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"Not particularly successful"? A re-assessment of the Plan Badajoz's impact on local economic growth (1950-1980)

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"Not particularly successful"? A re-assessment of the *Plan Badajoz*'s impact on local economic growth (1950-1980)

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Abstract:
Built between 1952 and 1975, the Plan Badajoz was an infrastructure project carried out by the Francoist regime to modernise the Badajoz province. Despite the creation of 115,000 Ha. of arable land through irrigation, and the modernisation and creation of transport infrastructure, the Plan has been criticised for not kickstarting economic growth and industrialisation in the province. Taking a quantitative approach, this dissertation nuances these claims and provides evidence surrounding Plan's effect on agriculture, industry, and overall level of economic growth. Using a difference-in-difference analysis, we find that while the Plan Badajoz did successfully stimulate an agrarian transformation in the province and partially offset rural exodus, it failed to generate industrial development, or convincingly generate growth among the municipalities it affected. This more rigorous analysis of the Plan's effects feeds into the debate surrounding the role of government intervention and agrarian reform in local economic development.

1. Introduction

In December of 1945, Spanish autocrat General Franco, came on a state visit to Badajoz. Landlocked at the border with Portugal, the province had until then been largely overlooked by the Spanish government. On that state visit Franco witnessed "enormous economic and social disequilibria" within the province, but also significant gaps in employment, wages, and living standard between the province and the rest of the country.[1] Given the dire state of the Spanish economy, this was especially alarming.

To address Badajoz's "subdevelopment" problem, on the 7th of April 1952, the Spanish Congress approved of the "*Plan of works, colonisation, industrialisation and electrification of the province of Badajoz*", better known as the "*Plan*

[1] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.333

Badajoz".[2] The plan had two aims: first, the economic and social development of the province. Second, testing the impact of "colonisation" on agricultural development, to see if this method could be applied elsewhere.

In this context, colonisation refers to the purchase or seizure of unproductive lands, their irrigation and transformation into arable land, and their repopulation. Until the late 1950s, this technique was used by the Francoist regime to stimulate regional development by improving agricultural productivity.[3] Created in 1939, the *Instituto Nacional de Colonización* (hereafter INC) was the administration responsible for channelling agricultural modernisation through the development of irrigation infrastructure, improvement in technology, and the instalment of settlers. Between 1940 and 1970, roughly 300 villages were created *ab nihilo*.[4]

Although this was not the first attempt to irrigate the province, nor was it the INC only front, the *Plan Badajoz* distinguished itself by its size.[5] Its initial budget of 5.374 billion pesetas (or about 2.1 billion 2023 USD), funded the creation of a network of dams and canals regulating the Guadiana River (the main river crossing the province) and the creation of 115,000 hectares of irrigated land in its meadows, of which 100,000 hectares were to be "colonised" and 50,000 hectares repopulated. By 1962, the budget was revised to match the hydraulic projects and road's 287% and 461% cost increase.[6]

Given the outpour of public investment into the province between 1952 and 1975, coupled with its initial level of backwardness, it is reasonable to expect that this led to rapid development through catch-up growth. However, this is not what

[2] Boletín Oficial del Estado núm. 99, de 8 de abril de 1952, pp. 1587-1590
[3] Ernesto Clar, Miguel Martín-Retortillo, and Vicente Pinilla. "The Spanish path of agrarian change, 1950–2005: From authoritarian to export-oriented productivism." *Journal of Agrarian Change* 18, no. 2 (2018): 325
[4] Perfecto, Miguel Ángel (2015). "El nacionalsindicalismo español como proyecto económico-social". Hernando, Silvia (30 May 2018). "Los pueblos que se inventó Franco". *El País*. Archived from the original on 2 June 2021
[5] Sánchez Sánchez-Mora, J. A. "El proceso de colonización en Extremadura (1952-1975): sus luces y sus sombras." *El agua en Extremadura (Recursos hídricos, usos y gestión del agua* (2012) p.225
[6] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.333

emerges from the literature, who's appraisal of the plan's economic effects is overwhelmingly negative. It is this underlying contradiction that this dissertation will explore. Using a simple difference-in-difference model, we will compare the municipalities within the Badajoz province that were directly adjacent to the plan, with those further away, to quantify trends in local fiscal income, population, agricultural and industrial performance. From these, a comprehensive picture of the effects of the *Plan Badajoz* emerges. We conclude that while the plan has significant effects on the province's agrarian structure, its inability to kickstart to industrialisation explains its failure to generate long-term economic growth. Using contemporary accounts from the province's trade association and existing literature on Spanish industrialisation and the role of agriculture in economic development, we build a novel narrative to explain the plan's limitations.

This is particularly relevant since no studies have yet analysed the medium-term impact of the *Plan Badajoz*, from a quantitative point of view. The plan is often dismissed as an example of the failures of colonisation, despite little consistent evidence. More widely, this dissertation feeds in the debate on the role of state intervention in economic development and the role of agriculture in economic development. Gargantuan infrastructure projects targeting economic development are not only a legacy of Spanish fascism, but still occur in both authoritarian countries (think of the New Valley project in Egypt, or NEOM in Saudi Arabia), and democracies alike (such as the 18 billion dollar Kaleshwaram lift irrigation opened in India in 2019).[7] Studying the successes and failures of this plan can provide useful insight into how to revitalise a region through irrigation, especially as we enter an era where water-management and the fight against desertification will be an increasingly challenging political and economic issues.

[7] Nalla Venkateshwarlu, and Sridhar Rao Deshpande. "Kaleshwaram Project–A Growth Engine for comprehensive Godavari Basin development Plan." *Water and Energy International* 64, no. 5 (2021): 6-15.
Abdelhafez, Ahmed A., Mohamed HH Abbas, Mona HM Kenawy, Ahmed Noureldeen, Hadeer Darwish, Ashraf MG Ewis, and Mahdy H. Hamed. "Evaluation of underground water quality for drinking and irrigation purposes in New Valley Governorate, Egypt." *Environmental Technology & Innovation*22 (2021): 101486.
Alshimaa Aboelmakarem Farag. "The story of NEOM city: Opportunities and challenges." *New Cities and Community Extensions in Egypt and the Middle East: Visions and Challenges* (2019): 35-49.

2. Literature review and historiographical context

2.1 The lack of industrialisation critique

Despite slight reconsiderations in more recent years academic accounts of the *Plan Badajoz* are overwhelmingly negative. Overall, the plan is criticised for its inability to sustain economic growth and properly transform the region. Barciela et al. provide the most comprehensive account of the region's poor industrialisation.[8] In short, the authorities simultaneously failed to create incentives for private investment, while adopting protectionist measures to stimulate "complementary" industries that transformed the province's agricultural products. This and hampered competition led to an overreliance on the agro-food industry, which accounted for 90% of the region's industries in 1981. Furthermore, the generalised incapacity for firms to "walk by themselves » past the infant industry stage accentuated these imbalances.[9] The departure from strong state interventionism following the 1959 Stabilisation Plan exposed these inefficiencies: because of insufficient production, conserve-making plants were only used at 69% of their capacity and a vicious cycle of self-reliance between farmers and industrialists restrained incentives to diversify production. Industrialists could not commit to purchasing and transforming new products without the insurance of being able to sell them, so farmers focused on existing production (typically tomatoes), preventing any form of experimentation.[10]

2.2 The ideological critique

The primary aim of the *Plan*, however, was not industrialisation, but rather agrarian driven development. It is the socio-political component of these reforms, and thus of the plan which have garnered most attention from academics. For Ortega, Canadell and Baigorri, the *Plan Badajoz* is "the best example of Francoist propaganda of the entire regime".[11] Barrientos explains that the plan is a "piece of marketing" and a "showcase" for the regime to demonstrate its technical

[8] Ortiz, Mª Inmaculada López, and Carlos Barciela. "Autarquía e intervención: el fracaso de la vertiente industrial del Plan Badajoz." *Revista de historia industrial* (1998): 125-171.
[9] Ibid. p.133
[10] Ibid., p.150
[11] Ortega Canadell, R 2004, 'Política agraria y propaganda institucional en la década de 1950', Estudias *d´Historia Agraria,* no. 17, pp. 645-658.

capability and generous social agenda to both the Spanish people and foreign observers.[12] This leads Rubio to conclude that the program's ideological component "was more intense that its own materialisation".[13] More simply put, Franco's colonisation efforts were "not particularly successful". [14]

The internal colonisation component on which the plan is based is reflective of Franco's ideological doctrine. On the one hand, the creation of villages *ab nihilo* concretises the new social order to which fascist societies aspired. Evidence of this can be found in the town's urbanism, or their names rooted in national-Catholicism (e.g.: *San Francisco de Olivenza)*, historical triumphalism (e.g.: *Pizarro*) or outright praise to Franco *(e.g.: Guadiana del Caudillo)*. On the other hand, the agrarian reforms, which associated each peasant with a parcel, promoted a specific ideology of peasant sovereignty and family as the central unit of production, whose self-reliance was key to Spanish autarky. Authors such as Naredo see this as a crucial instrument for social control.[15] Taking this analysis a step further, Swyngedouw writes that the hydraulic policy (the infrastructure, rather than the human organisation around it) itself served the ideological mission of "changing the geography of Spain" to mark Franco's lasting impact. [16] Others, more pragmatic, emphasise that the creation, and more importantly the mediatisation of a new class of small landowners served the objective of increasing agricultural production and establishing a social consensus.[17] Because of this strong ideological component, critiquing the *Plan Badajoz* gradually became synonymous to critiquing Francoism.

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[12] Barrientos, G, 'Extremadura 1945-1995', *Alcántara, no 39,* p.38.
[13] Pérez Rubio, J A 1994*, Yunteros, braceros y colonos. La política agraria en Extremadura 1940-1975,* Ministerio de Agricultura, Madrid. P.363
[14] Camprubí, L. 2014. *Engineers and the making of the Francoist Regime.* Cambridge: MIT Press.
[15] Naredo, J.M. 1978. [Background and characteristics of the hierarchic society sustaining the spoliation in Extremadura with special reference to the Badajoz Plan]. Barcelona: Ruedo Ibérico.
[16] Erik Swyngedouw: "Technonatural Revolutions: The Scalar Politics of Franco's Hydro-Social Dream for Spain, 1939-1975 Transactions *of the Institute of British Geographers*, Jan. 2007, New Series, Vol. 32, No. 1 (Jan. 2007), p.14
[17] Oyón, J.L. 1985. Colonias agrícolas y poblados de colonización: Arquitectura y vivienda rural en España (1850- 1965) PhD thesis, Escola Tècnica Superior d'Arquitectura de Barcelona: Universitat Politècnica de Catalunya. Or Riesco Roche, s., and F. J. Rodriguez Jimenez. "El Plan Badajoz: entre la modernización económica y la propaganda política." In *Comunicación en el V Encontro Rural Report. XV Congreso de Historia Agraria de la Seha. Lisboa*, pp. 27-30. 2016, For instance.

2.3 The social critique

The Plan's most substantiated criticism relates to its social effects. Besides comments on the Plan's totalitarian nature, recurrent critiques claim that most of the newly created irrigated land (*regadío*) benefited already wealthy landowners, essentially diverting millions of pesetas into their pockets, and widening social inequalities. *Extremadura Saqueada*'s (Extremadura ransacked) publication in 1978, explains that the plan enabled the extraction of profits from agriculture and hydroelectricity without benefitting the region.[18] This "looting" was partially confirmed by Medina, who found that between 1960 and 1970, the area of newly created *regadío* belonging to settlers had decreased from 44% to 30%, while the large landowners (with domains greater than 35 ha) ended up owning 36% of this land, up from 23%.[19]

For many, this was a way for Franco to maintain the local elite's political support.[20] This is of course subject to much discussion. On the one hand, Mora points out that landlords were in fact expropriated of 60,000 Ha. of irrigated land. Furthermore, the compensation system was particularly efficient, since it granted landlords non-irrigated land in compensation, for which irrigation was to be privately arranged.[21] On the other, Rubio argues that large landlords were able to circumvent expropriation attempts by exploiting legislative loopholes.[22] Consequently they would have been able to keep their hands on the most valuable plots of lands, although Mora posits that is impossible since land was irrigated regardless of its productivity.[23] This poses other efficiency concerns, although not

[18] Gaviria, M.; Naredo, J.M. and Serna, J. (Eds). Extremadura saqueada: recursos naturales y autonomia regional [Looted Extremadura: natural resources and regional autonomy], pp. 11-25.
[19] Medina, J 2002, El Plan Badajoz y el desarrollo económico de la provincia, Tecnografía, Badajoz.p.73.
[20] See Erik Swyngedouw: "Technonatural Revolutions: The Scalar Politics of Franco's Hydro-Social Dream for Spain, 1939-1975" *Transactions of the Institute of British Geographers*, Jan. 2007, New Series, Vol. 32, No. 1, pp. 9-28 for instanc
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[21] Sánchez Sánchez-Mora, J. A. "El proceso de colonización en Extremadura (1952-1975): sus luces y sus sombras." *El agua en Extremadura (Recursos hídricos, usos y gestión del agua* (2012): 225-240.
[22] Pérez Rubio, J A 1994, *Yunteros, braceros y colonos. La política agraria en Extremadura 1940-1975*, Ministerio de Agricultura, Madrid: 223 et seq.
[23] Sánchez Sánchez-Mora, J. A. "El proceso de colonización en Extremadura (1952-1975): sus luces y sus sombras." *El agua en Extremadura (Recursos hídricos, usos y gestión del agua* (2012): 235

a distributive one since, in any case the settlers had no way of testing if the land was any good before actually exploiting it. To reconcile both views, Roche and Jimenez rely on oral history sources and hypothesise that while rich landowners were generally favoured by colonisation, it was perhaps less the case in Badajoz since local pressure groups lobbied in favour of redistribution. [24]

All these debates have left very little room for proper economic analysis, although in more recent years some more coherent data driven research (albeit very rare) has been published. These efforts to properly understand the effects of the *Plan Badajoz* often have public policy objectives, rather than strictly historical goals in mind. Consequently, Cuadrado's doctoral thesis studies the impact of the plan from a primarily agronomical point of view, while in a later policy brief, he uses the plan as an example of a rural development model. The purpose of this work is to inform of the policy implications of the Gredos declaration, a measure which seeks to curb desertification in rural Spain.[25]

2.4 Historiographical context and current debates

This change in approach also comes in a context of the slight rehabilitation which characterises post-2000 scholarships. Roche and Jimenez recognise that previous authors may have "suffered from a certain determinism" in their accounts,[26] and Pompa explicitly state that "for reasons, a lot of them not very objective, the *Plan Badajoz* has received very harsh criticism." [27] Mora, writing in 2012, highlights some of the "moderate successes" of the Plan, such as the creation of 175,000 Ha. of irrigated land and employment opportunities which otherwise would have

[24] F. J. Rodríguez Jimenez. "El Plan Badajoz: entre la modernización económica y la propaganda política." In *Comunicación en el V Encontró Rural Report. XV Congreso de Historia Agraria de la Seha. Lisboa* p.12. 2016

[25] Romero Cuadrado, Carlos. "Aspectos económicos ligados a las explotaciones creadas por el Plan Badajoz." PhD diss., Agrónomos, 2007.
Núñez Martínez, Juan Jacobo, María Romero Cuadrado, and Luis Romero Cuadrado. "Del modelo del Plan Badajoz a la Declaración de Gredos. Dos modelos de desarrollo rural= From the Badajoz Plan model to the Gredos Declaration. Two models of rural development." 2021

[26] F. J. Rodriguez Jimenez. "El Plan Badajoz: entre la modernización económica y la propaganda política." In *Comunicación en el V Encontro Rural Report. XV Congreso de Historia Agraria de la Seha. Lisboa* (2016) p.16

[27] Pompa, Pedro Gómez. "El Plan Badajoz y el agua." *Agricultura: Revista agropecuaria y ganadera* 839 (2002): 355.

certainly never happened. Today, while only covering 6% of the region's surface, the area produces 30% of the region's agricultural production and accounts for 60% of all agriculture related production.[28] This reconsideration can be explained by a common trend in the historiography of post-dictatorship Spain. In the immediate post-dictatorship period, researchers and intellectuals systematically dismissed Francoism, and anything that was associated to it. The next generation of academic proved to be more nuanced.[29]

This doesn't mean that the criticism made by scholars prior to 2000 is systematically biased. As early as 1962, the International Bank for Reconstruction and Development (the future World Bank) was concerned by the amounts of public (and foreign lent) funds invested into the project. It recommended that the regime renounce to the social component of settlement, colonise only the areas that ensured an exponential increase in productivity, and focus on land concentration.[30] This was poor timing: as the direction of agrarian policy was changing, workers had already settled on their newly allocated but small (on average 6 Ha.) parcel. Roche and Jimenez identified a "clear caesura" in the early 60s. This coincides with the Liberalisation Plan, a new growth model for Spain that radically shifted from autarky to economic liberalism and encouraged the entry of foreign capital. This foreign injunction on economic policy materialised the aphorism "fewer farmers, for a better agriculture". [31]

This radical change in economic priorities did not serve the effects of the plan well. If anything, it highlighted its weaknesses. In a 1966 article, Naylon already pointed out the lack of industrialisation, which he attributed to the general population's inability to match public investment due to their low (albeit 23,2%

[28] Sánchez Sánchez-Mora, J. A. "El proceso de colonización en Extremadura (1952-1975): sus luces y sus sombras." *El agua en Extremadura (Recursos hídricos, usos y gestión del agua* (2012): 238-239

[29] Miguel A. Cabrera, "Developments in contemporary Spanish historiography: From social history to the new cultural history." *The Journal of Modern History* 77, no. 4 (2005): p.992

[30] Fuentes Quintana, Enrique, and Revista de Occidente. *El desarrollo económico de España: juicio crítico del informe del Banco Mundial*. Madrid: Revista de Occidente, 1963

[31] The quote is from a 1954 speech by Cavestany, the Spanish minister for agriculture, commonly praised for modernising the country's agriculture. Jiménez, 'El Plan Badajoz' p.6

higher than in 1952) wages.[32] A 1970 report by the colonisation institute itself claimed that new industries that were not auxiliary to the plan (i.e. cement plants) or agricultural in nature were "insufficient if not non-existent.[33] Yet, in many ways the contemporary studies, even those conducted by foreigners, were more nuanced than those conducted by the next generation of scholars, perhaps because they still had in mind the conditions in which the region laid a decade earlier. In 1954, Nordam found that 31% of farmers were almost permanently unemployed, 45% of the population was in an uncertain and unstable economic condition and illiteracy rate reached 30%.[34] For Naylon, financial considerations were secondary to the provinces "alimentary safety", and in any case, high investment in agriculture was a consequence of modernisation. The certain sense of urgency relating the issue of poverty found in contemporary reports seems to explain the optimism surrounding the plan.[35] For many experts, despite the high cost, this was the first proper attempt to develop the region, which had so far been largely neglected from public considerations.

2.5 Gaps in the existing literature

Beyond that, the *Plan Badajoz* took inspiration from other irrigation plans in more developed countries. These too were characterised by strong interventionism. The notable difference is that they dealt with a low population pressure environment and were thus able to exploit large productive exploitations from the get-go.[36] Contemporaneous literature cites the *Tennessee Valley Authority* and the *National Bureau of Reclamations* in the US and France's *National Company for the*

[32]John Naylon. "The Badajoz Plan: An Example of Land Settlement and Regional Development in Spain (Der Badajoz-Plan als Beispiel eines ländlichen Siedlungswerkes und Regionalplanung in Spanien)." *Erdkunde* (1966): 58-59

[33] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.335

[34] Núñez Martínez, Juan Jacobo, María Romero Cuadrado, and Luis Romero Cuadrado. "Del modelo del Plan Badajoz a la Declaración de Gredos. Dos modelos de desarrollo rural= From the Badajoz Plan model to the Gredos Declaration. Two models of rural development."p.5

[35] Naylon, John. "The Badajoz Plan: An Example of Land Settlement and Regional Development in Spain (Der Badajoz-Plan als Beispiel eines ländlichen Siedlungswerkes und Regionalplanung in Spanien)." *Erdkunde* (1966): 42

[36] Reisner, M. 1993. *Cadillac Desert: The American West and its disappearing water*. Harmondsworth: Penguin. Worster, D. 1992. *Rivers of empire: Water, aridity, and the growth of the American West.* Oxford: Oxford University Press.

Organisation of Languedoc and the lower Rhone as a direct influence.[37] As argued by Molle et al. during the 20th century, the state assigned itself "the role of (large-scale) developer of water resource" as part of a process of "public legitimisation, investment and development".[38] This is a crucial piece of contextualisation that has so far been ignored by scholars studying the Badajoz project, who tend to focus exclusively on its role within the context of Francoism. Understanding the emergence and development of this project within a wider international context provides us with additional tools to assess its limitations and successes.

The scholarship's diversity, and its bias (developmental optimism, anti-Francoism and more recently particularism) makes the debate surrounding the *Plan Badajoz's* efficiency and its ability to stimulate regional economic growth an interesting one to take part in. What the past literature crucially misses is firstly, a more holistic economic appraisal based on quantitative and statistical results, and secondly a comparative analysis of the effects of the plan within the region. Quantitative results would considerably strengthen the rigour of some of the arguments previously put forward, and limit the risk for systematic bias, while the comparative analysis would allow to differentiate with more certainty, the effect of the plan from the other economic trends. Basing itself on Hornbeck and Keskin's approach in their 2015 paper: « Does Agriculture Generate Local Economic Spillovers »,[39] this dissertation substantiates the debate surrounding the *Plan Badajoz's* ability to generate economic growth by comparing major trends in 4 key indicators: population, average size of agricultural parcels, number of industry, and municipal income between a treatment group (composed of communes directly adjacent to the plan) and a control group (all other communes) between 1950 and 1980. This allows me to conclude that while the plan did help to remedy the effects of rural exodus, and increased agricultural productivity, it

[37] Instituto Nacional de Estadística, Organización sindical de Badajoz Reseña *Estadística de la Provincia de Badajoz*, (Madrid: María Gómez Ediciones,1962) p.760

[38] Molle, F.; Mollinga, P.P. and Wester, P. 2009. Hydraulic bureaucracies and the Hydraulic Mission: Flows of water, flows of power. Water Alternatives 2(3): 332

[39] Hornbeck, Richard, and Pinar Keskin. "Does agriculture generate local economic spillovers? Short-run and long-run evidence from the Ogallala Aquifer." *American Economic Journal: Economic Policy* 7, no. 2 (2015): 192-213.

failed to generate industrial development and overall failed to generate additional income in the communes it directly affected.

3. Source presentation and discussion

3.1 Publishing body and purpose

The data used for this dissertation were all published as official statistics by *the Instituto Nacional de Estadística* (National Institute for Statistics-hereafter INE) in conjunction with a cabinet office (differing depending on the report's topic.). These were collected as part of an effort by the Francoist administration to compile statistical information initially crucial for planification, but also for the development of national accounting. Overall, the sources are clear and well organised and offer a wide range of indicators to pick from, which is especially relevant for our study since municipal level data is rare.

3.2 The sources

To compile the panel data necessary to assess the impact of the plan Badajoz on its province's economic development, the following sources were used:

3.2.a Reseña Estadística de la Provincia de Badajoz, for the years 1954, 1962 and 1976[40]

These records provide a uniquely detailed municipal breakdown of the demographic, economic, cultural, and social characteristics of the province. The purpose of these publications is for the Spanish government to measure the economic and social impact of the *Plan Badajoz* on the province and to plan accordingly. Given the spotlight placed around the Plan, we can also infer that these results were used for communication, if not as propaganda informing the public of their province's development. To this extent, we can expect some amount

[40]Instituto Nacional de Estadística, Organización sindical de Badajoz Reseña *Estadística de la Provincia de Badajoz*, (Madrid: SUCS. De Rivadeneira S.A ,1954), Instituto Nacional de Estadística, Organización sindical de Badajoz Reseña *Estadística de la Provincia de Badajoz*, (Madrid: María Gómez Ediciones,1962) Instituto Nacional de Estadística, Organización sindical de Badajoz Reseña *Estadística de la Provincia de Badajoz*, (Madrid: Talleres Gráficos "Victoria"1976)

of bias with regards to the explanations given. The 1962 issue has for instance an entire chapter devoted to the plan Badajoz as an example of "regional planning", promoting the Investments made by the Spanish State to solve issues of subdevelopment. This is less of an issue for statistics as of themselves since their records appear complete and deprived of any analysis. The indicators extracted of these sources are population, the number of industries per municipality (1954 and 1962 only), and municipal income. The controls used in the regression: soil quality, altitude, average rainfall, area, number of trainlines and distance to capital city were also drawn from these sources.

The liberty taken by the authors to change the selected indicator from year to year, and to change the way they are collected or accounted for is the main issue surrounding this source. Typically, in the 1962 volume, the author indicates that "only economically relevant" industries are considered, without providing any clarification as to what constitutes an "economically relevant" industry.[41] This results in a sharp drop in the number of industries for the year 1960. Given that there is no coherent explanation to explain for such a sharp drop, we can safely attribute this to the change in accounting. All else equal, the number of industries should have increased approximately in line with the province's economic growth. Furthermore, a lot of the firms classified as industries in the 1954 edition, were classified as commerce's in the 1962 edition. Once again, the distinction between commerce and industry is not made clear. To resolve this issue, some degree of speculation was necessary. Since in the 1954 issue, each industrial firm is listed in a specific category (i.e., Chemical, mining etc…), each commerce belonging to such category in the 1962 issue was counted as an industry.

This process, although thoughtfully developed, and in line with the numbers found for previous years, is not free of any issues. There is no way to properly verify which business classifies as an industry and vice versa. Nonetheless, since we are

[41] Instituto Nacional de Estadística, Organización sindical de Badajoz Reseña *Estadística de la Provincia de Badajoz*, (Madrid: María Gómez Ediciones,1962) p.362

interested in relative changes between municipalities, and that each municipality receives the same treatment the essence of the analysis is sound.

3.2.b Censo Agrario de España: for the years 1962, 1972, 1981 [42]

The *Censo agrario de España* provides agricultural data concerning production, land usage, parcellation, and agricultural employment. Publication started in 1962 and occurs on a decade basis. These volumes were published by the INE in conjunction with the ministry of Agriculture to get an outlook on the state of Spanish agriculture, at a national, regional, and local level. The publications of these results marks Spain's rapprochement with international institutions since the forewords explicitly mention the need of agricultural statistics to comply with FAO recommendations.[43] They also highlight that in the early 1960s, agricultural transformation was still a priority for the Spanish state.

The volumes are very consistent, and the only concern is that of the impact of self-reporting (they are built using questionnaires answered by individuals themselves like for other census-type data). According to Jimenez et al. the issues relating to self-abstention in these surveys are an "everlasting concern".[44] However, given the verifiability of each information by the authorities, it is unlikely that anyone would have willingly mis-reported. The data extracted from these volumes are the sown agricultural surface per municipality and the number of agricultural parcels per municipality. The 1981 edition also contains the number of people working in agriculture per municipality.

[42] Instituto Nacional de Estadística, Ministerio de Agricultura, Organización sindical, *Censo Agrario de España*, (Madrid: Artes Gráficas, 1962) Instituto Nacional de Estadística, Ministerio de Agricultura, Organización sindical, *Censo Agrario de España*, (Madrid: Artes Gráficas, 1972) Instituto Nacional de Estadística, Ministerio de Agricultura, Organización sindical, *Censo Agrario de España*, (Madrid: Artes Gráficas, 1981)

[43] Ibid. , p.1

[44] F. J. Rodriguez Jimenez. "El Plan Badajoz: entre la modernización económica y la propaganda política." In *Comunicación en el V Encontro Rural Report. XV Congreso de Historia Agraria de la Seha. Lisboa*, 2016 p.15.

3.2.c Desarrollo económico de la provincia de Badajoz, 1971[45]

A different type of source, this report was compiled for the 25th anniversary of the National Economic and Syndical Congress in 1970. It deals largely with the "development worry" of this trade association concerning their region. This book, compiled by various academics and technocrats addresses the perceived failures of the plan Badajoz, how to resolve them, and establishes goals for the short, medium, and long-term. This critical report highlights the transparency regarding the plan's failures. Some efforts were made by public official to understand the failures of industrialisation although most of the requests made in this volume were not met. This open criticism corroborates the idea that data presented in official volumes is coherent and unaltered, since these volumes were published in all legality, and in fact were sponsored by State agencies to keep track of the progress of the *Plan Badajoz.*

This volume is crucial for our appraisal of the Plan Badajoz for two reasons. Firstly, contemporary accounts provide crucial contextualisation to the data presented in other volumes. The recommendations made by Badajoz's trade union underline the main challenges to the plan's success, namely the lack of capital. Of course, this report effectively lobbies the government for additional funds and tax rebates. As such the issues and data presented may be misrepresentative and exaggerated. With this in mind, a focus on recurring themes and suggestions, rather than the evidence presented, will inform our enquiry into the failures of the plan's industrial component. Secondly, this volume contains essential industrial data for the year 1970. This data is, *rather originally*, presented on a map.

Next to each municipality's name is written the number of industrial firms present, and in some cases a breakdown per sector. Fundamentally, data presentation is this source's only major difference. As for the other sources accounting for industry, there is little traceability as to how the information was collected and under what standard. The data is nonetheless consistent with that

[45] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)*

collected in previous years when it comes both to the number and category of industries when available.

4. Research design and methodology

4.1 The Plan Badajoz as a quasi-natural experiment

Between 1952 to 1975, the plan Badajoz radically transformed the province by creating, among other, 115,000 hectares of arable land through irrigation and new infrastructure, both transport and hydroelectric plants, thanks to dams on the Rio Guadiana. However, this investment in public infrastructure didn't benefit the entire region equally, while the communes neighbouring the Rio Guadiana benefited quasi-exclusively from the project, other communes south of the province didn't immediately, if at all, benefit from the project.

The plan can be considered as a quasi-natural experiment as the first and only large-scale infrastructure project in the region. Built over a relatively short period of time, it clearly segregates communes that until then had similar characteristics. As such, a difference-in-difference analysis studying the effect of the plan on communes that were adjacent to the *Plan Badajoz* (i.e., treatment group) and those that were not (i.e., control group) before and after the plan is the appropriate technique to isolate its effect on the province's economic development. A difference-in-difference analysis allows us to mitigate confounding effects, since the treatment and control group, are both subject to the same confounders, be it national policies, weather patterns (approximately) or socio-economic conditions. Given that the studied period (1950-1980) is one of profound economic and social transformation throughout Spain, this technique is all the more relevant.

The treatment and control group were created thanks to contemporary maps specifying the Plan Badajoz's location within its Province (see figure 1. in the appendix). Municipalities included in the map were assigned in the treatment group, while other municipalities were assigned to the control group. Following the allocation, we have a treatment group containing 39 municipalities, located for

the vast majority in the Rio de Guadiana basin, and a control group containing 123 municipalities, located throughout the rest of the province.

4.2 Choice of indicators

Of course, economic development cannot be measured as such. For this reason, four different indicators have been selected from the available data: Population, average size of agricultural parcels, number of industries per commune and municipal income. These serve as proxies to estimate economic development. For each indicator, all available data was collected (162 data points, or one per municipality except for data on rainfall, which was only available for 68 municipalities).

Population: observing population flows is crucial to understand the dynamics of "colonisation", an explicit aim of the Plan, but also to determine if the plan generated migration, either internal or external to the province. If the plan generates economic opportunities and employment, then people can be expected to move to the municipalities that benefit from the plan. Given the low availability of transport and especially motorised transport in the period, commuting to work from other municipalities is unlikely.

Average size of Agricultural parcels: Is an indicator for agricultural development. This was computed by collecting the number of agricultural parcels for each municipality, as well as the "used agricultural surface" (henceforth SAU) for the same municipalities. One of the explicit aims of the Plan being the creation of 115,000 hectares of arable land through irrigation, it is crucial to account for the changes in the total surface of arable land available for cultivation. Consequently, each municipality's SAU has been divided by the number of parcels, to find their average size.

Parcels rather than production is preferred as an indicator for agricultural modernisation because it is less exposed to the idiosyncratic risk of bad harvest (an important constraint given that the data is published for one in every ten

years) and because it is not confounded by unequally distributed machinery or intrants (there is evidence of very uneven yield/hectares among municipalities). Furthermore, it conducts a fairer assessment of an "agrarian" transformation rather than a strictly agricultural one. Smaller parcels are strongly associated with subsistence/low intensity agriculture, and the lifestyle that goes with it, on top of being strongly correlated with high yields.

Number of industries: The number of industries is an indicator for the industrialisation rate of the province. The underlying assumption being the more industrialised a municipality, the more economically developed it is. There are several limitations while counting the number of industries rather than computing output or the number of employees. This is because highly developed industries in mining or food processing for instance have the same weight as a local ironmonger employing two or three artisans. Nonetheless, because we do not have consistent access to employment data in this period, and even less to localised output levels, this is the best way to account for industrial presence per municipality.

Per capita municipal income: Finally, municipal income, or the total revenue of the municipality from local taxes on individuals and businesses gives us a proxy for the Gross Domestic Product in each municipality, the most frequently used measure of economic performance.

Since taxes are collected according to the same criteria for each municipality (same income tax brackets, capital gains tax etc…), higher fiscal earnings imply wealthier habitants, increased sales, or increased consumption, in all three cases phenomena correlated to economic development. This indicator has two main limitations: like GDP per capita, it is an average figure, which may hide some inequalities. This is especially true for municipalities with stronger industrial presence, as high corporate tax revenues may not account for generally low standards of living within the population. Furthermore, not all municipalities are attributed the same "exceptional income" since regional subsidies and income from fines are perceived on an *ad hoc* basis (although they represented a maximum of

5% of revenue for the studied period)[46] Fiscal capacity pauses another issue regarding the data's representativeness, especially in earlier periods. Because of a depressed supply, many commodities were sold on the black market, and thus not subject to taxation. Furthermore, for workers engaging in quasi-subsistence farming and small-scale craftsmanship, the deductible income may not be a relevant measure for economic activity.

For the years 1950 and 1960 and 1970, the results were given in pesetas, and were then simply divided by the number of inhabitants for each year. All results were discounted for inflation using Motes' data computed using CPI price indices, the base year being 1950.[47]

4.3 Building the model

Following the specification in Hornbeck and Keskin (2015), for each indicator, outcome $\boldsymbol{Y}$ in each municipality $\boldsymbol{m}$ at instant $\boldsymbol{t}$ is regressed against the fraction of municipalities adjacent to the Plan Badajoz and municipality fixed effects $\boldsymbol{\alpha mt}$ (soil quality, rainfall, altitude, population density, number of railroad lines deserving the commune, and distance to the to the province's capital) to account for initial differences between communes in 1950.[48] We report the estimated change in commune level outcome $\boldsymbol{\beta}$ relative to our starting year 1950. As such we get the equation:

$$(\mathbf{1}) \qquad \boldsymbol{Ymt - Ym1950 = \beta tBadajozm + \alpha mt + \varepsilon mt}.$$

Because of geographical and historical differences between municipalities, it is difficult to satisfy the formal parallel trends assumption required to conduct a difference-in-difference analysis. These differences can be explained the Plan

[46] Instituto Nacional de Estadística, Ministerio de Agricultura, Organización sindical, *Censo Agrario de España*, (Madrid: Artes Gráficas, 1972) p.180

[47] Maluquer De Motes J. (2013). *La inflación en España. Un índice de precios al consumo, 1830-2012,* Estudios de Historia Económica, n. 64, Banco de España p.57

[48] Hornbeck, Richard, and Pinar Keskin. "Does agriculture generate local economic spillovers? Short-run and long-run evidence from the Ogallala Aquifer." *American Economic Journal: Economic Policy* 7, no. 2 (2015):
200.

Badajoz's development near the Guadiana's valley which exhibit distinct geological characteristics (the water used for irrigation came from its affluents, and the slopes made it easier to build dams). The valley also happens to be home to relatively fertile soil and is much more highly urbanised than the rest of the region. To increase the likelihood of this assumption holding, we use propensity score matching. This involves "matching" the treatment units with control units that have a similar distribution of covariates (accounting for municipality fixed effect). This reduces the bias that arises from the non-random assignment of participants to the treatment and control groups. By mimicking a randomised experiment, any observed differences in outcome are more likely due to the treatment rather than other factors. Furthermore, estimates a more precise since the matched sample is smaller (so lower variance) and more homogeneous than the original sample. These were the covariates used to match treatment and control groups:

Covariate batch 1: Altitude, Soil Quality, average Rainfall

These controls are used to account for cofounders when regressing the average size of agricultural parcel. They account for geographical and geological variations in the province's terrain and weather, that can influence parcellation. Simply put, a parcel in a high-altitude terrain with poor soil quality is less likely to be productively exploited than a parcel in a low altitude terrain with fertile soil. The soil quality information is derived from a classification found in the *Reseña estadística* (1954), and each soil group is then assigned a coefficient reflecting the terrain's fertility (0 to 4).

Covariate batch 2: Distance to the Capital city, number of trainlines crossing the municipality, population density in 1950

These controls are used to account for cofounders when regressing population, municipal income per capita and the amount of industry. They account for potential network effects associated to high population, or proximity and ease of access to a large city (proxies for geographical integration). Simply put if a municipality is densely populated in 1950, it will likely attract more industry, and

migrants, and be better connected to other productivity hubs, regionally and nationally.

4.4 Limitations

Although every effort had been made to make sure that data presented in the sources was computed using the same accounting standards and data-extraction methods from year to year, it remains that the industrial indicators and municipal income may be flawed, especially for the year 1970.

Furthermore, separating municipalities based their immediate proximity to the project has obvious limitations. Firstly, a municipality's adjacency to the project does not automatically imply that it benefited from its spillovers. Secondly, it is unclear as to how intensely a commune would benefit from the plan due to its immediate proximity to a specific dam or canal. This is evidently the 'heroic assumption' of our model, but to the extent that land reclamation and the colonisation that ensued were an extremely localised phenomenon, it appears to be the best compromise between simplifying assumptions and the available data. Quantifying spillover effects across the economy requires a stronger set of assumption, greater magnitude in the observed differences, as well as more complex statistical techniques. [49]

Regarding the statistical tools utilised, propensity score matching is not free of limitations as highlighted by strong debates in statistical literature.[50] Briefly, the main limitation of this technique is that it assumes that all cofounding variables have been included in the model. While best effort has been made to collect main cofounders, the nature of empirical modelling makes it inevitable that some cofounders have been left out. Another consequence of this matching technique is

[49] See for instance Donaldson, Dave, and Richard Hornbeck. "Railroads and American economic growth: A "market access" approach." *The Quarterly Journal of Economics* 131, no. 2 (2016): 799-858. Or Kline, Patrick, and Enrico Moretti. "Local economic development, agglomeration economies, and the big push: 100 years of evidence from the Tennessee Valley Authority." *The Quarterly journal of economics* 129, no. 1 (2014): 275-331.

[50] King, Gary, and Richard Nielsen. "Why propensity scores should not be used for matching." *Political analysis* 27, no. 4 (2019): 435-454.

that it is unable to deal with unobserved data and will ignore the entries where a covariate is missing. This inevitably leads to a loss in precision and increases potential bias. Thankfully, all covariate data is complete, except for rainfall. Nonetheless, it remains that this is a powerful tool to balance the distribution between treatment and control groups to estimate treatment effect in quasi-experimental situations like this one and is a widely used method in the field of social sciences, especially when conducting difference-in-difference analyses.[51]

5. Results

Table 1: Average Treatment effect on proxies relative to 1950

Relative to 1950 (1960 for (2) and (3))	**Population**	**Agricultural population**	**Size of parcel (Ha.)**	**Number of Industry**	**Real Income per capita (in 1950 pesetas)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
1960	927.47			2.08	-18.93
	(1358)			(3.31)	(18.98)
1970	1352***		5.93**	4.65	-10.18
	(375.7)		(2.92)	(4.48)	(9.68)
1980	2477***	-1159.81***	11.49***		
	(877)	(293.48)	(3.07)		
Sample municipalities	162	68	68	162	162

Notes: **significant to the 5% level, ***significant to the 1% level.
Each column reports estimates from equation (1): the change in the indicated outcome variable, relative to 1950 (or 1960) is regressed on the share of municipalities adjacent to the plan Badajoz. Covariates for population and industry were population density in 1950, distance to capital city, and number of train line passing through each city. For agriculture it was rainfall, soil quality and altitude. For agricultural population, all covariates were controlled for. Standard errors are reported in parentheses.

[51] Crown, William H. "Propensity-score matching in economic analyses: comparison with regression models, instrumental variables, residual inclusion, differences-in-differences, and decomposition methods." *Applied Health Economics and Health Policy* 12 (2014): 7-18.

5.1 Effect on population

Table 1 shows the average treatment effect on communes adjacent to the Badajoz project versus other communes of the province between 1950 and 1980. Throughout the period, the municipalities from the treatment group exhibit higher growth, or lower decline that the control group. Although this phenomenon is not statistically significant in the 1960s, it gives an insight into a trend that continued and solidified itself in the following two decades. By 1980, there is statically strong evidence that communes in the treatment group had on average 2477 more inhabitants that those of the control group. Overall, these results should not be interpreted as population growth but rather a lower relative decline. Although some municipalities exhibit modest growth, the overall trend in population is one of rural exodus.

Graph 1 (see appendix) shows the trends in rural population in both the treatment and control group and highlights the exodus experienced by rural municipalities, with the total rural population falling from about 550,000 in 1950 to about 300,000 habitants by 1980 in the control group, a 45% decrease in population. The treatment group seems to experience a later decline (from the 1970s rather than the 1960s), probably because of the impact of colonisation. Because they had recently been granted property, newly settled colons had much lower incentives to migrate than landless peasants and other destitute farmers that composed up to 45% of the population prior to the plan.[52]

Graph 2 (see appendix) shows the trends in urban municipalities (with a population greater than 10,000) and the divergence between the treatment and control group corroborates that the *Plan Badajoz* had a positive impact on population growth in areas affected. The province's largest city, Badajoz, is the only one that exhibits substantive growth, with its population increasing from 80,000 in 1950 to 111,000 by 1980. The treatment group other urban

[52] Núñez Martínez, Juan Jacobo, María Romero Cuadrado, and Luis Romero Cuadrado. "Del modelo del Plan Badajoz a la Declaración de Gredos. Dos modelos de desarrollo rural= From the Badajoz Plan model to the Gredos Declaration. Two models of rural development."p.5

municipalities exhibit very modest growth, with population increasing from 116,000 in 1950 to 130,000 in 1980. The control group urban population however decreases from 123,000 to 86,000 in during the same period, a 30% decrease.

Despite a context of rural exodus, the plan Badajoz managed to reduce population outflow, notably in urban centres. This can be linked to the creation of employment in services within these cities, and the progressive tertiarisation of the Spanish economy during this period. However, most of the rural population emigrated to other more dynamic Spanish provinces, or abroad.

5.2 Effect on agriculture

The primary goal of the *Plan Badajoz* was to increase the economic and social development of the province by modernising agricultural techniques and promoting agrarian reforms. To this extent, a vast majority of the literature considers it mainly as an agrarian plan.

Column 2 of Table 1 shows that from the 1970s, there is moderate statistical evidence to suggest that parcels were larger, on average 5.9 Ha. larger, for the treatment group when compared to 1962. Since the first edition of the *Censo Agrario* was published in 1962, we have no evidence for the period between 1950 and 1960 but given that this decade was crucial for agrarian reform in Spain, we can only expect the difference to be larger had data collection started in 1950. By 1980, there is strong statistical evidence to suggest that the parcels of the treatment group were on average 11.49 Ha. larger than those of the treatment group.

Furthermore, column 3 shows that there is strong statistical evidence supporting that on average, by 1980 there were 1159 less people working in agriculture (all agricultural job included) in the treatment group than in the control group. This corroborates the success of an agrarian reform. New parcels are bigger, and have less people work on them, suggesting the adoption of more efficient exploitation

methods, and possibly the development of mechanised agriculture to replace the human workforce.

Consequently, there is strong statistical evidence that the Plan Badajoz shaped the agrarian development of its region. These results are particularly relevant knowing that the average parcel size in 1950 was less than 1 Ha.[53] Larger parcels and a lower share of the population working in agriculture indicates a departure from low-intensity or even subsistence farming. Circumstantial evidence, such as the rise of agricultural product transformation industry in the region, suggest that the agricultural production increasingly integrated in industrial chain.

The decrease in the number of agricultural workers, coupled with a relative increase in population and in the size of parcel suggest that the Plan Badajoz succeeded in stimulating the agrarian transformation in the province. This rapid modernisation of agriculture, characterised by a change in the agricultural way of life has been labelled the "crisis in traditional agriculture".[54] Nationally, in 1954, the "Consolidation Act" was passed, which limited the subdivision of parcels and encouraged the creation of bigger estates. It appears that the Plan Badajoz was a successful vector to enforce this reform, that can be summarised by the aphorism "fewer farmers for a better agriculture".[55] By reducing municipalities' high-pressure environment, characterised by over-parcellation and high population density, and so high rural unemployment and unproductive agriculture, the Plan Badajoz was successful in promoting agrarian reform.

5.3 Effects on Industry and Municipal income

Column 4 shows that on average, the treatment group had 2 more industries per municipality than the control group by 1960, as compared to 1950. By 1970, this

[53] López Ortiz, Inmaculada. "Entre la tradición y el cambio: la respuesta de la Región de Murcia a la crisis de la agricultura tradicional." (1999): 81

[54] The expression seems to come from Lapeyere's 1974 paper: Fundación de la Santa Cruz del Valle de los Caídos. Centro de Estudios Sociales. *La Crisis de la agricultura tradicional en España: la nueva empresa agraria*. Vol. 34. Centro de Estudios Sociales del Valle de los Caídos. (1974)

[55] Alba Díaz-Geada. "Land consolidation, development and local resistance in rural Galiza during the Franco dictatorship (1939–1975)." History and Anthropology (2021) p.51

number rises to 4. These results support the lack of industrialisation critique previously discussed. Firstly, the lack of statistical significance means that we must treat these results with caution as their representativeness is uncertain. Secondly, given the wide definition of industry adopted (see section 4.2), even an increase of 2 or 4 "industries" per municipality cannot be considered as evidence of industrialisation. Looking at individual data points, some of the larger cities industrialised (Almendralejo +205 industries, Badajoz +241, Zafra +47), but it is not clear if this had any link with the plan Badajoz. Alternatively, wider trends in Spain's industrial development, or a rising consumer base in the cities (notably in Badajoz) could explain this uneven development.

Furthermore, we find that income per capita (column 5), is marginally lower (by roughly 18 pesetas in 1960 and 10 pesetas in 1970), for the municipalities affected the plan Badajoz. Once again, these results are not statistically significant so cannot be taken at face value. It is nonetheless surprising that these numbers are not significantly higher, given the apparent success of the agrarian reforms. How can we explain that the municipalities benefitting from the *Plan Badajoz* are not better off, when not worse off, then other municipalities who did not receive this treatment?

At this stage, we can only hypothesise. It could be that tax rebates decrease short term fiscal earning to incentivise firms to settle and to grow. This could justify the smaller difference in fiscal earning between 1960 and 1970, as more firms mature (or fail) they start paying standard tax rates. Another explanation relates to the demographic features of the Plan. Since the farmers of the plan were selected among the poorer inhabitants of the region, it could be that this selection negatively affected municipal income (which would also imply that the agrarian reform was not as effective as previously thought). Comparatively, in the control municipalities, these poorer peasants emigrated, leaving only better endowed inhabitants, who would on average pay more taxes.

6. Discussion

These results substantiate the debate around the *Plan Badajoz*'s success in solving the province's "economic and social disequilibria". On the one hand, there is strong evidence to suggest that the agrarian component of the plan succeeded. Exposure to the plan results in agricultural parcels being on average 11 Ha. larger, and a lower agricultural population (despite rural exodus being less intense). On the other hand, poor industrialisation, and subsequent lack of economic growth despite this investment remains to be explained, especially in a context where the Plan's returns on investment are heavily scrutinised. This section builds on these results and contemporary accounts of the plan to build a novel narrative surrounding the plan's inability to industrialise the province. Private individuals' inability to match public funding coupled with national trends, and the inability for agrarian project to generate industrial growth more generally explains why the industrial component of the plan failed.

6.1 Lack of private initiative, or lack of public funding?

From the onset, the Spanish government "reserved to the private initiative" the province's "industrialisation and electrification process".[56] The industrialisation process was thought to complement the province's agrarian transformation, and as such didn't require State intervention.[57] For Barciela et al. this proved to be a crucial policy error. Because of low domestic savings rate coupled with a lack of governmental stimulus, Badajoz's population was not willing, if able at all, to invest in the relatively risky industrial endeavours required to generate economic growth.[58] Despite the creation of a new consumer base, and "satisfactory" investment into transportation infrastructure was, as shown by the construction and renovation of 658 km of roads by 1970, the extension of the river port of Huelva, and the creation of new train lines, industrialisation never kicked off.

[56] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.333
[57] Idem
[58] Ortiz, Mª Inmaculada López, and Carlos Barciela. "Autarquía e intervención: el fracaso de la vertiente industrial del Plan Badajoz." *Revista de historia industrial* (1998) p.140

Industrialisation proved particularly difficult in the province because of its reliance on extractive industries, associated with very high costs of entry. Looking at industry's valuation per sector in 1969, we notice that these are quasi-exclusively extractive, and that the food and drinks industry is valued at 2.3 billion pesetas, or almost half of the total valuation of all industries in the province.[59] Not only did this create an unhealthy reliance of local industry on agriculture and vice-versa, but the anti-competitive environment it fostered made it even harder to enter the market. Producers and suppliers already formed a tight network, that benefitted from subsidies (for industries) and newly attributed infrastructure (for farmers). Even the industries that were not specialised in food products suffered from a lack of development due to high barriers to entry.

Typically, mining showed a lot of potential, as an estimated 30 million tons of iron ore lay deep in the province's ground.[60] But like many other industries this activity never picked up.

Contemporary reports by Badajoz's trade association also point out towards imbalanced industrial policy. Notably, it claims that the construction industry crowded out other industries. [61] In the earlier stage of the plan, when government subsidies were available, construction industries were strategic since directly involved in the construction of the plan's infrastructure: road, dams, and canals. Because of its immediate importance, the construction sector received most aids, despite offering relatively short-term benefits. This, coupled with unsafe property rights (landowners, the only one with sufficient capital to invest in industry, had parts of their property seized or purchased at very low prices) disincentivised the province's few entrepreneurs to invest in risky industrial ventures. Consequently, the reports find that "auxiliary" industries (those directly involved in the plan's construction and exploitation), such as cement production, construction, fertiliser

[59] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.363
[60] Ibid., p.368
[61] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.336

production and food industry overall's development was "insufficient". Other industries' growth was qualified as "almost null".[62]

The solutions recommended by the syndicate give us an interesting insight into the difficulties that industrial entrepreneurs faced and corroborate the lack of private capital hypothesis. For the province of Badajoz to become a "preferred industrial location" the syndicate recommended that the state give strong fiscal incentives. Notably, they advocated for the tax rate to be reduced by 95% on corporate, indirect, inheritance and capital gains tax as well as a 95% tariff reduction.[63] These drastic fiscal recommendations underline that potential entrepreneurs struggled to access capital, because of excessive taxation, or because they were not able to contract loans, themselves subject to taxation. In the post-1960 period, the state increased the tax burden to stabilise the economy and decrease government deficit. Nonetheless, the tax burden was still lower than its European neighbours.[64] While these efforts by the Badajoz trade association can be perceived as lobbying attempts to reverse the tax increases, they do point out that capital was scarce, perhaps not because of the fiscal burden, but rather because of low saving rates due to low wages.

Other suggestions are less politically orientated. They push for the development of new industries (notably in the metallurgical sector), a stronger integration of existing businesses by concentrating the food industry, and investment in education.[65]

Although the Ministry for industry attempted to remedy a few of these issues, it failed to address the central problem of lack of capital. Attempts to strengthen existing industries accentuated the diversification issue, since the food industry received more subsidies. Many projects such as the "industrial polygon of new

[62] Idem
[63] Ibid., p.363
[64]David López Rodríguez and Cristina García Ciria. "Spain´s tax structure in the context of the European Union." *Documentos ocasionales/Banco de España, 1810* (2018) p.10,14
[65] Consejo económico sindical provincial de Badajoz (eds.), *Estructura y perspectivas de Desarrollo económico de la provincia de Badajoz,* (Madrid: SUCS. De Rivadeneira S.A 1971*)* p.368

creation" next to Merida, or the industrial corridor following the north-south axis crossing the province through Merida and Zafra never materialised.[66] By 1970, the project had already lost momentum and by Franco's death in 1975, it ceased to attract any attention from the state, which explains the continued decline in both population and attractivity.

These structural problems, coupled with the lack of government stimulus specifically targeting new industries, can explain why the *Plan Badajoz* did not contribute to the development of industry in the province, yet alone in the municipalities that received direct investment in infrastructure. While wages did increase in the 1950s and 1960s, it appears that they lifted people out of poverty rather than create a new group of savers ready to invest in industry.[67] Moreover, the redistributive aims of the plan were probably perceived as creating an unsafe business environment for richer landowners, who in any case tended to be absent from the province.

6.2 Could the Badajoz province ever industrialise?

Another reason why the *Plan Badajoz* was unable to kickstart industrialisation and strengthen economic growth is that this investment was not and could not be important enough to counteract nationwide economic trends occurring during the project's development. A first reason to explain the project's lack of a coherent industrial strategy is simply the inexistence of a coherent industrial strategy at the national in the plan's early days. By the late 1950s, Franco, constrained by the apparent failures of his autarkic policies, and the international loans the country had contracted from the United-States (following the 1953 Treaty of Madrid) as well as newly joined international organisations such as the IMF, was forced the reduce interventionism and embrace a more liberal economic policy.[68] Consequently, the emphasis shifted from agriculture to industry. It follows that

[66] Ibid., p.376
[67] John Naylon. "The Badajoz Plan: An Example of Land Settlement and Regional Development in Spain (Der Badajoz-Plan als Beispiel eines ländlichen Siedlungswerkes und Regionalplanung in Spanien)." *Erdkunde* (1966): 58-59
[68]Black, Stanley. *Spain Since 1939: From Margins to Centre Stage*. Bloomsbury Publishing, 2009.pp 32-33

the plan, officially promulgated in 1952, but really designed from 1948 onwards was ill-equipped to deal with the new realities of the Spanish economy. To some extent, the province's isolation meant that it lagged a few years behind Madrid and the more dynamic Mediterranean coast, but by 1970, it was evident that the amenities provided by the plan were no longer adequate to guarantee the province's economic dynamism.

This context of rapid economic development, saw Spain's income treble between 1960 and 1973. Production of electricity and steel doubled, so did exports, and imports tripled.[69] By the mid 1960s, Spain passed the UN criteria for a developed nation and by the end of the decade, the country welcomed a record of 30 million tourist.[70] These are just a handful of statistics to contextualise the radical economic transformation that the country underwent. But as with most rapidly developing country, this "economic miracle" was unevenly distributed, and this crucially impacted the path of the Badajoz province and the *Plan Badajoz'*s ability to successfully achieve its initial purpose: modernisation through agrarian reform.

Clar and Pinilla argue that before this period, the Spanish population had essentially remained rural. They attribute this to a lack of pull factors due to an underperforming industrial sector when compared to its European neighbours.[71] The same authors argue, that until the Civil War, Spain agricultural capacity expanded faster than its population. This position as a net exporter provided little incentives for developments in the non-agricultural sector. During the autarkic period, price controls depressed supply, since farmers, who could no longer sell at a margin, had no incentives to invest in their exploitations. As agriculture became insufficient to cover domestic demand, the country turned to new sectors to compensate for its declining terms of trade, hence the development of industry and tourism from the late 1950s onwards. This stimulated pull factors towards more

[69] Simon, Barton, *A history of Spain*. Bloomsbury Publishing, 2009: 240
[70] Black, Stanley. *Spain Since 1939: From Margins to Centre Stage*. Bloomsbury Publishing, 2009. Judt, Tony. "The Age of Affluence." *Advertising & Society Review* 8, no. 4 (2007): 540
[71] Chapter in Lains, Pedro, and Vicente Pinilla, eds. *Agriculture and economic development in Europe since 1870*. London: Routledge, 2009. pp.332-359

dynamic and industrialised regions such Catalonia, Madrid, or the Basque country, fuelling the rural flight away from less dynamic provinces such as Badajoz. [72]

Martinez-Garlagga et al. find in their paper that the Spanish manufacturing sector became increasingly concentrated over time. The decrease of trade cost, and subsequent market integration gave rise to a core-periphery pattern which perdured until 1975.[73] Despite attempts by both government and individuals to attract capital into the province, the Spanish economy's "centripetal nature",[74] coupled with the government 's more generalised inability to carry out its "unnecessary" 4-year industrial plans, meant that domestic or foreign investment did not flow into Badajoz.[75] Between 1860 and 1960, the share of national manufacturing held by Extremadura (the autonomous region to which Badajoz belongs) fell from an already modest 3.5% to 1.1%, a decline that continued until the 2000s when it hit 0.8.[76] Thus, investment in agriculture was the only reasonable option that offered reasonable rates of return, only because Franco's plan had already poured billions trying to modernise the province.

These structural challenges made it extremely hard for the province to industrialise, and consequently to escape the vicious circle of rural exodus, a fact that is too often omitted in the literature surrounding the *Plan Badajoz*. This nuances the failures of the regionalist policy of development poles and industrial complexes. More specifically in the case of the *Plan Badajoz,* the Francoist government's inaction outside of the immediate scope of the plan (i.e., the lack of a proper industrial strategy) can be read as a silent withdrawal from the plan's grandiosity, as it had become clear that it could no longer, or perhaps never was

[72]Ernesto Clar and Vicente Pinilla "Chapter 12. The contribution of agriculture to Spanish economic development, 1870-1973" in *Agriculture and economic development in Europe since 1870*. (Lains, Pedro, and Vicente Pinilla, eds, London: Routledge, 2009) p.311-333
[73] Martinez-Galarraga, Julio, Elisenda Paluzie, Jordi Pons, and Daniel A. Tirado-Fabregat. "Agglomeration and labour productivity in Spain over the long term." *Cliometrica* 2 (2008): 204
[74] Ibid., p.195
[75]Juan Pablo Fusi. "El boom económico español" *Cuadernos Historia16, no.34* (Barcelona: Grupo 16, 1985) p.21.
[76] Martinez-Galarraga, Julio, Elisenda Paluzie, Jordi Pons, and Daniel A. Tirado-Fabregat. "Agglomeration and labour productivity in Spain over the long term." *Cliometrica* 2 (2008): 204

able to face the country's new economic realities. One may even ask if the government's gradual retrieval from the plan was not a half-hearted attempt to avoid sunk-cost fallacy.

This is not to say that the industrial failure of the plan Badajoz was an historical accident, due to poor timing. There were many instances when the Francoist administration could have stopped or modified the plan, as the first report warning about the project viability came in 1962. Furthermore, given the "experimental" nature of the project, the government should have been better informed when implementing similar colonisation plans in other Spanish regions.

6.3 Can agriculture generate local economic spillovers?

Beyond the debate surrounding the failures of the *Plan Badajoz*'s industrial component, such an ambitious plan highlights a strong belief in agrarian reform's capacity to successfully develop regions. As previously mentioned, from an international perspective, the plan Badajoz was not an isolated state-led hydrological project. This new point of comparison poses new questions surrounding the role of agricultural and agrarian reforms in economic development. In their 2015 article Hornbeck and Keskin discuss how improvements in the local agricultural sector disproportionately affect local non-agricultural activity. Looking at the development of irrigation infrastructure, pumping from the Ogallala aquifer in the US Midwest, they find that "substantial and persistent gains in the agricultural sector" do not spillovers to non-agricultural activities.[77] They attribute this to the United States' specific agricultural context, claiming that heavily mechanised and well-integrated agriculture, with high labour mobility explains the overall stagnation of development indicator in other sectors, such as population or value added in non-agricultural sectors.[78] This contrasts with India, characterised by low-labour

[77] Hornbeck, Richard, and Pinar Keskin. "Does agriculture generate local economic spillovers? Short-run and long-run evidence from the Ogallala Aquifer." *American Economic Journal: Economic Policy* 7, no. 2 (2015):
200.
[78] Ibid., p.206

mobility, and less mechanised agriculture, which experiences greater losses to non-agricultural sector due to declining agricultural income but also a greater inflow of non-agricultural activity to employ former workers.[79]

In the case of the Badajoz province, it appears that the province suffered from the worst of both worlds: while its mechanisation characteristics resembled India's, because of far lower barriers to immigration (smaller geographical distances, no linguistic barriers), the rural population trends characterised by high labour mobility, resemble more those of the US. So do the outcomes, as strong productivity increases in agriculture are not matched in other sectors of the local economy. One significant difference however, is the relative increase in population among municipalities affected by the *Plan Badajoz,* compared to the relative decline in counties affected by the Ogallala aquifer.[80] This would not only suggest that population dynamics, notably labour mobility is determinant in understanding if agrarian plans are able to generate non-agricultural growth (corroborating the push-pull hypothesis brough forward by Clar and Pinilla), but also that that artificial settlements cannot sustainably circumvent the demographic trends (rural exodus) they are intended to fight.

Contemporary sources highlight the lack of private capital and state subsidies to explain for the failures of the industrial component of the plan Badajoz. With the benefit of historical hindsight, we can see that nationwide industrial trends and agricultural plans' more generalised inability to generate industrial output can explain the failures of the plan.

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[79] Sekhri, Sheetal. "Wells, water, and welfare: the impact of access to groundwater on rural poverty and conflict." *American Economic Journal: Applied Economics* 6, no. 3 (2014): 76-102.
Foster, Andrew D., and Mark R. Rosenzweig. "Agricultural productivity growth, rural economic diversity, and economic reforms: India, 1970–2000." *Economic Development and Cultural Change* 52, no. 3 (2004): 509-542.
[80] Hornbeck, Richard, and Pinar Keskin. "Does agriculture generate local economic spillovers? Short-run and long-run evidence from the Ogallala Aquifer." *American Economic Journal: Economic Policy* 7, no. 2 (2015):
204

7. Conclusion

By using quantitative methods, this paper takes a non-partisan approach to substantiate and nuance the literature's appraisal of the *Plan Badajoz*. Its detractors often point out its inability to develop industry in the province, without going into further details and explaining these failures. As such, until the 21st century, when authors adopted a more critical mindset, the plan has remained synonymous with the economic fiasco of the Francoist Era and been used as a symbol of his megalomania. This paper finds that while the plan did stimulate the agrarian revolution by promoting larger agricultural parcels (on average 11.5 Ha.) associated with higher productivity, and mitigated the effect of rural exodus, it was not able to significantly boost industry in the province, and consequently, had little impact on overall economic performance. Looking into the structural characteristics of Spanish industrialisation and the demands from local syndicates, we were able to build a new narrative to explain the plan's inability to generate spillovers from agricultural development. On the one hand, the absence of industrial policy left residents, who for the large part had no access to capital, with the responsibility to start their own industry, and on the other hand, its fatally long development meant that by its completion it was no longer suited to the province's economic needs. All in all, the structural features of this period of industrialisation meant that the high concentration of industry, coupled with strong rural exodus made it very unattractive to invest in the province, despite substantial improvements in its transport infrastructure, new consumer base, and proximity to the Portuguese border.

Beyond building a novel narrative on the successes and limitations of the plan Badajoz, this dissertation feeds in the debate surrounding the impact of agrarian development on overall economic development. It responds to the need for a wider study of these features in different historical and economic contexts to refine and support the existing theoretical literature. The case of the Badajoz province underlines the importance of labour mobility when explaining the different effects of agricultural development on the economy. The ease of migration is an important

contributing factor to explain industrial concentration in developing countries, notably those whose core can absorb the countryside's excess labour.

Despite significant clarifications about the debate surrounding the *Plan Badajoz*, this paper was unable to determine its impact on larger towns. This arises from the simplistic separation of municipalities into two categories, which fails to account for local variation. While there is no significant evidence to support that the plan had a positive impact on the treatment group *on average*, outliers in that same group experience in the 20 years following the plan substantial growth in industrial capacity. These outliers also happen to be larger towns. Did the plan significantly contribute to the development of these new industries, or were they simply the product of national industrial trends (industry tends to develop in larger urban centres)? This dissertation opens many more questions that would require further research. Relating to the Plan's opportunity cost, a clear accounting of the cost and revenues that it generated would be necessary. Another interesting issue revolves around the electrification problem. Like industrialisation, electrification was left at the initiative of the private sector, and as such remained underdeveloped in the studied period: it would be interesting to understand why private firms failed to exploit public infrastructure, when they usually are a popular source of rent-seeking in developing economies (see the privatisation of state-owned services in post-soviet Russia for instance). Finally, from an ecological point of view, water-management in the Iberic peninsula is an increasingly challenging issue. While the creation of new arable land through river regulation and irrigation positively contributed to the short and medium run development of agriculture, it is unclear how sustainable this could be on the longer run, for both the Badajoz province and regions downstream of the Rio Guadiana. Building on these results could provide insights on water-management and its impact on economic development in transitioning countries.

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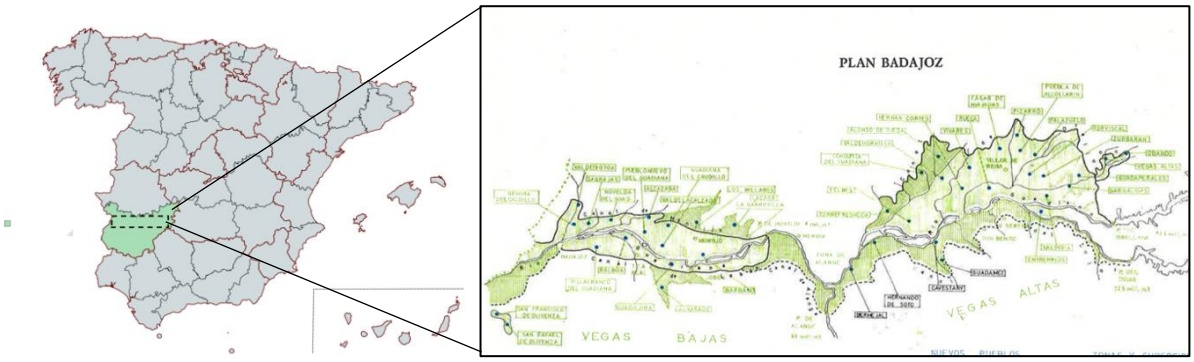
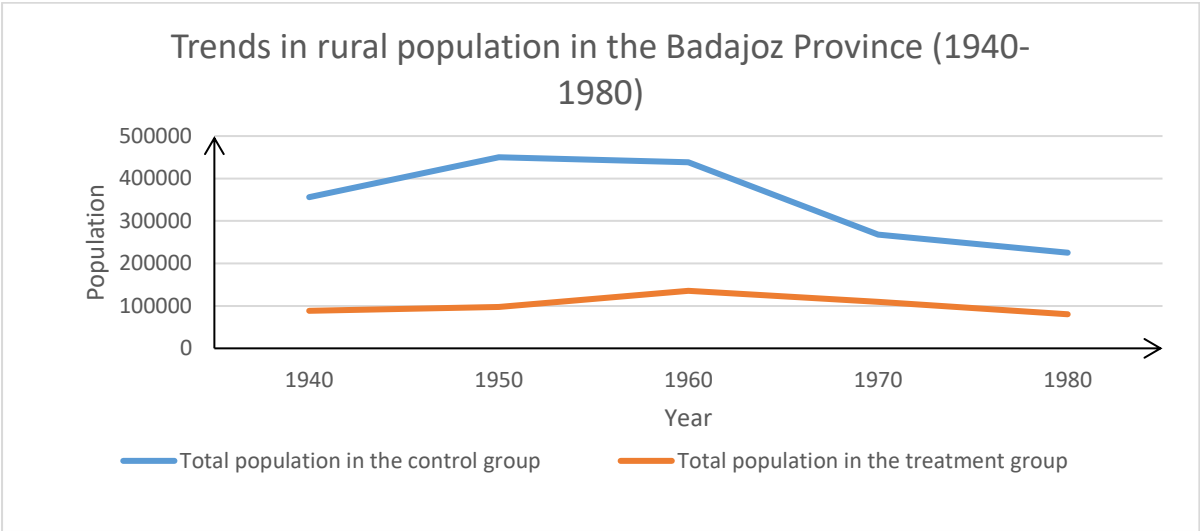
Appendix

Figure 1: Map showing the *Plan Badajoz'* localisation within Spain



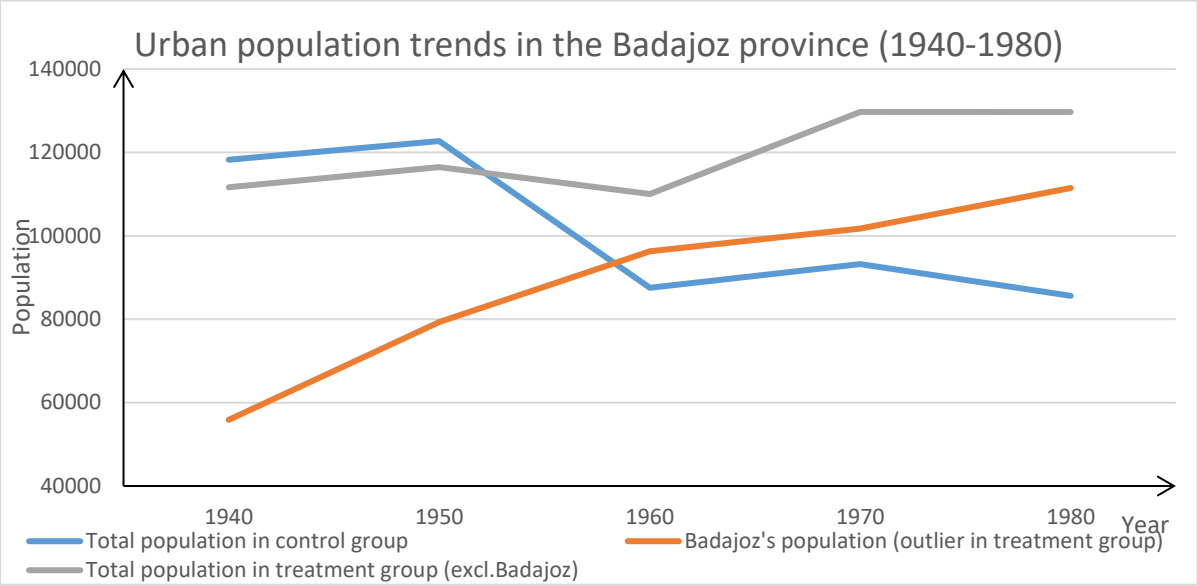
Notes: In green, the Badajoz province.
Source: Own creation, using Mapchart and an original map from Desarrollo económico de la provincial de Badajoz p.334

Graph 1: Trends in rural population in the Badajoz province between 1940 and 1980



Source: INE, Reseña *Estadística de la Provincia de Badajoz, 1954, 1962, 1974, Censo de población 1981*

Graph 2: Trends in urban population in the Badajoz province between 1940 and 1980



Source: INE, Reseña *Estadística de la Provincia de Badajoz, 1954, 1962, 1974, Censo de población 1981*