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Examining the relationships between Social Media Usage, Education, and Digital Skills on ccTLD Renewal Rates

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Executive Summary

This study investigates the determinants influencing the renewal of country code top-level domains (ccTLDs) across a panel of OECD countries. It explores several critical factors, including the level of education, digital literacy, and the prevalence of social media usage within these nations. By leveraging unique datasets from sources such as Eurostat, CENTR and the World Bank, the research integrates diverse and comprehensive data points.

The study employs econometric techniques, to quantitatively assess how these variables impact ccTLD renewal rates. Through this approach, the research identifies key determinants that significantly influence the sustainability of online presences for businesses, organisations, and individuals. The findings provide insights into the role of education and digital competencies in fostering digital engagement, as well as the influence of social media as a platform for domain relevance and connectivity.

The study also explores potential policy implications, offering recommendations to enhance ccTLD renewal through targeted interventions such as improving digital literacy programs that assert the role of local domain identities, encouraging greater awareness of the need for local domain identities beyond social media alone, and the role of social media for domain visibility, as well as supporting the development of educational initiatives to promote digital inclusion. By contextualising these factors within the broader framework of digital transformation, the study contributes to a deeper understanding of the mechanisms underpinning the vitality of ccTLDs in an increasingly interconnected global economy.

Key Findings

- i. **Education** - The analysis shows a strong positive correlation between educational attainment and domain renewal rates. Higher levels of education within a population are significantly associated with increased likelihood of domain renewal, indicating that educated populations are more aware of the importance of maintaining an online presence.
- ii. **Digital Skills** - Digital skills emerge as a critical factor in sustaining domain registrations. The results demonstrate that populations with higher digital literacy are more likely to renew their domains, reflecting the necessity of digital proficiency for effective and continued online engagement.
- iii. **Social Media Usage** - Social media engagement also plays a significant role in domain renewal. Populations with higher social media usage are more inclined to renew their domains, suggesting that active participation in digital platforms drives the need for maintaining web presences.
- iv. **Market Concentration** - The study finds that higher market concentration negatively impacts domain renewal rates. Less competitive markets may hinder the renewal of domains due to reduced incentives and innovation.
- v. **Domain Pricing** - Higher domain prices are consistently shown to discourage domain renewals across all models. This finding underscores the importance of affordable domain pricing in sustaining the digital economy.

Policy Implications

The results of this study suggest several important policy considerations:

- i. **Enhancing Education and Digital Skills:** Investment in education and digital skills training is crucial for fostering a population capable of sustaining their online activities, including domain renewals.
- ii. **Encouraging Market Competition:** Policies that reduce market concentration could create a more dynamic environment, fostering higher rates of domain renewal through increased competition and innovation.
- iii. **Affordability of Domain Pricing:** Keeping domain registration and renewal fees at accessible levels is essential for ensuring that individuals and businesses can continue to maintain their digital identities.

The study provides robust evidence that education, digital skills, and social media usage are significant drivers of ccTLD renewal rates within the EU. By understanding these key factors, policymakers and stakeholders can develop targeted strategies to enhance the sustainability of the digital economy, ensuring that populations are equipped and incentivized to maintain their online presence. Future research could further explore these dynamics and examine additional variables to deepen our understanding of the factors influencing domain renewals.



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Abstract

This study investigates the relationship between social media usage, educational attainment, digital skills, and the renewal of country code top-level domains (ccTLDs) within the European Union. Using econometric techniques, we explore how these factors influence domain renewal rates, providing insights into the digital behaviours that sustain online presence. The findings indicate that higher levels of education, digital skills, and social media engagement significantly increase the likelihood of domain renewal, while market concentration and higher domain prices pose challenges to sustaining online domains.



Introduction

The digital economy relies heavily on the continuous registration and renewal of web domains, which serve as vital components of online identity and presence. As the internet continues to expand, understanding the factors that influence the renewal of country code top-level domains (ccTLDs) becomes increasingly important. This paper examines the correlation between social media usage, educational attainment, digital skills, and domain renewal rates, with a focus on identifying the key drivers of sustained domain registrations.

Previous research has emphasized the importance of digital infrastructure and skills in promoting online engagement. Education has been linked to greater technological adoption and innovation, while digital skills are crucial for effective internet use (Greener et al 2011). Social media has also been identified as a key platform for digital interaction (Peng and Mu, 2011), driving the need for individuals and businesses to maintain active web presences. It is notable that there is however very little empirical work engaging with internet domains employing large multi-jurisdictional datasets (see inter alia Umana et al 2010). There appears to be no prior studies examining the relationship between social media engagement and domain uptake. This study builds on modest existing literature by exploring domain update factors, specifically in the context of ccTLD renewals with a social media focus.

Methodology

To maximise the utility of the available data within the given specifications, this study employs a Least Squares Dummy Variable (LSDV) modelling approach. This approach is chosen due to its suitability for accommodating panel data structures where fixed effects are critical to controlling for unobserved heterogeneity across countries. Variables are denoted using specific abbreviations for clarity and consistency throughout the analysis: education levels (eu_educ), digital skills (eu_digital_skills), and social media usage (eu_socialmedia) serve as the primary independent variables of interest. Additionally, the models include controls for population size (popn_total), market concentration (hhi), and domain pricing (wp_buy_tax_ex) to account for other factors that might influence ccTLD renewal rates.

While Arellano-Bond dynamic panel estimation was considered for this analysis due to its ability to handle potential endogeneity and autocorrelation in panel data analysis, its application was limited by data constraints. Specifically, the relatively small size of the panel and gaps in the dataset reduced the reliability of lagged dependent variables as instruments, a key feature of the Arellano-Bond methodology, and precluded the methodology’s application given the impact of differencing and lags on available data were the AB method to be employed. This limitation made it challenging to balance model robustness with the statistical power necessary for meaningful inference. This balance was achieved by incorporating controls suitable controls to ensure robustness.

Consequently, the use of LSDV modelling allowed for a more straightforward incorporation of the data at hand, facilitating the inclusion of fixed effects to control for time-invariant unobserved heterogeneity among the EU countries. The regression models were then applied to examine the impacts of education, digital skills, and social media usage on ccTLD renewal rates. By controlling for population size, market concentration, and

domain pricing, the analysis ensures a comprehensive approach to understanding the drivers of domain renewal behaviour.

Despite the advantages of the chosen methodology, the limitations of the dataset are acknowledged. Suggested areas for future research and the scope of future research is moderated by future data availability; the collection of more granular data and the exploration of alternative modelling approaches to better capture the dynamic aspects of ccTLD renewal behaviours.

Results

The regression results provide compelling evidence of the strong positive correlation between educational attainment, digital skills, and social media usage with ccTLD renewal rates. In all three models, these factors show significant positive coefficients, indicating that higher education levels, better digital skills, and greater social media engagement are associated with increased domain renewal rates. Conversely, market concentration and higher domain prices consistently exhibit negative effects on renewal rates.

Education and Digital Literacy

The findings indicate a positive association between education (eu_educ) and digital literacy (eu_digital_skills) at the regional level and ccTLD renewal rates. These relationships may reflect the role of broader societal factors, such as educational attainment and digital competencies within a population, in creating an environment conducive to sustaining an online presence. For instance, regions with higher levels of education and digital skills might have better-developed digital infrastructure, more businesses operating online, or a greater cultural emphasis on maintaining digital assets. However, the findings do not imply a direct causal relationship between these regional characteristics and domain renewals, as other unobserved factors may also play a role.

Social Media Usage

The analysis also identifies a positive association between regional social media usage (eu_socialmedia) and ccTLD renewal rates. This suggests that in regions where social media engagement is high, the perceived value of maintaining a digital presence through ccTLDs may also increase. High social media usage at the aggregate level might indicate a digitally active population or an ecosystem where online branding and visibility are priorities, thereby encouraging domain renewals. Nevertheless, the relationship likely reflects broader digital ecosystem dynamics rather than a direct link to individual domain management decisions.

The analysis of the control variables; population size (popn_total), market concentration (hhi), and domain pricing (wp_buy_tax_ex); offers critical insights into the structural and economic factors shaping ccTLD renewal rates. Each of these variables represents broader contextual influences that interact with the primary independent variables, providing a more complete understanding of domain renewal behaviours across regions.

Population Size (popn_total)

Population size serves as a proxy for the scale of a country's economy and the potential size of its internet-using population. Larger populations often correlate with higher numbers of domain registrations and renewals, as more individuals, businesses, and organisations establish and maintain an online presence. However, the relationship between population size and renewal rates is not necessarily linear or uniform. In countries with larger populations but limited digital infrastructure or high levels of income inequality, the impact of population size on ccTLD renewals may be diminished. Conversely, smaller countries with advanced digital economies and widespread internet penetration may exhibit disproportionately high renewal rates per capita. This suggests that while larger populations might provide a broader base for domain registrations, the extent to which this translates into renewals depends on additional factors, such as digital literacy, internet accessibility, and economic conditions.

The mixed findings regarding population size highlight the need to consider its interactions with other variables. For instance, in regions with high digital literacy and advanced digital infrastructure, population size may amplify the effects of these factors, leading to higher renewal rates. In contrast, in regions with low digital engagement, even large populations may not significantly impact domain renewal behaviours.

Market Concentration (hhi)

Market concentration, measured by the Herfindahl-Hirschman Index (hhi), reflects the level of competition within the domain registration and management market. A high HHI indicates a concentrated market dominated by a few large players, while a low HHI suggests a more competitive environment with multiple registrars. The findings indicate that market concentration has a notable influence on ccTLD renewal rates. The findings support the conclusion that more concentration has negative impact on domain renewal, however while the direction of the signs is consistent across the estimates, the parameter is significant in the majority of the estimates but not all estimates. This suggests the need for a nuanced interpretation. In highly concentrated markets, a lack of competition may lead to higher domain prices or limited service offerings, potentially discouraging renewals. However, larger registrars in concentrated markets might also leverage economies of scale to provide streamlined services or loyalty incentives that encourage renewals.

In contrast, competitive markets with lower HHI scores may foster innovation, competitive pricing, and better customer service, all of which can positively impact renewal rates. However, intense competition could also lead to market volatility, with smaller registrars exiting the market, potentially causing uncertainty for domain holders. This dual nature of market concentration underscores the complexity of its relationship with domain renewals and suggests the need for a balanced market structure that encourages competition without destabilising the domain management ecosystem. Future analysis pertaining to the implications of concentration for service innovation, pricing and platform innovation is also critical, as each are likely moderating factors.

Domain Pricing (wp_buy_tax_ex)

Domain pricing, represented as the wholesale price excluding tax (wp_buy_tax_ex), emerges as a significant factor negatively associated with ccTLD renewal rates. Higher domain prices can act as a financial barrier to renewals, particularly for small businesses, individuals, and non-profits with limited budgets. The findings align with economic theory, which suggests that price sensitivity can influence purchasing decisions, including the decision to maintain an online presence through ccTLDs.

The impact of pricing may be more pronounced in regions where domains are viewed (relatively) as discretionary rather than essential. For example, businesses in industries heavily reliant on digital engagement may prioritise domain retention despite higher costs, whereas others, employing social technology based entity presences (Facebook), ecommerce (Aliexpress) or listing platforms (Ebay), or third party subdomain platforms (Wix), may opt not to renew. The pricing structure can also vary based on regional regulatory frameworks and competition levels, with more competitive markets likely offering lower prices. Additionally, bundled services or discounts for multi-year registrations can mitigate the negative impact of high prices, suggesting that pricing strategies by registrars play a crucial role in influencing renewal rates. Understanding and disentangling different regional patterns of usage of domains and domain alternatives, and associated pricing is an essential future research agenda. It is also critical to ensure a diverse range of websites employing new and diverse domains.

Interactions Among Control Variables

The interaction between population size, market concentration, and domain pricing adds further complexity to the analysis. For instance, in densely populated regions with concentrated markets, higher domain prices might exacerbate the negative impact on renewal rates, as limited competition could reduce pricing flexibility. Conversely, in competitive markets with low market concentration, even higher populations might not offset the deterrent effects of elevated domain pricing.

Similarly, market concentration may mediate the influence of population size. In countries with larger populations and low market concentration, increased competition may drive down prices and foster a more vibrant domain renewal environment. In contrast, in smaller populations with concentrated markets, the lack of competition could amplify the negative effects of high prices.

Conclusions

The findings underscore the importance of fostering education and digital skills development to support the digital economy. Policymakers should consider strategies that enhance digital literacy and promote social media engagement to sustain domain renewals. Additionally, efforts to reduce market concentration and lower domain pricing could mitigate the challenges posed by these factors, further encouraging sustained domain registrations.

This study demonstrates the significant impact of education, digital skills, and social media usage on the renewal of ccTLDs. By identifying the key drivers of domain renewal, this research provides valuable insights for policymakers and stakeholders seeking to support the growth and sustainability of the digital economy. Future research should explore additional variables and consider longitudinal data to further refine our understanding of these dynamics.

Econometric Models

Table 1: Regression Results on ccTLD Renewal Rates			
Variable	Model 1: Education (eu_educ)	Model 2: Digital Skills (eu_digital_skills)	Model 3: Social Media Usage (eu_socialmedia)
Coefficient			
eu_educ	10.7263***		
	(-1.2227)		
eu_digital_skills		8.6695***	
		(-1.7871)	
eu_socialmedia			9.6912***
			(-1.5872)
popn_total	0.0016**	0.0006	0.0013
	(-0.0007)	(-0.0013)	(-0.0012)
hhi	-35.9405	-96.9474**	-73.8798*
	(-19.09)	(-41.8296)	(-37.159)
wp_buy_tax_ex	-22868.39***	-38396.37***	-29875.03***
	(-4368.03)	(-8799.45)	(-8311.14)
Constant (_cons)	297523.1***	542259.7***	422771.1***
	(-44358.5)	(-88422.5)	(-88990.5)
Observations	247	107	95
R-squared	0.4354	0.4597	0.5338
Adj. R-squared	0.426	0.4385	0.513
F-statistic	46.65	21.7	25.76
<p><i>Table Note: Significance levels: $p < 0.1$ (*), $p < 0.05$ (**), $p < 0.01$ (***). Standard errors are in parentheses below the coefficients.</i></p>			

Data Note - While the studies employ suitable methods of estimation, the modest amounts to data available to facilitate analysis, necessitate that the studies are seen as robust foundational explorations of the noted issues. The estimations serve as robust exploratory estimates of critical domain relationships that will inform future studies, and potentially support the development of viable forecasting methodologies and models.

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About the author

Dr. Michael D’Rosario is a Senior Research Fellow at Central Queensland University’s CREATE institute and a Lecturer at the University of Adelaide, specializing in applied economics, data science, and policy evaluation. He facilitates Executive Education for the University of Oxford’s AI in Business program, focusing on the strategic applications of artificial intelligence in industry.

Formerly Chief Economist and Head of Data Science at Per Capita, Dr. D’Rosario led initiatives like the Australian Inequality Index and consulted for organizations such as Transparency International and CENTR. With a PhD in Econometrics and Policy, he has over 15 years of experience in research, teaching, and advising on economic and data-driven solutions spanning the University of Melbourne, Deakin University and Loyola University, where he was a Prime Minister’s Fellow.

Dr. D’Rosario’s work bridges complex data analysis with practical insights, advancing ethical AI integration, education, and policy innovation. His interdisciplinary expertise drives collaborations across academia, government, and industry to tackle contemporary challenges.

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