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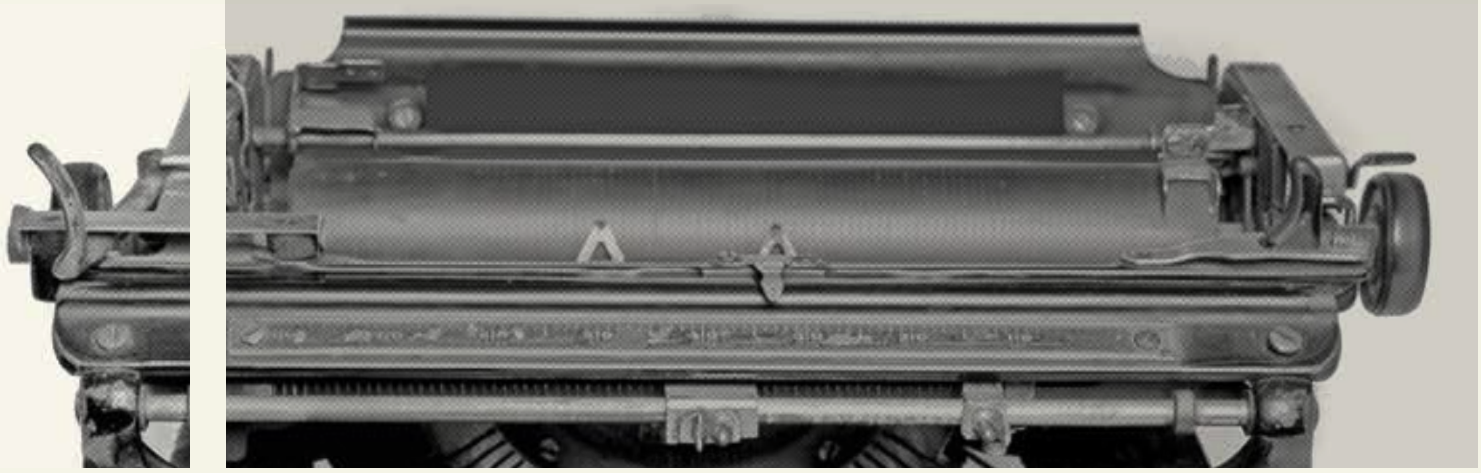

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Elite interests and public expenditure in education in the late XIX and early XX century in Prussia: a dialogue between history and economics

Intereses de las élites y gasto público en educación en Prusia a finales del siglo XIX e inicios del siglo XX: un diálogo entre la historia y la economía

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ELITE INTERESTS AND PUBLIC EXPENDITURE IN EDUCATION IN THE LATE XIX AND EARLY XX CENTURY IN PRUSSIA: A DIALOGUE BETWEEN HISTORY AND ECONOMICS[*]

Sebastián Enrique Acosta Madiedo Aranzalez[1]

Abstract

This paper discusses how Prussia's public education policy was intentionally guided by economic principles that modern economists have formalized and modelled. The essay takes two particular economic models and compares its results with the primary sources available from that time and the research results of current academics and historians who have tackled the subject from their discipline's point of view. The general conclusion is that the Prussian policy of Public Education was strongly guided by economic principles, which are congruent, intuitively, with the chosen economic models' theoretical and empirical results.

Keywords: Prussia, education, expenditure, intentions

JEL Classification: N33, N43, H30, H71, I20

[*] I thank Professor John Mauro Perdomo Munevar for his unconditional support, for his feedback and for the time he invested in the revision and publication process of this paper.
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INTERESES DE LAS ÉLITES Y GASTO PÚBLICO EN EDUCACIÓN EN PRUSIA A FINALES DEL SIGLO XIX E INICIOS DEL SIGLO XX: UN DIÁLOGO ENTRE LA HISTORIA Y LA ECONOMÍA

Resumen

Este artículo discute hasta qué punto la política pública en torno a la educación en Prusia fue guiada por principios económicos que los economistas modernos han formalizado y modelado. El ensayo analiza dos modelos económicos particulares y compara los resultados obtenidos por los economistas con fuentes primaras de la época y las conclusiones de las investigaciones realizadas por académicos e historiadores que han abordado el tema desde sus respectivas áreas del conocimiento. La conclusión general a la que llega el presente texto es que la política educativa en Prusia fue guiada de forma significativa por principios económicos congruentes, de forma intuitiva, con los resultados teóricos y empíricos de los modelos seleccionados.

Palabras clave: Prusia, educación, gasto, intenciones

Clasificación JEL: N33, N43, H30, H71, I20

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1. Introduction

Like most siblings, history and economics have a rocky albeit complementary relationship. They use vastly different tools to achieve the rigour required by the scientific method and often come to clashing conclusions. Nevertheless, there are times where historical research can enrich and nurture economic theory by showing that individual, governmental, and social class-based motivations and actions are consistent and commensurable with the mathematical and statistical models that tried to explain these very intents, spurs and decisions many years later.

One case of brotherly cooperation between history and economics is the theoretical and empirical research surrounding the expansion of public education in Prussia between the last two decades of the 19th century and the first one of the XX century.

The gist of Galor & Moav's (2006) theoretical model describes investment in public education in a very similar way to which Prussian officials planned to do so 150 years ago. On the other hand, Hollenbach's (2019) statistical findings are congruent with how historians portray the interests, aims and decisions of the Prussian industrialist elite and particular government officials throughout the 1880s, 1890s and early 1900s.

The paper will show this first, by briefly explaining Galor and Moav's 2006 Model and Hollenbach's 2019 empirical findings and then, by finding evidence of intentionality in essays written by modern historians and economists — such as Lode Corneel Vereeck (1993), Hartwin Spenkuch, Rainer Paetau & Stefan Reibenich (2010a)[2] and Jingyoung Yu, a votum written by Minister of culture Adalbert Falk in 1877 and the *University Bylaws* of Prussian higher education institutions written in 1882[3].

The ultimate goal of this investigation is to make a small contribution to history and economics by fostering a dialogue between the two social sciences and showing how economic research can be enriched through historical sources. It will bring to light traces of modern economic intuitions, intentions and thought processes in historical institutions social collectives and individuals.

[2] This essay was part of a compilation edited by Wolfgang Neugebauer in 2010.
[3] Compiled by Paul Friedrich Dam

2. The Economic Analysis of Public Expenditure in Late 19th and early 20th Century Prussia

Modern economists have tried to explain different historical contexts with the tools of their discipline since economics emerged. Educational policy in Prussia in the late 1800s and early 1900s is no exception.

This section will strive to outline the main ideas of the two most relevant models that have dealt with this topic: Galor and Moav's 2006 theoretical model, which outlines the conditions under which a society can transition towards a classless society through taxation, intergenerational transfers and investment of public funds in education, and Hollenbach's 2019 statistical research, which found a causal relationship between levels of industrialisation in Prussian cities and investment in education.

2.1. Galor and Moav's Theoretical Model

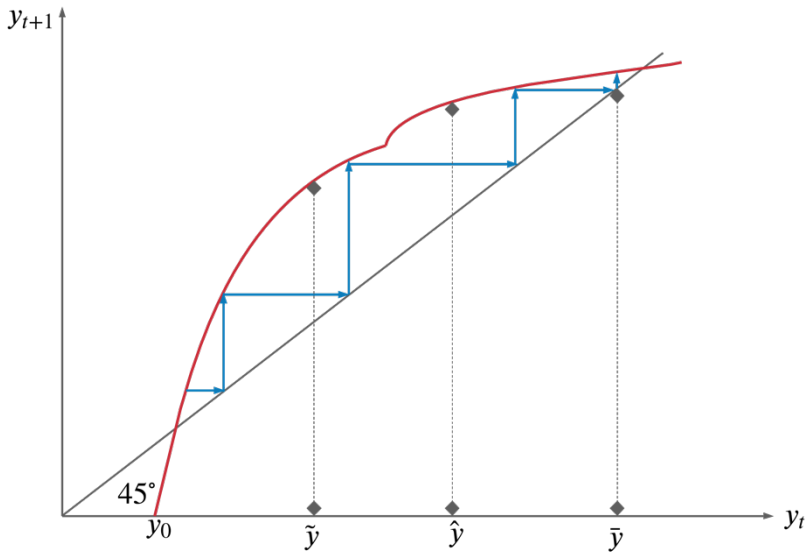
Galor and Moav argue that the demise of class society and the capitalist-worker dichotomy would only be possible through a cooperative effort between workers and industrialists, which would be reflected in a gradual increase in expenditure in public education (Galor & Moav, 2006, p. 85). The dynamic, intertemporal allocation model, proposed by these academics, argues that it will be more profitable for the industrialist class to start investing in public education unilaterally through taxes, than saving all of their profits for future consumption.

According to the authors, once enough physical capital is accumulated, investment in public education will improve the qualifications of the workers, making them more productive and increasing the profits of the next *generation* of industrialists. In addition, Galor and Moav also claim that this will increase the overall level of productivity, give more resources to the workers, and eventually encourage them to start contributing to the public education tax as well.

This investment will gradually converge to a steady state equilibrium, where wealth and resources will be distributed optimally and equally across all members of society. The authors also call the steady state equilibrium the point of class society's demise (Galor & Moav, 2006, p.103).

The Short and Unwinding Road to a Classless Society: A Graphic Approach

Graph 1. The Three Stages to reach a Classless society



Source: Simplified Version of the graph found in (Galor & Moav, 2006, p. 105).

The model, just like the Gregorian calendar, is divided into two eras: before and after the birth of public education. The era before public education goes from y_0 to $\tilde{y}$. The authors assume that public education exists at every point after $\tilde{y}$.

The second era or *regime*, as the authors call it, is also divided into two stages. The first goes from $\tilde{y}$ to $\hat{y}$ and models the time between the birth of public education and the time in which all people, regardless of social class, start to contribute to the tax system. The second stage lies between $\hat{y}$ and $\bar{y}$ and shows the transition from a society where everyone can contribute to the tax system to one where social classes no longer exist.

The variable on the vertical axis is measured in overall future productivity per worker units y_{t+1}. It depends on the current productivity level per worker y_t.[4] The current labour productivity per worker, in turn, is a function of both the current tax rate τ_t and aggregate

[4] This means that *regime* change will depend on current levels of productivity; Once a certain level of productivity is reached, society will transition to the next stage.

intergenerational transfers $B_t(b_t^R, b_t^P)$. Each lower case b_t represents the intergenerational transfers from the wealthy capitalist class R and the poor working-class P.

The evolution of output per worker behaves differently in each regime and stage. In *regime* 1, the output is given by:

$$y_{t+1} = \text{Max}\{A[\beta\{[\lambda(1-\alpha)+\alpha]y_t(\tau_t, B_t) - \lambda\theta\}^{\alpha}], 0\} \text{ [1]}$$

The other variables represent technological development A, the minimum wage necessary to make intergenerational transfers possible θ, the share of capital in total output owned by the capitalist class α, and the weight or importance that people give to intergenerational transfers β.

In regime 2, stage I, the evolution of output per worker behaves according to the expression:

$$y_{t+1} = A[(1-\tau_t)\lambda b_t^R]^{\alpha}[h(\tau_t \lambda b_t^R)]^{1-\alpha} \text{ [2]}$$

The only new variable $(\alpha - 1)$ represents the share of capital in total output not owned by the wealthy capitalist class. This stage is the first where investment in physical capital by the working class is possible. This characteristic is shown by the curve's kink in the middle of the interval between $\hat{y}$ and $\overline{y}$ in graph 1.

In stage II of regime 2, this evolution will be shown by the expression:

$$y_{t+1} = A\left[(1-\tau_t)\beta[y_t - \theta]\right]^{\alpha}[h(\tau_t \beta[y_t - \theta])]^{1-\alpha} \text{ [3]}$$

This stage of the model is the first one where the working class is willing and able to contribute to the public school system through taxes. It is also the first stage where the proletariat performs intergenerational transfers; before this point, the model assumes they do not have enough capital; thus, no economic capability to do so.

It is also important to note that, at this stage, the curve in the graph becomes smoother because of a greater propensity to save, coupled with a larger and better income. This behaviour means people will consume less in the present, lower the tax rate and transfer the money directly to the next generation for future consumption.

This feature of the model can be considered a prelude to the moment in which society reaches the steady-state equilibrium, a point at which productivity, technological advancement, the tax rate, wages, the rate of direct intergenerational transfer, and capital distribution are equal and constant.

Galor and Moav's equations and graph, show that society's road to classlessness will depend on cooperation and labour productivity instead of violence and class struggle[5]. The authors built a model in where the productivity of the workforce increases with proper wages and time, better technology and better education and where education improves through the willingness of the ruling elites to pay their taxes.

2.2. Hollenbach's Empirical Model

Taking Galor and Moav's Model as his inspiration (Hollenbach, 2019, p. 3), Hollenbach employed the model that the original researchers applied in the United Kingdom and used it to analyse public expenditure in education and its relationship with industrialisation in Prussian cities in the 19th century. The result was a causal relationship between per capita public expenditure in education and industrial employment: the variable he used as a proxy for industrial elite capital ownership (Hollenbach, 2019, p. 1).

The author used three statistical models and the data from Prussian cities collected on the German census of 1907 to reach his goal. First, he performed six simple Ordinary Least Squares (OLS) regressions to find a correlation between per capita expenditure in education and the level of industrialisation in Prussian cities. Afterwards, he performed a generalized spatial two-stage least square model (GS2SLS) to account for and mitigate the effects of spatial spillovers and spatial dependence between some variables in the models. Finally, he used an instrumental variable model to reaffirm his findings and prove a causal relationship between his two variables.

[5] The thesis of the model goes, explicitly, against Marx's argument. The German economist and philosopher, argued that the ruling capitalist elite had to be eliminated and that a dictatorship of the proletariat should be put in its place in order to transition to a classless society. In contrast, Galor and Moav argue that a classless society would only be achieved through cooperation.

The Simple OLS Regression Model

Hollenbach began his research by performing a set of simple OLS regression models. Instead of taking a particular parameter as his reference frame, he decided, first, to perform three separate tests with different amount of control variables: applying no control to his first test, a limited number of controls for his second test, and a full array of controls, which included province fixed effects, the difference between population parameters and the full hypothesis, in the third test. The general formula used for these regressions was:

$$y_i = \alpha + \beta_k X_{i,k} + \gamma \text{ industrial}_i + \varepsilon_i, i = 1, \dots n. \; [4]$$

Where y_i is the measure of educational investment in a particular Prussian city, according to German the census of 1907. α is the common intersect; $X_{i,k}$, the matrix of control variables; β_k, the corresponding vector of coefficients; *industrial*, the variable that measures industrial employment in city i. Finally, γ corresponds to the estimated rate of change in education expenditure when a marginal change in industrial employment occurs, and ε_i, to the error term.

The main result drawn from these regressions was that expenditure in education was highly sensitive to industrial employment because a one standard deviation increase from the mean in the independent variable was related to a 6% increase in per capita public expenditure in education. Furthermore, the author also claims that all his tests were statistically significant at a level of 5%.[6] Hollenbach also noted that his confidence interval did not include the number 0, which means that no matter how slight, there would always be an impact of per capita investment in education over industrial employment. (Hollenbach, 2019, p. 15).

The author confirmed his findings by correlating industrial employment and education enrolment. The results obtained when changing the dependent variable —while leaving the proxy for industrialisation and the three mechanisms of control intact, yielded similar results to those he obtained when regressing public education investment (Hollenbach, 2019, p. 15).

[6] This means that the probability of committing a type-1 error or rejecting the null hypothesis when it is assumed to be true is 5%.

The Spatial Autoregressive Model

Despite its robustness, Hollenbach was not satisfied with the results obtained by the first set of linear regressions because they did not account for potential spatial spillovers and correlations between cities that were close to one another.

The author argued that, although not every city and town was an industrial centre, smaller cities near an industrial centre could also see an increase in demand for public education. Also, local elites from nearby urban centres with less industrial capabilities could become free riders of industrial centres elites. These situations could have an impact on the original regressions and even generate biased estimates (Hollenbach, 2019, p. 15). His suspicions were confirmed by a Moran's I test, through which the academic was unable to reject the null hypothesis of no spatial correlation in the residuals (Hollenbach, 2019, p. 15).

To account for this, the author decided to build a GS2SLS model that included the spatial lag for the dependent variable by adding the industrial employment in every other city y_j and the neighbouring structure of y_i (embodied in $w_{i,j}$) to the original model. When placed together, these variables created a weighted average of adjacent cities' influence on the dependent variable (Hollenbach, 2019, p.16). The author's proposed equation for this new model was:

$$y_i = \lambda \sum_{j \neq k} w_{i,j}\, y_j + \alpha + \beta_k X_{i,k} + \gamma\ \text{industrial}_i\ + \varepsilon_i \quad [5]$$

All the variables assigned with a meaning in the original model do not change in this one. $\sum_{j \neq k} w_{i,j}\, y_j$ accounts for the weighted average of the spatial lag generated by every other city included in the model and λ accounts for the spatial correlation parameter. The new *variable* values were based on the inverse distance between cities, which later were row standardized (Hollenbach, 2019, p. 16)[7].

The researcher found that the final results obtained from the GS2SLS were similar to those of the original OLS regression and that —although there existed a possible spatial dependence,

[7] For a comprehensive explanation of the logic behind the model used by Hollenbach, see *Maximum likelihood and generalized spatial two stage least squares estimators for a spatial autoregressive model with spatial autoregressive disturbances* by Drukker, Puscha and Raciborski (2013).

the spatial correlation parameter decreased substantially when province fixed effects were taken into account (Hollenbach, 2019, p. 16).

After obtaining these results, Hollenbach's investigation faced only three threats: the lack of strength in his findings —which until now proved no causal link between the proxy for industrialisation and education, omitted variable bias —which meant the results could be altered if some variables in the error term where made explicit in the regression models, and reverse causality —which implied that an increase in public education expenditure caused a greater degree of industrialisation and not the opposite (Hollenbach, 2019, p. 16).

To counter these issues, the author decided to treat industrial employment as an endogenous variable, and use a geographic, exogenous instrument for the model: the location of carboniferous rock strata. He used this measurement as his instrumental variable, because another paper had pointed out that carboniferous areas were highly correlated with later coal discoveries, and coal was one of the most critical natural resources needed to power factories in the industrial era (Hollenbach, 2019, p. 17)[8].

The result, as expected, was a robust negative correlation within the bivariate regression between logged distance to carboniferous strata and industrial employment, yielding a R^2 equal to 0.42 (Hollenbach, 2019, p. 17)[9].

Although Hollenbach is aware that he cannot prove that the covariance between the instrument and the unobserved error —a necessary assumption for performing the instrumental variable regression, he appeals to the reader's common sense. Then, he argues it is highly unlikely that carboniferous strata influence the political process or the decisions of Prussian politicians; not least because rock strata precede political deliberation by a few million years (Hollenbach, 2019, p. 17).

[8] To obtain more information about the relationship between coal and carboniferous strata, see *Coal and the European industrial revolution*. University of Oxford: Discussion Papers in Economic and Social History. by Fernihough & O'Rourke (2014).

[9] According to the author, the robust F statistic for the first stage of the test with a full set of controls was 16.41 and 17.64 in the one with partial controls. Compared to the available evidence, according to the author, these numbers show that the instrument is considerably strong to predict industrial employment (Hollenbach, 2019, P. 17). Although the author does not mention it directly in the paper, his statement seems to imply that Hollenbach is referring to a high degree of dispersion between the distances of different cities and carboniferous areas from the mean distance and that this significant dispersion makes the instrumental variable effective.

The academic also counters the concerns on "the influence of spatial dependence because of the geographic nature of the instrument" (Hollenbach, 2019, p. 18) by performing another spatial two-stage least square model that uses the same variables as the original GS2SLS. Once again, the results of the Spatial 2sls model with heteroscedastic standard errors yielded similar results to those found in the original OLS model and the GS2SLS model (Hollenbach, 2019, p. 18-19).

The spatial-2sls results, according to Hollenbach, suggest a causal effect of industrial employment on education expenditure in a similar way in which the OLS suggested a correlation between these variables. The research's general conclusion is that the members of an elite group will only invest in education if the investment increases the elite's return on capital. (Hollenbach, 2019, p.19).

Now that economics has provided a solid theoretical frame and a wealth of empirical evidence that shows a causal link between government spending in education and industrialisation, we can proceed to prove that these findings were not incidental. Also, the existence of a convincing amount of evidence that shows that the intentions of historical actors, entrepreneurs and the German government had a significant economic grounding.

3. The Roots of Economic Intentions in Germany's Education Policy

To trace the economic intentions of Prussian government policy education, one only has to turn back the clock to the early 1870s. Although the policy enacted throughout this decade was not as significant as later decisions, it shows that a faction of government officials, industrialists and politicians were thinking about educational policy through the lens of economics.

3.1. The First Attempt at an Educational Reform Grounded on Economics

The Sorrows of Minister Falk

The most prominent but forgotten attempt to reform education in Prussia in favour of the industrialist elite's economic interests and concerns was led by the Education, Religion and Medical affairs minister Adalbert Falk.

Falk is generally remembered by current historians as the minister of the culture wars and is portrayed as a politically motivated man. His educational reform of 1872 is described as a political manoeuvre to eliminate the influence of the catholic church from public education, at best, and as a measure to place Prussia at the forefront of competition between German states at worst[10]. Even so, his government *votum*[11], sent to the ministry of the state on June the 7th, 1877, shows a different perspective.

Although the first section of the *votum* shows a politically committed and ideologically charged minister, in the second section, Falk expresses concern over "the current measures for the maintenance of public schools", which had "become completely unsustainable". According to the minister, "new unbearable burdens are ladening the state treasuries and the rural communities are being unable to provide (public education) as they are supposed to" (Neugebauer, 2010b, p. 247).

The minister's supported his claims by referring to the multiple discussions that the *Landtag* and the *Herrenhaus* had over this topic and a legal quarrel between a Prussian conservative politician and the local Lutheran church in Pleß. The proposal of the minister was to "further increase the support of the Prussian central government (for public education) ; support increase which, although hotly debated in parliament and government, seemed to yield unjust results" (ibid).

Despite his arguments and pleas, Spenkuh's and Paetau's essay claims that minister Falk's proposal would end up being abandoned after the finance ministry considered the proposal too expensive and unnecessary to implement. Falk's project was too ambitious, for it proposed to reform all areas of education. It was expensive because it would have meant investing two-fifths of Falk's ministry's total budget in the reform. It was inconvenient: the Kaiser and Bismarck had shifted their policy towards the culture war in the late 1870s; secularizing education was no longer a priority for them (Neugebauer, 2010a, p. 62)[12].

[10] Education in Germany in the 19th century was regulated autonomously by each German state. Falk, as a minister for the Prussian government, only had influence in Prussia.
[11] Government *Vota* – a Latinism that is generally translated as vows in English - was the name given to certain government documents in Prussia and Germany throughout the 19th century, which outlined and communicated the plans and commitments of a Minister and his institution to the rest of the government and the Emperor.
[12] The culture war was a political struggle between the German government and the catholic and Lutheran churches. The struggle permeated the political, social and economic spheres. Falk was very close to the National

Regardless of his failure, Falk's small but significant contribution to the education system embodied in the educational reform of 1872[13], in addition to what he expressed through his votum, show that this individual, at one of the highest government levels, had the intention of enacting reforms on the schooling system based, at least partly, in economic intuitions and the economic interests of the industrialist elite, which in turn was advocating for a more public and state-controlled education; a proposal that would make this service more accessible, but subordinate to the interests of the state and the industrialists. This, in a nutshell is commensurable and very similar to the proposal of Galor and Moav.

3.2. Private Intentions in Public Interests: German entrepreneurs financing education for the public.

Although Falk's attempts at a radical education reform failed, he was not the only individual striving to change Prussia's education. The industrialist class was also actively trying to make the school system serve their interests by financing and promoting, privately, the creation of trade schools and technical institutions. It is important to note that, in contrast to Falk, who also had political motivations to advocate for it, the leaders of German industry were solely concerned with increasing their profits.

The intentions of private industrialists, and the zeal with which they defended their private interests by sponsoring education, are better illustrated by Dr Jing young Yu. In her PhD thesis, Dr Yu brought evidence from statistics of that period, which showed there were 213 trade schools with 21,000 students in Prussia alone. To reaffirm the independent and private character of this endeavour, Dr Yu quotes the director of trade schools in Kiel, who claimed that during the '70s, Falk's ministry had left the task of sponsoring, organising and managing trade schools to industrialists with private interests and ordinary citizens (Yu, 2011, p. 36).

Liberals, who were committed to secularize education on both ideological and economic grounds. His reform proved too progressive for the Kaiser at that time and was one of the main reasons for the emperor to dismiss him in 1979.

[13] The Kaiser enacted an education reform in 1872 that separated the Mittelschule or middle school from the elementary and placed all elementary, middle and high schools under state control, taking this control away from the church. The legislation proposed in the votum, would expand the state's powers at the school level, regulate universities, and surrogate all education in Prussia to the interests of the state.

Through Helmut Naunin's work, Dr Yu also argues that the Bourgeoisie of that time got increasingly aware of its responsibility to the community. This fact increased the Bourgeoisie's prestige and consolidated position of power, which was ultimately grounded on economic stability and not political connectivity or proximity to the central government (Yu, 2011, p. 38).

The main argument one can derive from the author's analysis is that the intentions of the industrialists —a more productive labour force, was not only a pipe dream that sometimes found eco in the central government, but rather an active, constant and self-regulated effort of industrialists, who left the evidence of their intentions in their independent investment on the Prussian education system through trade schools.

These intentions are aligned to the economic models exposed. Only the regions with a heavy presence of industrial class would autonomously create these kinds of trade schools, which would be similar to Hollenbach's proposal of localized government expenditure based on the degree of industrialisation, and only the children of working-class members of society would attend these trade schools. Also, they were specifically designed for vocational training, and most members of the Bourgeois wanted more than mere vocational training for their offspring, which is similar to the proposal of Galor and Moav.

4. The Dawn of the Althoff System

Due to the liberal climate of self-regulation and the increase of privately sponsored higher education instutitions, minister Puttkamer, the conservative who followed Falk, was ousted from the Ministry of Culture, Education and Medical Affairs. Gustav Konrad Heinrich von Goßler was put in his place and Friedrich Althoff —a simple government official until that time, started to implement the set of policies that would revolutionize the Prussian education system through economic thought. Although minister von Goßler's administration was not particularly conservative, his tenure would have probably gone unnoticed in education had it not been for Friedrich Althoff.

Althoff was not a career politician, nor an idealist and, most definitely, nor a conventional bureaucrat. He earned prominence because of Goßler's tenure and remained prominent after Goßler was dismissed, not only for actively defending the industrialists' interests at the state

level but also for managing universities as firms, knowledge as a national resource and education as an instrument of economic policy.

This civil servant started to gain prominence in 1882, when he received a call from the ministry to become a *referendar*[14] whose task was to appoint academic personnel. Although his official post had a pretty limited scope, those same years, he was already performing significant contributions in matters of scientific and educational policy (Vereeck, 1993, p. 30).

The cornerstone of Althoff's system, was to see research and education as a public good with externalities. He was the first one to consider knowledge as nonexcludable and nonrival, and to consider that its production generated effects on third parties which had positive and negative consequences to firms, industries and individuals (Vereeck, 1993, p. 17).

When the ministry called this man to become an advisor, he designed a system based on six principles, connected through his cornerstone idea of education as a public good, which guided the Prussian education system until 1910. These principles were the bureaucratisation and professionalisation of the university administration, tighter government control on the system of employment for professors, the specialization of universities in particular areas of knowledge, the procurement of private funds for research, the creation of fruitful academic relationships with universities abroad, the creation of a network of contacts within universities that would help the government to attain these goals (Neugebauer, 2010a, p. 172).

Out of these principles, four of them had a direct economic intuition behind them. The first aimed to increase the university's labour productivity, making it a more efficient producer of professionals who would enter the labour market and knowledge or research which would be useful for the state. The second principle would contribute to the same goal: university professorship would become like any other job, a careful selection process from which the most capable and productive worker can emerge. The third one, which is probably the most congruent with Hollenbach's research, had to do with regional specialisation. This specialisation was made to meet the needs and interests of those who funded the research, mostly were private industrialists.

[14] Term used in Germany to refer to civil servants in training, who would later get senior positions in a public institution

Finally, the fourth principle shows economic intentionality because it aligned the interest of public universities with the interests of those who were willing and able to fund a research and were interested in doing so. The transactional character of this measure and the intention behind it was so clear that Althoff established the *Kaiser Wilhelm Institut* and funded scholarships through it with this explicit purpose; even Siemens took advantage of Althoff's scholarship programme (Neugebauer, 2010a, p. 198). Thus, the university became a direct service provider for industrialists, who would help to finance and sponsor it in exchange for the university's targeted research.

The principles for which Althoff advocated, intuitively implemented the most important ideas from the model of Galor and Moav into government policy and, by doing so, these very same principles paved the way to validate Hollenbach's empirical research. It is important to highlight that some parts of the policy were designed for the industrialist class to invest directly, independently and privately instead of relying on taxes, a key feature of Galor and Moav's model.

Even so, the Althoff system was set up to produce what Galor and Moav's model's theory wanted to produce high quality, specialized research (technology) and a professionally and technically capable human capital.

In other words, research and people, who served the interests of the industrialist elites and the state. This government policy was so successful that its consequences soon became an integral part of the bylaws of several Prussian universities and German universities in general.

5. Intentions Engraved in Stone: The University Bylaws After Althoff

The legacy of Friedrich Althoff did not limit itself to increasing the prestige of Prussian universities abroad; the policies eventually reached the documents of government and the statutes of the universities he set himself to reform in 1882. The evidence of his work was collected by Paul Friedrich Damm, who compiled the bylaws of several universities around the German empire. According to the editor's sources, the University of Berlin's stated mission was to "provide the best education for the industrial life of the state and the municipality" (Damm, 2019, p. 55).

The bylaws also state that the institution was "entirely subordinated to the ministry for cultural, educational and medical affairs" (Damm, 2019, p. 55). The ministry had the power to determine and increase or decrease "the departments of the university and their respective disciplines" (p. 55). He also had to appoint a government official who would supervise "all economic questions of the university, and support the headmaster for taking all the material related decisions of the university" (Damm, 2019, p. 66).

These two provisions gave all effective control of the academic direction and the university's economic expenditures to the government. This document was approved in 1882, and it remained unchanged until the end of the first world war. It was Althoff's first act as a prominent government official, and it would outlast his reign in power.

Beyond the impact of Althoff and his legacy, these documents show that, by the early 1880s and throughout the following three decades, the government would intentionally adopt a capitalist interest-driven policy; one in where industry and productivity, sponsored by government and private funds, were at the forefront of the Decisions of the government.

The Althoff system also shows that at the beginning of the decade, it was not only industrialists and individuals but also the government that was also intending to drive its educational policy along economic lines.

In addition, the policies outlined by the bylaws are also entirely consistent with the model of Galor and Moav because they subordinate the administration of education to the state and provide it with public funding while at the same time making it a tool for the industry. Furthermore, these bylaws are also consistent with Hollenbach's findings: the university could adapt its curriculum according to the industrial needs of a city. As its finance depended entirely on a government official, this official could deem the university useful or useless in the function of the industry it served.

6. Conclusions

Throughout this paper, individuals' historical intentions , a social class and a government were analysed to trace clusters of economic thought, based on two models.. After thorough analysis the main conclusion showed overwhelmingly that these economic intuitions of the models of

Hollenbach, Galor & Moav were present in the policymakers, the industrialists and the government of Prussia and remained present on them from the 1880s, until the start of the great war.

A secondary conclusion is that Galor and Moav's theoretical model and Hollenbach's empirical model are consistent with the economic reality of Prussia and their results are not the product of chance or coincidence. Those results reflect concrete economic intentions and actions of historical actors at a particular time.

These two conclusions fulfil the paper's aims, namely, to foster a dialogue between history and economics and to enrich economic theory through history by showing how primary and secondary sources can give names, lives and intentions to stakeholders and prominent figures that economics treats as simple variables.

Further investigations should find other similar correlations in other areas such as healthcare expenditure or expenditure in other industrial goods. On the historical side, a deeper investigation of the available primary sources, on the ministry of finance documents, and this ministry's attitude throughout Althoff's administration would also enrich the field. Further questions can also be asked about the attitude, intentions, and decisions of other historical actors, such as conservative rural elites, whose perspective was left out of this analysis's scope.

The impact of particular historical events, paramount to the history of Prussia and Germany, should also be analysed more deeply in future research. This is a fertile and unexplored field with many areas that can be discussed in other papers with either a broader or a different scope.

7. References

Damm, P. F. (2019). *Die Technischen Hochschulen in Preussen: Eine Darstellung Ihrer Geschichte Und Organisation; Nach Amtlichen Quellen (Classic Reprint)*. Forgotten Books. https://books.google.com.co/books?id=-tRStAEACAAJ

Galor, O., & Moav, O. (2006). Das Human-Kapital: A Theory of the Demise of the Class Structure. *The Review of Economic Studies*, *73*(1), 85-117. http://www.jstor.org/stable/3700618

Hollenbach, F. M. (2019). Elite interests and public spending: Evidence from Prussian cities. *The Review of International Organizations*. https://doi.org/10.1007/s11558-019-09347-z

Neugebauer, W. (2010a). *Acta Borussica: Neue Folge, 2. Reihe: Preußen als Kulturstaat, Abteilung I: Das Preußische Kultusministerium als Staatsbehörde und gesellschaftliche Agentur (1817-1934), Band 2.1: Das Kultusministerium auf seinen Wirkungsfeldern Schule, Wissenschaft, Kirchen, Künste und Medizinalwesen : Darstellung*. Akademie-Verlag. https://nbn-resolving.org/urn:nbn:de:kobv:b4-opus-25315

Neugebauer, W. (2010b). *Acta Borussica: Neue Folge, 2. Reihe: Preußen als Kulturstaat, Abteilung I: Das Preußische Kultusministerium als Staatsbehörde und gesellschaftliche Agentur (1817-1934), Band 2.2: Das Kultusministerium auf seinen Wirkungsfeldern Schule, Wissenschaft, Kirchen, Künste und Medizinalwesen : Dokumente*. Akademie-Verlag. https://nbn-resolving.org/urn:nbn:de:kobv:b4-opus-25323

Vereeck, L. (1993). *The Economics of Science and Scholarship: An Analysis of the Althoff System* Maastricht University Datawyse / Universitaire Pers Maastricht.

Yu, J. (2011). *Die Entwicklung berufsbildender Schulen in Preußen, Sachsen und Württemberg zwischen 1869 und 1914*. https://www.repo.uni-hannover.de/handle/123456789/7845