's support head-to-head with Japan (see Tables 2 and 3 above). Of the 22 nuclear reactors pre-authorized by the Spanish government through its history, 17 reactors were awarded to US manufacturers (12 WH, 5 GE, only 15 formalised contracts for Eximbank support), 3 with Germany (KWU-Kraftwerk Union, a Siemens/AEG joint effort), and one with France (Electricité de France). Only 10 of those reactors achieved connection to the grid: 8 by US companies

⁴⁵ The loan was a relatively small one of \$670,000 for tobacco. *Remarks of Henry Kearns, President and Chairman, Export-Import bank of the United States, before the Spain-US Chamber of Commerce, New York City*. Press Release, February 17, 1970, Bound Press Releases, January 6, 1970-June 30, 1970, J6g, 2275, Ex-Im Bank Archives, College Park, Maryland, US.

⁴⁶ De la Torre and Rubio-Varas (2015b), section 4.2.

⁴⁷ Press Release, May 29, 1972, Bound Press Releases, July 2, 1971-June 30, 1972, J6i, 2277, Ex-Im Bank Archives, College Park, Maryland, US.

⁴⁸ De la Torre and Rubio-Varas (2015b), table 4.4.

(6 WH, 2 GE), and one by each French and German manufacturers.⁴⁹

Table 4
Spanish nuclear program by plant, size, supplier, costs and initial financial support by Eximbank
Current Million US \$

Plant Name	Year Ordered or applied for	Size (MW)	Supplier	Estimated Total Cost of the project	EXIM direct loan (on 1st application)	EXIM Guarantees (on 1st application)	Status
Signed contracts							
Zorita	1964	150	US (WH)	41,7	24,5	-	Operational 1968-2006
S. M ^a de Garoña	1967	460	US (GE)	93,9	42,9	-	Operational 1971-2013*
Vandellos 1	1967	480	France	92,0			Operational 1972-1989
Lemoniz 1	1972	900	US (WH)	200,9	62,0	-	Due in Operation 1978 (M)
Lemoniz 2	1972	900	US (WH)	177,3	64,5	-	Due in Operation 1979 (M)
Almaraz 1	1972	900	US (WH)	211,2	64,5	-	Due in Operation 1977, (actually 1981)
Almaraz 2	1972	900	US (WH)	208,8	62,0	-	Due in Operation 1978, (actually 1984)
Asco 1	1972	900	US (WH)	545,0	36,5	58,0	Due in Operation 1978, (actually 1985)
Asco 2	1972	900	US (WH)	605,0	40,0	40,0	Due in Operation 1979, (actually 1986)
Cofrentes	1973	900	US (GE)	280,0	38,5	38,5	Due in Operation 1980, (actually 1985)
Trillo 1	1975	1000	Germany (KWU)	192,3	86,5	57,7	Due in Operation 1982, (actually 1988)
Valdecaballeros 1	1976	1000	US (GE)	433,8	59,0	59,0	Due in Operation 1981 (M)
Valdecaballeros 2	1976	1000	US (GE)	436,1	57,0	57,0	Due in Operation 1982 (M)
Vandellos 2	1976	930	US (WH)	836,0	73,5	49,5	Due in Operation 1982, (actually 1988)
Sayago	1976	930	US (WH)	764,8	63,5	-	Due in Operation 1982, project cancelled
P. Endata 1	1976	930	US (WH)	731,0	66,5	-	Due in Operation 1984, project cancelled
Escatron 1	1977	930	US (WH)	625,0	85,0	27,0	Project cancelled
Regodola	1977	1300	Germany (KWU)	-	-	-	Project cancelled
Preliminary Commitments (PC) and Applications							
Trillo 2	1975	1000	Germany (KWU)				Due in Operation 1982 (M)
Escatron 2 (PC 3331)	1976	930	US (WH)	625,0	85,0	27,0	Project cancelled
Vandellos 3 (PC 3845)	1976	1000	US (WH)	850,0	88,0	-	Project cancelled
Santillan	1976	970	US (GE)	-	-	-	Bids due in 1977, project cancelled
P. Endata 2	-	1000	US(WH)	-	-	-	Bids due in 1978, project cancelled
Cabo Cope	-	1000	US(GE)	-	-	-	Bids due in 1978, project cancelled
Tarifa	-	1000	-	-	-	-	Bids due in 1979, project cancelled
Sayago 2	-	-	-	-	-	-	Bids due in 1978, project cancelled

Sources and notes: elaborated from data in J.C Cruse, *Memorandum Spanish Nuclear program* Box H 116, Folder 524. Ex-Im Bank Archives, and *Authorizations for Nuclear Power Plants and Training Center from Inception thru March 31, 1983*, 6-8. [1959-1983]. Box H128, Folder 705. Ex-Im Bank Archives. Years of actual operation from Romero De Pablos, and Sánchez Ron (2001). Vandellós 1 economic data from Sánchez Sánchez (2000). The offer for Trillo 1 from the Eximbank NARA Document Number: 1975STATE166552. Excludes secondary application for funding, fuel funds and training centre funds. (*) S.M^ade Garoña may be operational again in 2016. (M) Plants affected by the nuclear moratorium of 1984, which never went operational.

⁴⁹ Rubio (2011), table 1, pp. 71-94.

Except for Vandellós 1, which was entirely financed by the French, all bids for nuclear reactors came with an offer of Eximbank financial support. That includes the three reactors eventually adjudicated to German manufacturers, of which only one was built. US authorities attributed the loss of the two reactors of Trillo and the one of Regodola to German manufacturers to the superior financing terms offered by the West Germans, which the US Eximbank was unable to match.⁵⁰

The Spanish nuclear surge correlated with important external shocks. The suspension of the convertibility of the dollar in August 1971 (which made US imports cheaper for Spain up to 1975), followed in October 1973 by an astronomical increase in oil prices. The third external driving force behind the boom (and the least mentioned in the literature) was the marketing offensive, driven by the Nixon administration, to sell reactors and nuclear technology.⁵¹ In March 1974, the US Embassy in Madrid in a telegram to the US Secretary of State suggested the following:

‘[...] areas for US exports or good prospects for increased US exports as a result of higher petroleum and raw material prices and supply shortages:

1. Technical assistance and equipment sales for Spain’s expanding nuclear energy and thermal energy industry. Re[lativ]e to nuclear production of electricity, percentage share of total Spanish electrical production estimated to rise from about 1.5 per cent in 1970 to some 45 per cent by 1985. While Westinghouse and General Electric as well as US design firms, e.g. Bechtel, Foster Wheeler, have played major role in Spanish nuclear energy program, US industry must continue to be energetic in meeting other competition sources in order [to] exploit increasingly attractive possibilities.’⁵²

The US viewed the oil crisis as an opportunity for expanding nuclear power in the world. So did many governments, at least in the immediate aftermath of the first oil crisis. The problem was how to finance such expansion. In April 1975, Henry Kissinger, US Secretary of State, sent a telegram to the US Embassy in Madrid stating that:

- ‘1.[...] Eximbank anticipates that applications for 5 additional Spanish nuclear power plants will be submitted this year. Each plant costs approximately \$500 million to construct and the construction period is five to six years. 60 to 70 per cent of the cost will be local and will require peseta financing.

2. Eximbank needs to determine the capacity of the Spanish capital markets, debt and equity to fund the peseta portion of these proposed nuclear power plant projects from 1975 through 1982. Embassy is requested to furnish Eximbank capital market projections to support its evaluations. One useful benchmark would be the actual capital raised in Spain from 1970 through 1974 by private and public borrowers and by equity issuers and

⁵⁰ The KWU offer contained a financing proposal covering (1) a loan of 90% of the German content at 9% fixed rate, (2) a loan of 10% of the German value to be applied to Spanish goods and services, and (3) the capitalization of interest during construction. In contrast, the Eximbank offered the standard financing package described in the previous section. See Comptroller General’s Report to the Congress, *US Nuclear non-proliferation policy*, 46, but also NARA Document Numbers: 1975STATE166552; MADRID 06260 091426Z; Paragraph 5 in STATE 212498, which reflect the exchange of telegrams between the US State Department and the US Embassy in Madrid about the Trillo issue.

⁵¹ De la Torre and Rubio-Varas (forthcoming).

⁵² NARA Document Number: 1974MADRID01553.

comparing these amounts to the debt and equity raised by the electric utility industry during this five year period'.⁵³

The worries expressed by Kissinger about the capacity of the Spanish capital market to finance its share in the nuclear program make evident the ultimate dependence of Spanish nuclear imports from the US financial assistance both directly through Eximbank loans, and indirectly by guaranteeing private loans for the nuclear projects. For every dollar lent by the Eximbank, there was a dollar lent by a private institution. Indirect collaboration of Eximbank with private banks was formalized with the birth of PEFCO (*Private Funding Corporation*) in 1970.⁵⁴ PEFCO's stockholders initially represented a consortium of fifty-five commercial banks, seven industrial exporting corporations and an investment banking enterprise. They assembled private capital to finance US exports of capital goods. The Eximbank had a substantial role in PEFCO's business decisions. In the case of Spain PEFCO contributed to finance the nuclear projects of Ascó 1, Valdecaballeros 2, and Vandellós 2 with some \$96 million.⁵⁵ Major US banks also participated on the nuclear loans to Spain such as the Chase Manhattan Bank and the Manufacturers Hanover Trust Company of New York. But as plants became more expensive over time and a larger share of the projects became local costs, the role of the Spanish financial system also increased the original concern of Mr. Kissinger in his cable of 1975.

The dully response by the US Embassy in Madrid, provided the data requested but noted that:

'[...] very large portion of funds comes from cajas de ahorro (savings banks) and that government closely controls destination of these funds. For example, over 74 per cent of fixed income borrowing by private non-financial institutions in 1973 was supplied by cajas which must put 40 per cent of their loans into public borrowing or into other obligations determined by the government. As a Ministry of Finances official noted, there is practically no real bond market as such since most issues are simply sold to cajas. The government consequently, should be in position to assure that local funds will be available from cajas for nuclear projects'.⁵⁶

This expected role of the cajas remains an open research issue. What is clear that the major Spanish private industrial banks (Banco Urquijo, Banco de Bilbao, Banca March, Banco Español de Crédito, Banco de Vizcaya, etc) played a major role as intermediaries with the US financial institutions and also as channelers of domestic funds to the Spanish nuclear project.⁵⁷

From 1975 the dollar rally lead to more than double the cost in pesetas of the nuclear loans which first payments were due in the early 1980s. The credits that had been obtained along the 1970s gradually become so expensive in pesetas that the electrical companies

⁵³ NARA Document Number: 1975STATE074005.

⁵⁴ PEFCO's description comes from Becker and McClenahan (2003), p. 149.

⁵⁵ *Authorizations for Nuclear Power Plants and Training Center from Inception thru March 31, 1983*, 6-8. [1959-1983]. Box H128, Folder 705. Ex-Im Bank Archives, College Park, Maryland, US.

⁵⁶ Telegram available through http://www.wikileaks.org/plusd/cables/1975MADRID02787_b.html, but not at NARA.

⁵⁷ De la Torre and Rubio-Varas (2015b), chapter 4.

could not bear to repay them.⁵⁸ There was no chance of getting more subsidies from the US (given the change in policy about the Eximbank support for nuclear after Reagan's election) and the chances of refinancing in other currencies also were complicated in the early 1980s. The stage was served for a financial crisis that, we suspect, contributed substantially to the problems that the Spanish electricity and financial sectors faced in the fledgling democracy. Probably there lays, more than anywhere else, the seed of the nuclear moratorium that paralyzed the Spanish nuclear program in 1983, reducing it to just 10 operational reactors.

5.- Some conclusions and research agenda

We have explored the financial facilities the US provided to its exports of nuclear technology from 1959 to 1980. Pumping public money for exporting nuclear facilities to the world explain a great deal of the US share in the global nuclear market before the 1980s. A question that remains open is to what extent the downfall of US public money for nuclear exports from the mid-1980s, which precede Chernobyl's incident, contributed to the standstill of the industry worldwide as much as the incident itself.

The Eximbank played a crucial role financing the Spanish nuclear program. The financial facilities provided by the US helps to understand how Spain, one of the poorest countries of the Western World by the 1950s, managed to become an early adopter and champion importer of commercial nuclear power materials in less than two decades. In fact, Spain became the largest client of the largest nuclear manufacturer in the world by, at the same time, becoming the largest nuclear borrower of the Eximbank.

This paper opens more questions than it answers. A grand open question is whether the US facilities led to nuclear overinvestment in Spain, but also elsewhere in the developing world. Many other questions remain to be explored in the Spanish history of nuclear power: the exaggerate role played by Westinghouse over General Electric (unmatched in the world market or the US market); the story and accounts of the many cancelled projects besides those affected by the moratorium; the local private finance support remains almost entirely uncovered, both the role of the cajas and that of the industrial banks. The relative cost per MW as the nuclear program unfolded, as much as the waning share of the US in the total costs of the Spanish nuclear project shall be also investigated. A plentiful research agenda lies ahead of us.

⁵⁸ Espitia (1985). The financial problem was clearly identified by the government and recognized by the electrical industry. *Diario de Sesiones del Congreso de los Diputados, II Legislatura*, nº 178, pp. 5461 y 5480.

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