Competing for Bachelor's Degrees: Are Community Colleges Cutting into the Market Share of Four-Year Institutions?

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Working Paper 201705

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Abstract

To address local workforce needs and expand access to affordable bachelor's degrees, a number of states have allowed community colleges to offer bachelor's degree programs. Despite concerns that community college baccalaureate (CCB) degree programs will cut into the market share of four-year institutions, extant literature has yet to examine the impact of CCBs on the bachelor's degree production of four-year institutions. Using program-level data, this study shows the presence of a local CCB program has a positive effect on bachelor's degree production of nearby public four-year institutions but negatively impacts bachelor's degree production at for-profit four-year institutions. Findings represent the first comprehensive evaluation of the impact of CCB degree programs on neighboring four-year institutions.

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Introduction

Competition within education has become a popular topic area for journalists, policymakers, and a host of stakeholders in both K-12 and higher education. Within the K-12 sector, proponents of market-based education reform typically suggest that the proliferation of school choice and alternative K-12 options will enhance competition and thereby increase the performance — particularly in low-performing school districts (e.g., Booker, Gilpatric, Gronberg, & Jansen, 2008). In higher education, the adoption of the market-orientation approach by both public and private institutions has been in response to increased competition for students, faculty, and revenue in the form of tuition (Marginson, 2006). Although community colleges (two-year institutions) have not traditionally competed with four-year institutions for the same students do not due to significant differences in their core curricular missions (Cohen & Brawer, 2008), a growing number of states have blurred the line between these institution types by allowing community colleges to offer bachelor's degrees in high-demand and localized economy-linked program areas (Walker, 2005; Russell, 2010).

Traditionally public community colleges have been restricted by state laws from offering any credential higher than the associate degree, but a total of 23 states have adopted community college baccalaureate (CCB) degree programs (Fulton, 2015) in order to address local workforce needs, expand access to bachelor's degrees, and provide affordable bachelor's degree options for place-bound students who may have limited access to a four-year college or university (Bemmel, Floyd, & Bryan, 2008). Consequently, the number of bachelor's degrees conferred at community colleges increased from 1,690 in 2000 to 17,035 in 2014 (authors' calculations using IPEDS data). Despite the perceived benefits associated with community colleges addressing local

workforce needs by offering bachelor's degrees in targeted program areas, some critics have expressed concerns that CCB degree programs detract from the core curricular mission of community colleges and may lead to unintended consequences, such as duplicating the efforts and harming the enrollment numbers of nearby four-year institutions (e.g., Bailey, & Morest, 2004).

While a large and growing number of community colleges now have the authority to award bachelor's degrees, previous research has yet to explore the impact of CCB adoption on the bachelor's degree production of nearby public, private, and for-profit four-year institutions. The majority of CCB-adopting states only grant community colleges the authority to offer bachelor's degrees to a small subset of academic programs or two-year institutions (Fulton, 2015), but Florida represents the most comprehensive implementation of a CCB policy, as 26 of 28 community colleges in the state of Florida have adopted at least one baccalaureate degree program (Florida College System, 2017). To examine the potential presence of competition between CCB institutions and traditional four-year institutions, we limit our sample to Florida colleges and universities to capitalize on the systematic implementation of CCB degree programs within the state and leverage our access to robust program-level data across the state of Florida.

Given these dynamics, we aim to answer the following research questions:

1. To what extent does CCB adoption impact bachelor's degree production at nearby four-year institutions?

In addition, over half of all Hispanic students and more than 40% of Black students enrolled in higher education attend community colleges (American Association of Community Colleges, 2017), and these results may be stratified according to students' race/ethnicity.

2. Does the impact of CCB adoption on the bachelor's degree production at nearby four-year institutions vary according to students' race/ethnicity?

Guided by institutional theory, particularly the notion of institutional isomorphism, this study draws from a unique program-level panel dataset to examine changes in bachelor's degree production at four-year institutions before and after the adoption of localized CCB degree program(s). We employ a quasi-experimental generalized difference-in-difference-in-differences (DDD) analytical approach to examine the effects of CCB adoption on bachelor's degree production at nearby four-year institutions. In doing so, we make two meaningful contributions to existing scholarship. First, we add to the limited body of evidence pertaining to the impact (and potentially unintended consequences) of CCB degree programs. Second, this study leverages a unique dataset to estimate the competitive forces between institution types and across sectors of higher education.

Despite the growing demand for higher education, there is, in theory, a fixed number of students interested in earning their bachelor's degree (Paulsen & Pogue, 1988). Competition for these students, and the resources they bring, drives institutional policies and plays a role in broader state and federal policy considerations. Our results illustrate that CCB adoption creates a competitive market for students that is concentrated primarily between community colleges and for-profit institutions. In addition, we find, contrary to public discourse, that public four-year institutions may actually benefit from the presence of local CCB degree programs, with varying effects according to students' race/ethnicity.

Literature Review

Although community colleges face their share of limitations, such as a lack of resources relative to flagship research universities (Hendrick, Hightower, & Gregory, 2006) and low

transfer and completion rates (Mullin, 2010), they continue to play an essential role within the larger higher education landscape. For example, community colleges have been lauded for providing the necessary developmental education for academically underprepared students (Bemmel, Floyd, & Bryan, 2008; Bragg, Kim & Barnett, 2006; Cohen & Brawer, 2003; Walker & Pendleton, 2013; Witt, Wattenbarger, Gollattscheck, & Suppiger, 1994) and offering mobility pathways for working or low-income students (Armstrong & Hamilton, 2013). While sub-baccalaureate degree production has been, and continues to be, a major focus area of the community college mission, community colleges have multiple curricular missions and face unique pressures to be responsive to their local workforce. Given the political and fiscal pressures faced by community colleges to serve their local constituencies, the implementation of the curricular missions may vary across community colleges, leading to a growing number of community colleges offering bachelor's degrees in high-demand and localized degree programs (Bahr & Gross, 2016).

The Context (and Controversy) of CCB Degree Programs

In 1989, West Virginia was the first state to authorize the adoption of a CCB degree program (Fulton, 2015). As of 2015, 23 states granted permission for community colleges to confer bachelor's degrees, but 21 of those 23 states had four or fewer community colleges offering bachelor's degrees, with the majority of participating community colleges administering fewer than seven baccalaureate degree programs (McKinney, Scicchitano, & Johns, 2013). The increasingly popular practice of offering CCB degree programs has been described previously as a mechanism to respond to local and state workforce demands (Walker, 2005; Russell, 2010), reduce costs for students and taxpayers (Bemmel, Floyd, & Bryan, 2008), and expand access for

place-bound students who do not live near a four-year institution (Bemmel, Floyd, & Bryan, 2008).

However, critics of CCB adoption have suggested that CCBs may do more harm than good by deviating community colleges from their traditional role within higher education, citing the potential for unintended consequences related to emulating four-year institutions and thereby cutting into the market share of four-year colleges and universities. Lewin (2004) suggests community college baccalaureate programs are unnecessary and expensive duplications of content and services already provided by traditional four-year institutions. By duplicating the efforts of four-year institutions, community colleges that adopt bachelor's degree programs have been accused of drifting from their intended curricular mission related to sub-baccalaureate degree production in an effort to enter the market for four-year students (Floyd & Walker, 2009; Labaree, 2010, 2017; Russell, 2010; Walker, 2005). The notion of mission drift has been defined previously as "a well-known phenomenon in American higher education in which one segment of higher education redefines its mission to include the responsibility already being performed by another" (Kerr, 2001, p. 3), but references to "mission drift" when critiquing the logic of CCB adoption often fail to acknowledge the multiple curricular missions of community colleges, including the need to offer credentials in alignment with local workforce needs.

Supporters of CCB adoption argue that CCB degree programs would provide an affordable alternative to traditional baccalaureate degrees (Jacobs & Dougherty, 2006; Meyer 2006; Russell 2010; Walker, 2005). Prior literature has shown that community colleges typically provide baccalaureate degree options that traditional four-year colleges and universities are not able to provide, such as alternative scheduling, more affordable pathways to the bachelor's degree (Bemmel, 2008; Cook, 2000), and better, more targeted student services (Skolnik &

Floyd, 2005; Troumpoucis, 2004). Skolnik (2009) noted the clear distinctions between CCB-adopting community colleges and four-year institutions that the CCB is only one of many factors that separate community colleges and universities, as factors related to the occupational foci, applied teaching methods, student populations, and faculty-teaching orientation differ considerably at community colleges versus four-year colleges and universities.

Advocates of CCB adoption have also noted that CCB degree programs center the needs of the local constituency by responding directly to high-demand areas identified by local employers (Cohen, 2003; Floyd et al., 2005; Floyd & Walker 2009; Garmon, 2002; Walker, 2001; Walker, 2006). Projected shortages in high-demand fields, such as nursing, teaching, and other public service occupational areas, are problematic developments for economies at both the local and state level (Garmon, 2006). Ignash and Kotun (2005) described CCB adoption as a direct response to the unwillingness of traditional four-year institutions to meet local workforce needs in applied, technical, and occupational fields, with other scholars noting that CCB adoption represents a response to unfilled workforce-related needs (Floyd & Walker, 2003; Furlong, 2003; Walker, 2001) and potentially a step to reduce overcrowding at selected four-year universities (Lewin, 2009).

Prior Research on CCB Degree Programs

Numerous studies examining the influence of CCB adoption have utilized qualitative methods, focusing on policy antecedents and motivational forces surrounding CCB implementation (Hrabak, 2009). In a qualitative case study of three states, Gonzalez (2005) designed an instrument to allow community colleges to begin the process of determining whether to offer the bachelor's degree. McKee (2001) also conducted a qualitative case study to identify issues surrounding the development of CCB degree programs. In addition, Petry (2006) found

that administrators from five CCB-adopting institutions in the state of Florida developed CCB degree programs to increase access to bachelor's degrees and improve workforce development in their local areas.

Much of the research related to the state policy decision to allow community colleges to offer bachelor's degrees has focused on the relationship between CCB adoption and the community college mission. Floyd, Falconetti, and Hrabak (2009) conducted a qualitative study and found that CCB adoption created challenges for participating community colleges seeking to compete with four-year institutions by adding CCB degree programs while continuing to maintain their focus on the traditional sub-baccalaureate community college mission. Another study found that several community college presidents considered CCB adoption as a way to gain affiliation with the nearby four-year colleges and universities with higher status, noting that the sub-baccalaureate community college mission may be getting "pushed away" (Essink, 2013, p. 74). Although the stated purpose of CCB adoption is to expand access to bachelor's degrees to better serve the local community's workforce needs, extant literature lacks any empirical study of the unintended consequences of CCB adoption, such as the extent to which CCB adoption merely cuts into the market share of nearby four-year institutions rather than expanding access to bachelor's degrees offer within a given state.

Case Study Context: CCB Degree Programs in Florida

In 2001, the Florida Education Governance Reorganization Implementation Act changed Florida's K-20 educational system and provided community colleges with the ability to confer a limited number of baccalaureate degrees. Florida Senate Bill 1162 officially granted St. Petersburg Junior College the ability to confer baccalaureate degrees (Florida Senate, 2003a, 2003b). Florida ratified CCB adoption to help meet the "critical statewide need for trained

teachers, nurses, and information technology employees" (FLDOE, 2005, p. 1). The state of Florida later expanded the legislative authority of community colleges to offer CCB degree programs in areas of workforce development in 2008, targeting specific counties with nursing and education needs (FLDOE, 2008). Figure 1 provides a graphical representation of the Florida counties served by CCB degree programs, including a depiction of the density of these CCB degree programs. County-level diffusion appears to be occurring within clusters of high-density adoption of CCB degree programs in the southwestern part of the state and non-adoption in the northwestern region.

--- Figure 1 Here ---

CCB degree programs in Florida were stipulated to be concentrated in specific occupational fields that met proximate workforce needs (Floyd & Walker, 2009; Floyd, Falconetti & Hrabak, 2009) and did not duplicate the offerings of public four-year universities (Floyd, 2006). The state of Florida has become a national leader for the CCB movement (Fulton, 2015), as 26 of the 28 community colleges offer approximately 150 baccalaureate degree programs (Florida College System, 2017). Tables 1 and 2 provide an overview of the number and type of baccalaureate degree programs offered at each CCB-adopting community college, with the largest number of CCB adoptions in the state of Florida concentrated within the business, health, and education fields.

--- Tables 1 and 2 Here ---

Theoretical Framework

Higher education researchers have long sought to identify and analyze patterns of organizational responses to external pressures. According to institutional theory, colleges and universities engage in mission drift in order to improve their status and position relative to other

postsecondary institutions (Meyer & Rowan, 1977; Morphew & Huisman, 2002; Scott, 1987). For community colleges, institutional theory can explain why they would adopt new programs rather than maximize the efficiency within their existing offerings (Morphew & Huisman, 2002), as CCB-adopting institutions are able to adopt the rituals, programs, processes, and structures viewed as legitimate by external actors, such as state policymakers or four-year institutional leaders (Meyer & Rowan, 1977; Scott, 1987).

Although institutional theorists often view organizations as separate units engaging in behavior in response to external stimuli, organizations that respond to similar external forces tend to take on similar organizational structures; this phenomenon has been identified by sociologists as institutional isomorphism (e.g., DiMaggio & Powell, 1983). DiMaggio and Powell defined institutional isomorphism as a process of homogenization where organizations functioning within the same environment and under similar conditions come to resemble one another, arguing that increasing external pressures, combined with ambiguous environmental variables, have driven some colleges to converge their organizational structures by imitating high-status institutions. Traditionally, isomorphism explains the capacity of the external environment to stimulate similarities in structures and practices across organizations (DiMaggio, 1988; DiMaggio & Powell, 1983; Meyer & Rowan, 1977), but isomorphic change in the form of CCB adoption appears to be the result of voluntary imitation of four-year institutions as motivated by an increase in the long-term stability of the organization and improved likelihood of survival (e.g., Bastedo, 2006).

Institutional theory also suggests that colleges are an apt example of highly institutionalized organizations in which rationalized formal structures allow organizations to gain legitimacy, stability, and resources (Meyer & Rowan, 1977). Community colleges may seek to

emulate the practices of four-year institutions to improve their legitimacy and offer educational credentials (bachelor's degrees) deemed more valuable to prospective students and employers (Rosenbaum, Deil-Amen, & Person, 2006). This emulation of four-year practices by community colleges creates an environment in which community colleges may be forced to compete with four-year institutions for scarce resources. As community colleges enter the market for four-year students, prior work by DiMaggio (1988) suggests that both institution types may struggle to gain influence as students may be forced to choose between new institutional forms (CCB-adopting institutions) or the preservation of existing institutional forms (traditional four-year institutions).

Data

This study used secondary program-level data for postsecondary institutions granting bachelor's degrees or higher within the state of Florida. As mentioned earlier, Florida provides a unique context in which to study the impact of CCB programs on four-year institution degree production due to the scope and prevalence of these programs statewide. Given the available data at the program level, our analytical sample includes public, private non-profit, and private for-profit four-year institutions in existence between 2000 and 2014. Within our dataset, we have 123 unique four-year institutions, but we removed any institutions that had 70 percent or more of their awarded degrees at an associate degree level or less (i.e., certificate) as well as any institutions that were coded as a public two-year institution within the IPEDS data.[1] The logic of this decision was due to the reclassification of community colleges (or two-year institutions) as four-year institutions after they began awarding bachelor's degrees. Finally, we limited our

[1] Within the IPEDS data system each of the 23 community colleges in Florida are initially coded as a four-year institutions. Institutions that awards any number of bachelor degrees are coded as a four-year institutions. We wanted to create an indicator that represents the primary mission of institutions and thus reclassify any institutions that awards 70% of more of their degrees as associates degrees or less as a two-year institution.

sample to institutions in operation for the entire 15 year panel of our analytical sample to ensure that our estimates were not confounded by institutional openings and closures.

We operationalize our program-level data through the two-digit Classification of Instructional Programs (CIP) classification. CIP is a standardized reporting taxonomy generated by the U.S. Department of Education's National Center for Education Statistics (NCES) to track and report fields of study and program completion activity. To this end, we created a dyadic panel dataset where the unit of analysis shifts from the institution (College X) to the dyad of institution and two-digit CIP code (CollegeX_CIP). This approach allows for micro-level analyses while also accounting for trends at the individual program and institution levels.

The data from the Florida Department of Education were then merged with data from NCES's Integrated Postsecondary Education Data System (IPEDS) to gather institution-level factors. Factors, such as cost of attendance, institution-level student demographics, and institutional expenditure data, were included as control variables that may have influenced changes in enrollment and degree completion.

Policy/Treatment Indicator

Our primary independent variable is a binary indicator that signals if a four-year institution's two-digit CIP code was in a county served by a CCB program within the same two-digit CIP code. Within the state of Florida, community colleges have well-defined and distinct county-level service areas in which they can actively recruit students. While they are not prohibited from enrolling students from non-service counties, the vast majority of students enrolled in a community college are from its surrounding area and they are not permitted from actively marketing programs outsider of their service area. All Florida counties are served by a single community college, but not all counties have a four-year institution located within them.

Our decision to designate four-year institutions with two-digit CIP codes to "treat" them as if they were located in the service county of a two-year institution in that corresponding CIP code is purposeful given the context described above.

Figure 2 provides a graphical representation of the statewide distribution of four-year institutions granting bachelor's degrees or higher. Unlike the distribution of CCB-adopting institutions in which we see a nearly comprehensive distribution across the state, access to a nearby four-year institution is highly clustered within Florida, with particularly high-density clustering of four-year institutions in central and southeast Florida. While these clusters mirror population densities to some degree, they also leave selected counties in Florida without local access to a four-year institution. Appendix A provides a side-by-side comparison of four-year institutional distributions by county and institutional type.

--- Figure 2 Here ---

Empirical Strategy

We use a DDD framework to identify the causal effects of the adoption of CCB degree programs on bachelor's degree production at four-year institutions. Florida allows for the identification of this naturally occurring experimental framework, as the state is one of the largest adopters of CCB degree programs, and two-year institutions are legislatively mandated to service, but also limit recruiting in, specified counties within the state. Additionally, CCBs are program-specific and therefore allow us to capitalize on program-level degree production data to examine the micro-level effects of this policy change.

Triple Difference Approach

This study employs program-level data to estimate the impacts of local CCB adoption on bachelor's degree production at nearby four-year institutions. We first present the standard logic for our DDD approach with a single policy shock.

$$\bar{\delta} = (\bar{Y}_{i=1,p=1,t>2001}) - (\bar{Y}_{i=1,p=1,t\leq 2001}), \quad (1)$$

where $(\bar{Y}_{i=1,p=1,t>2001})$ is the logged transformed changes in bachelor's degrees awarded by student demographic groups for program *p* in which the local community college had adopted a CCB (treatment =1) and institution *i*, which had its local community college adopt any baccalaureate program (treatment =1) in the years *after* 2001—when Florida enacted legislation allowing broad-based baccalaureate degrees within its community colleges. $(\bar{Y}_{i=1,p=1,t\leq 2001})$ is the same set of outcomes for the same program at the same institutions in the years prior to the implementation of CCB legislation in Florida. The simplicity of the model presented in (1) provides a clear interpretation of the impact of the legislation; however, it fails to account for the global changes in associate degree completion, broader economic trends, or targeted initiatives by institutions to increase enrollment and success.

To show the casual impact of CCB programs, additional sources of variations must be identified to explain the exogenous impacts of enrollment and completion changes. Within this study, additional variations in the outcomes are partially examined by incorporating an additional difference-in-differences (DiD) parameter to equation (1). Since local community colleges can select the programs for which they adopt CCBs, conditions exist in which treated programs can be compared to untreated programs. With the assumption that the adoption of a CCB within a single program at the community college will only impact that same CIP code at the local four-year institution, we can employ the untreated CIP codes in the same way we compared

institutions pre and post adoption in equation (4). We can algebraically express this addition as follows:

$$\bar{\delta} = ((\bar{Y}_{i=1,p=1,t>2001}) - (\bar{Y}_{i=1,p=1,t\leq 2001})) - ((\bar{Y}_{i=1,p=0,t>2001}) - (\bar{Y}_{i=1,p=0,t\leq 2001})), \quad (2)$$

where the first terms are identical to those in equation (1) and exploit the within institutional differences pre and post policy. However, this term is now subtracted from the differences between treated and untreated CIP codes, resulting in a DiD estimation. This additional difference accounts for the overall changes in bachelor's degree production and institution-specific changes in completion.

The final concern not addressed through equation (1) is the potential for bias in the type of programs selected for CCB adoption. Presumably, the decision to implement CCBs within certain programs is related to heighted student interest or societal need (Moore & Shulock, 2014). Within the state of Florida, degrees in business administration and teacher preparation were adopted early and often given the statewide interest and shortages within four-year institutions. To account for the potential bias in program adoption, we exploit data available for treated programs within untreated institutions. Equation (5) is thus modified as follows:

$$\bar{\delta} = ((\bar{Y}_{i=1,p=1,t>2001}) - (\bar{Y}_{i=1,p=1,t\leq 2001})) - ((\bar{Y}_{i=0,p=1,t>2001}) - (\bar{Y}_{i=0,p=1,t\leq 2001})), \quad (3)$$

where the initial difference pre and post adoption within an institution is subtracted from the difference between treated programs in untreated schools. In generating our DDD estimate, we combined equations (1), (2), and (3) to generate the following:

$$\bar{\delta} = ((\bar{Y}_{i=1,p=1,t>2001}) - (\bar{Y}_{i=1,p=1,t\leq 2001})) - ((\bar{Y}_{i=1,p=0,t>2001}) - (\bar{Y}_{i=0p=0,t\leq 2001})) -$$

$$((\bar{Y}_{i=0,p=1,t>2001}) - (\bar{Y}_{i=0,p=1,t\leq 2001})) - ((\bar{Y}_{i=0,p=0,t>2001}) - (\bar{Y}_{i=0,p=0,t\leq 2001})) \quad (4).$$

In a regression framework, this estimation strategy can be expressed as

$$Y_{ipt} = \alpha_0 + \alpha_1 Post_t + \alpha_2 TreatInst_i + \alpha_3 TreatCIP_p + + \beta_1(TreatCIP_p * TreatInst_i) + \beta_2(TreatCIP_p * Post_t) + \beta_3(TreatInst_i * Post_t) + \beta_4(TreatInst_i * Post_t * TreatCIP_p) + \varepsilon_{it}, \quad (5)$$

where Y_{ipt}, is the outcome of interest for institution *i*, program *p*, in year *t*. $TreatInst_i$ *is* a dummy variable that indicates a 1 for four-year institutions whose local community college adopted a CCB and 0 for those that have not. $Post_t$ indicates the years after the CCB adoption period, and $TreatCIP_p$ indicates a 1 if the given CIP code (program) has been approved as a CCB adopting program. $TreatCIP_p * TreatInst_i$ controls the trends within treated programs within treated institutions, $TreatCIP_p * Post_t$ represents specific time trends of the treated program, and $TreatInst_i * Post_t$ represents specific time trends for treated institutions. Our DDD coefficient of interest would be $\beta_4(TreatInst_i * Post_t * TreatCIP_p)$, which represents the changes in program-specific bachelor's degree production at four-year institutions subjected to the local CCBs' pressures in the adoption period. Finally, ε_{it} is the institution-clustered standard error. The decision to cluster the standard errors at the institution level was designed to generate conservative estimates of statistical significance and relaxed assumptions of heteroskedasticity.

Despite legislative approval for CCBs in 2001, not all treated institutions implemented their respective CCBs immediately. To this end, we have variations in the initial adoption year at both the institution and program levels. To account for these variations, we implement a generalized difference-in-difference-in-differences (GDDD) model. Following the logic implemented by Belasco, Rosinger, and Hearn (2014) and Kramer, Holcomb, and Kelchen (2018), we specified our GDDD model as Equation (6):

$$Y_{ipt} = \beta_0 + \beta_1 \lambda_{ipt} + \beta_{2\ldots n} X_{it} + \alpha_{ip} + \delta_{it} + \gamma_{py} + \upsilon_i + \rho_p + \theta_t + \varepsilon_{pti,} \quad (6)$$

where Y_{ipt} is our outcome of interest in four-year institution *i* for degree program *p* during year *t.* λ_{ipt} is the coefficient of interest (GDDD indicator), which equals 1 in the year in which a four-year institution's program had a corresponding CCB program adopted locally in an adopting community college and thereafter; otherwise, the indicator equals 0. X_{it} is a vector of institutional characteristics that impact bachelor's degree completion. The remaining terms represent a set of terms that are fixed effects to account for the interactions specified in Equation (5). α_{ip} is the vector of program by institutional fixed-effects, δ_{it} is an institution by year fixed-effects, γ_{py} is a vector of program by year fixed-effects, and υ_i , ρ_p, θ_t are institutional, program, and year fixed-effects. Finally, ε_{it} represents a robust clustered, at the institutional level, standard error term that fluctuates across time.

The benefit of this model specification is the full control of college-specific time effects common across academic programs combined with time-varying program effects. This specification models out any influence on the outcomes related to specific programs at individual institutions, specific programs across institutions for a particular year, and specific institutions in a particular year. The estimates on $\beta_1\lambda_{ipt}$ indicate the outcome and enrollment impacts related to the adoption of CCBs.

To further test the differential effects of CCB adoption by institutional type and Carnegie classification, we incorporate interaction terms with our GDDD coefficient of interest

$$Y_{ipt} = \beta_0 + \beta_1\lambda_{ipt} + \beta_2 PR_i + \beta_3 FP_i + \beta_4(\lambda_{ipt} * PR_i) + \beta_5(\lambda_{ipt} * FP_i) + \beta_{6\ldots n}X_{it} + \alpha_{ip} + \delta_{it} + \gamma_{py} + \upsilon_i + \rho_p + \theta_t + \varepsilon_{pti,} \quad (7)$$

where we extend our main effects GDDD specification (Eq. 6) to include a binary indicator for private institutions (PR_i) and for profit four-year institutions (FP_i) where the indicator is equal to 1 for institutions holding each of those distinctions and 0 for others. We then incorporate two

interactions terms to capture the varying effects of the policy of private four-year institutions ($\lambda_{ipt} * PR_i$), and for profit four-year institutions ($\lambda_{ipt} * FP_i$), the DDD coefficient of Eq. 6 (λ_{ipt}) now becomes the causal effect of CCB presence for public four-year institutions.

We apply the same logic to our final specification on the varying effects of CCB adoption by Carnegie classification:

$$Y_{ipt} = \beta_0 + \beta_1\lambda_{ipt} + \beta_2 MA_i + \beta_3 BA_i + \beta_4(\lambda_{ipt} * MA_i) + \beta_5(\lambda_{ipt} * BA_i) + \beta_{6\ldots n}X_{it} + \alpha_{ip} + \delta_{it} + \gamma_{py} + \upsilon_i + \rho_p + \theta_t + \varepsilon_{pti,} \quad (8)$$

where we now include a binary indicator for master-level (MA_i) and bachelor-level (BA_i) institutions We then incorporate two interaction terms to capture the varying effects of the policy on master-level ($\lambda_{ipt} * PR_i$) and bachelor-level institutions ($\lambda_{ipt} * FP_i$). The effect of the CCB policy adoption on doctoral-level institutions is not included in our main effects GDDD coefficient (λ_{ipt}).

Limitations and Validation of Design Assumptions

The difficulty in any quasi-experimental design is identifying the counterfactual in the absence of policy adoption. The use of a GDDD design allows this study to approximate the impact of non-adoption in adopting programs by using non-adopting programs and non-adopting institutions as controls. This approach produces estimates of what *could* have occurred within the outcomes if the CCB had not been adopted. The assumption of this counterfactual approach is that treatment and control units following similar (or parallel) pre-policy patterns, and the resulting variations in the outcome can be attributed to policy adoption.

Although this assumption is difficult to test, this study employs two techniques to account for the parallel assumption. First, this study added a program- and institution-specific trend to the set of covariates (e.g., Kramer, Holcomb, & Kelchen, 2018). This inclusion controls for the

potential that adopting programs within adopting institutions may have experienced differences in the outcomes of interest prior to adopting a CCB. Accordingly, program and institutional trend variables were created by regressing dummy time variables for the years prior to 2001 on each of the dependent variables and by multiplying the resulting coefficient by year to create a unique program and institutional trend variable.

Second, we employ falsification tests to overcome a major concern with quasi-experimental approaches by untangling the policy effect from a potential corresponding time effect (Cook & Campbell, 1986). To this end, we artificially created the adoption of CCB degree programs years prior to the actual adoption. This approach allows the results to be viewed in context. Significant results prior to the actual adoption signal that the estimated impact on bachelor's degree production was not a product of CCB adoption but rather a time-effect that happens to coincide with the adoption of CCB programs.

Results

Table 3 provides the descriptive statistics of key institutional covariates used within our specified models. Specifically, this table compares four-year institutions within a county served by a CCB degree program with four-year institutions located in a county not served by a CCB degree program. On average, four-year institutions with a closely located community college offering at least one CCB degree program showed lower undergraduate enrollment, but other key institutional factors were not significantly different across the two groups. County-level factors appear to differ significantly across CCB and non-CCB institutions to a greater extent. This result aligns with the state policy narrative that CCB degree programs were originally intended to support counties that have large labor market shortages and limited access to bachelor's-degree–granting institutions.

--- Table 3 Here ---

Table 4 examines changes in institution-level bachelor's degree production outcomes for four-year institutions in the year prior to the Florida CCB legislation (2000) and the final year of our analytical dataset (2014). Across each of our bachelor's degree production outcomes, there appears to be a widening gap in the number of bachelor's degrees produced between four-year institutions with a local CCB degree program and those without one. For example, the gap in total bachelor's degrees increased from 15,996 bachelor's degrees to 32,073 bachelor's degrees, suggesting that the CCB's presence may have a positive influence on bachelor's degree production, but these are institution-level estimates and do not account for program-specific adoptions, which will be examined later.

--- Table 4 Here ---

Main Effects

Table 5 estimates the effects from our GDDD model for both our main effects and interacted models. Each model is fully specified and includes time-varying institution-level covariates, time-varying county-level covariates, and our previously discussed interacted fixed-effects specifications. This approach is in line with prior work using the DDD approach (e.g., Baker, 2016). In addition, we present four- and six-year lagged adoption indicators. Given that our outcomes are focused on bachelor's degree production, we would not expect many students to complete their bachelor's degrees in fewer than four years, and we use the six-year period to test the sustained impact of CCB program adoption.

Model (1), for four- and six-year lagged adoption, shows the overall effects without the consideration of our interaction terms. Overall, we find suggestive evidence that the presence of a CCB degree program increases bachelor's degree production in that program at the four-year

institution within that community college's service county. The effect becomes statistically significant (*p<0.05)* when using the six-year lag, with an estimated increase in program-level bachelor's degree production of 12%, suggesting that the presence of CCB programs might actually increase competing four-year degree production in the long run.

--- Table 5 Here --

Table 5 also examines the varying impact of the presence of a CCB degree program by institutional type (public and private) and non-profit status (non-profit or for-profit)—Model (2). Again, we examine the four-year and six-year lagged effects of the policy adoption. The reference group for Model (2) is public non-profit four-year institution, which is represented by the "CCB Adoption" non-interacted coefficient. Specifically, we find statistically significant and consistent evidence that the presence of a CCB degree program impacts four-year institutions differently. For public four-year institutions, we estimate a statistically significant (*p<0.01*) increase of 25.7% in bachelor's degree production after four years and a 36% increase after six years. For context, the average program-level bachelor's degree production at public four-year institutions was 157 degrees, so a 25% increase would produce an estimated increase of 39 degrees.

For private non-profit four-year institutions, we find a similar statistically significant effect, albeit at a much smaller magnitude. Private non-profit four-year institutions experienced a 4.6% increase after four years and an 8.9% increase after six years. In contrast, for-profit four-year institutions experienced significant decreases in their program-level bachelor's degree production following CCB adoption when using both the four- and six-year lags. For-profit four-year institutions experienced a statistically significant (*p<0.01*) decrease of 44.5% (19 estimated

bachelor's degrees) in bachelor's degree production at the program level after four years and a 69.1% decrease after six years (30 estimated bachelor's degrees).

Results from our interacted Carnegie classification specification (Model 3) demonstrate similar results. The effect of CCB adoption on doctoral four-year institutions showed a significant increase in program-level bachelor's degree production for programs with a local CCB degree program in place—13.6% after four years and 24.2% after six years. Master's degree granting institutions experienced a significant (*p<0.01)* decrease in program-level bachelor's degree production (2.1%) after four years and a slight increase of 5.1% after six years. Institutions that only grant bachelor's degrees did not differ statistically from doctoral institutions, suggesting that institutions only offering bachelor's degrees (traditionally liberal arts institutions) are a unique postsecondary experience not part of any institutional substitution decisions.

Heterogeneous Effects

Table 6 offers further analyses of the impact of CCB adoption on four-year institutions' bachelor's degree production by examining heterogeneous effects by race/ethnicity. As with our main effects (Table 5), we find that the presence of a local CCB degree program has a negative impact on bachelor's degree production at for-profit institutions for each of our race/ethnicity categories. Specifically, Hispanic students' bachelor's degree production, within treated CIP codes, significantly (*p<0.01)* decreased at for-profit institutions by 23.4%. Bachelor's degree production for White students at for-profit institutions also decreased significantly (*p<0.01)* by 46.3 percent. While not significant, we find suggestive evidence that Black and Asian students are also substituting CCB programs for similar degree programs at for-profit institutions.

--- Table 6 Here ---

In general, we find that Hispanic students' bachelor's degree production appears to be most sensitive to the presence of a nearby CCB degree program. Not only does program-level bachelor's degree production for Hispanic students shift away from for-profit institutions when a nearby CCB degree program is adopted, but Hispanic students appear to shift toward public four-year institutions and doctoral/research institutions. We find less evidence that Black students' bachelor's degree production is impacted by the presence of a localized CCB degree program, except for the potential substitution away from CCB degree programs at bachelor's or master's level institutions to programs at CCB degree programs at participating community colleges.

Robustness Checks

Given the time-varying nature of program-level CCB adoption, our GDDD approach relaxes many of the concerns that might be present when looking at a single-year policy shock. However, to test the robustness of our results, we create a within-year program-level placebo assignment. For every given institution-by-year program-level adoption, we randomly assign another two-digit CIP code to receive the treatment and then test the effects. We find no statistically significant effects on degree production using the four- or six-year lags. Additionally, we randomly assign implementation of a CCB degree program to another community college within the adopted year and find no statistically significant impact on our bachelor's degree production outcomes. Without a program-by-institution-by-year fixed effect, we feel confident that our estimates project the actual impacts of CCB implementation rather than spurious or external factors.

In addition to testing the placebo policy effects, we test our assumptions around functional form. Our decision to log transform our outcome variables was made for ease of interpretation; however, we run alternative model specifications with total degree and total

degree per 100 students enrolled and find that our results are consistent with our selected specification in both magnitude and significance. This finding leads us to believe that our point estimates are not functional-form dependent and, combined with other robustness tests, are attributed to the implementation of a CCB degree program.

Discussion and Conclusions

This study combines program- and institution-level data to examine the impact of CCB adoption on bachelor's degree production at nearby four-year colleges and universities. Our results provide the first known estimates of the effect of CCB adoption on four-year institutions' bachelor's degree production, revealing that CCB adoption had a positive effect on bachelor's degree production at nearby public four-year institutions but a negative effect on bachelor's degree production at for-profit four-year institutions. Although critics have argued that the adoption of CCB degree programs would duplicate efforts and diminish the market share of four-year colleges and universities, our findings show that only for-profit institutions are harmed by CCB adoption with respect to bachelor's degree production.

Further research should explore the rationale behind the positive influence of CCB adoption on bachelor's degree production at public four-year institutions. For instance, the presence of a CCB degree program may allow baccalaureate degree aspirants to make substantive progress toward a bachelor's degree by enrolling in the optimal sequence of courses before transferring to a public four-year institution, but future scholars would need to leverage transcript data to attribute these effects to course-taking patterns within CCB degree programs. Previous work has shown that enrolling initially at a community college before transferring to a four-year institution is associated with lower levels of student loan debt as well as a lower likelihood of obtaining a bachelor's degree (Hu, Ortagus, & Kramer, 2018). Additional research

can explore whether price-conscious students who enroll in a CCB degree program are more likely to transfer vertically and whether this finding can explain the positive influence of CCB adoption on bachelor's degree production at nearby public four-year institutions.

Given that a disproportionate number of Hispanic and Black students attend community college (American Association of Community Colleges, 2017), we also examine the heterogeneous effects of CCB adoption on bachelor's degree production according to students' race/ethnicity, finding that the presence of a nearby CCB degree program has a negative effect on bachelor's degree production at for-profit institutions among Hispanic students. This particular heterogeneous finding suggests that Hispanic students, many of whom are place-bound and low-income students (Shields, 2004), may be able to benefit from CCB adoption by earning their bachelor's degree without paying the high tuition prices at for-profit colleges and universities.

From a policy perspective, our results indicate that CCB adoption has achieved its aim in increasing state-subsidized bachelor's degree production in the state of Florida. Although institutional theory, particularly institutional isomorphism, can explain why community colleges would adopt new bachelor's degree programs rather than maximize the efficiency of their sub-baccalaureate offerings (e.g., Morphew & Huisman, 2002), legislative concerns related to the negative impact of CCB adoption on public four-year institutions' bachelor's degree production appear to be unfounded in light of the results described above. In opposition to these concerns, this study shows that the presence of a CCB degree program increases all levels of public bachelor's degree production and only cuts into the market share of for-profit colleges and universities.

This study leverages a unique dataset to investigate the effects of CCB adoption in Florida, but future research can explore whether these findings hold on a national level. If findings from this study prove to be generalizable based on future work examining the impact of CCB adoption across states, community colleges across the United States may consider adopting targeted, high-demand bachelor's degree programs as a mechanism to increase overall bachelor's degree production at public colleges and universities. Despite the positive outcomes associated with CCB adoption presented in this study, critics may continue to suggest that the implementation of bachelor's degree programs at community colleges represents a form of mission drift that detracts from the purpose of community colleges; however, we urge those detractors to consider the evidence presented in this work and the multiple curricular missions of community colleges (e.g., responsiveness to local workforce demands) before disregarding the potential utility of CCB adoption within target, high-demand program areas.

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Tables

Table 1: Baccalaureate Degree Programs at Florida Community Colleges

Florida Community College	# of Baccalaureate Programs
Broward College	11
Chipola College	10
College of Central Florida	3
Daytona State College	11
Eastern Florida State College	3
Florida Gateway College	4
Florida SouthWestern State College	10
Florida State College at Jacksonville	14
Gulf Coast State College	4
Indian River State College	17
Lake-Sumter State College	1
Miami Dade College	16
Northwest Florida State College	7
Palm Beach State College	3
Pasco-Hernando State College	2
Pensacola State College	2
Polk State College	4
Santa Fe College	7
Seminole State College of Florida	5
South Florida State College	3
St. Johns River State College	3
St. Petersburg College	25
State College of Florida, Manatee-Sarasota	7
Valencia College	3

Note: Represents number of CCB degree programs prior to the 2014 policy moratorium. Additional, CCB programs have been adopted in 2016 and 2017, but are not included within

this analysis.

Table 2: Number of Baccalaureate Degree Programs by Two-Digit CIP

Two-Digit CIP Code	Number of Baccalaureate Programs
Business, Management, Marketing, and Related Support Services	21
Health Professions and Related Programs	20
Education	14
Computer and Information Sciences and Support Services	9
Homeland Security, Law Enforcement, Firefighting & Related Protective Services	7
Engineering Technologies and Engineering-Related Fields	5
Public Administration and Social Service Professions	3
Communications Technologies/Technicians and Support Services	2
Biological and Biomedical Sciences	2
Legal Professions and Studies	1
Mechanic and Repair Technologies/Technicians	1
Visual and Performing Arts	1

Note: Represents number of CCB degree programs prior to the 2014 policy moratorium. Additional, CCB programs have been adopted in 2016 and 2017, but are not included within this analysis.

Table 3: Means Differences on Key Institution and County Level Covariates

	All	No CCB	CCB
Institutional Factors			
Sector: Public four-year	0.175	0.182	0.167
	(0.381)	(0.386)	(0.373)
Sector: Private four-year (NonProfit)	0.649	0.667	0.625
	(0.478)	(0.472)	(0.485)
Sector: Private four-year (For Profit)	0.175	0.152	0.208
	(0.381)	(0.359)	(0.407)
12-Month Undergraduate Headcount (#)	7,109.10	8,657.00	4,982.20 **
	(11590.4)	(13444.9)	(7938.6)
In-State Tuition and Fees ($)	15,582.60	16,157.30	14,796.90
(inflation adjusted)	(9445.5)	(9497.3)	(9329.3)
Instructional Expenditure per UG ($)	6755.60	6395.70	7250.40
(inflation adjusted)	(7625.5)	(6730.7)	(8692.1)
Research Expenditures per UG ($)	917.70	1045.80	741.40
(inflation adjusted)	(2732.7)	(2773.1)	(2669.9)
Pell Grant Expenditures per UG ($)	1220.80	1172.60	1287.10
(inflation adjusted)	(825.6)	(786.5)	(873.2)
Institution Funded Grant Aid per UG ($)	2478.90	2682.20	2199.40

(inflation adjusted)	(3465.2)	(3345.0)	(3609.6)
Total Expenditures per UG ($)	21784.50	23298.80	19702.30
(inflation adjusted)	(26420.8)	(30510.4)	(19287.6)
Proportion of Graduate Degrees (%)	18.80	20.16	16.92
(inflation adjusted)	(20.50)	(19.63)	(21.52)
County-Level Factors			
Unemployment Rate (%)	6.239	6.475	5.915 **
	(2.664)	(2.718)	(2.557)
Total County Population (#)	1,073,687.20	1,272,563.10	800,232.90 **
	(732757.4)	(784124.5)	(549202.9)
County Population 18-44 (%)	36.75	37.90	35.18 **
	(5.321)	(4.910)	(5.464)
Median Household Income ($)	50,251.80	49,272.80	51,597.80 **
(inflation adjusted)	(5959.7)	(5105.9)	(6743.3)
Observations	912	525	384

Note: Standardized differences, D, are based on the following formula: $D = (X_t - X_a)/\sqrt{(s_t^2 + s_a^2)/2}$

** indicates standardized differences of greater than 0.20 (significantly different)

Table 4: Total Bachelor Degree Production Pre and Post CCB Legislation

	Pre-CCB Legislation (2000)			Final Sample Year (2014)		
	No CCB	CCB	Difference	No CCB	CCB	Difference
Total Bachelor Degrees	33,271 (1633.6)	17,275 (1587.6)	-15,996	56,546 (3057.1)	24,473 (1837.2)	-32,073
Degrees by Sector						
Bachelor Degrees: Public four-year	24,279 (1511.3)	11,156 (3303.4)	-13,123	43,202 (3624.1)	15,480 (3155.3)	-27,722
Bachelor Degrees: Private four-year *(non-profit)*	8,550 (529.8)	5,706 (556.6)	-2,844	11,954 (760.3)	8,342 (756.6)	-3,612
Bachelor Degrees: For-Profit	442 (65.42)	413 (49.90)	-29	1,390 (223.3)	651 (135.3)	-739
Degrees by Carnegie Classification						
Bachelor Degrees: Research/Doctoral	27,946 (2011.3)	9,870 (3782.6)	-18,076	47,696 (4183.6)	11,815 (3973.0)	-35,881
Bachelor Degrees: Master's	3,893 (546.2)	5,434 (878.9)	1,541	5,783 (885.3)	9,775 (1265.4)	3,992
Bachelor Degrees: Bachelor's	1,233 (181.0)	1,390 (135.6)	157	2,024 (216.2)	1,888 (281.4)	-136
Degrees by Race/Ethnicity						
Bachelor Degrees: White	19,823 (1154.0)	12,691 (1215.4)	-7,132	26,976 (1731.3)	14,680 (1123.6)	-12,296

Bachelor Degrees: Black	4,801 (270.2)	1,497 (101.3)	-3,304	8,331 (409.7)	2,707 (161.1)	-5,624
Bachelor Degrees: Hispanic	5,206 (391.9)	1,486 (164.6)	-3,720	14,222 (1039.4)	3,491 (323.1)	-10,731

Notes; Standard deviations in parentheses

Table 5: Main and Lagged Effects

	four-year Lag			Six-Year Lag		
	(1) Overall	(2) Sector	(3) Carnegie Classification	(1) Overall	(2) Sector	(3) Carnegie Classification
CCB Adoption	0.053	0.257**	0.136+	0.120*	0.360***	0.242**
	(0.059)	(0.070)	(0.077)	(0.054)	(0.069)	(0.068)
Sector: Private four-year (non-profit)		-0.211***			-0.271***	
		(0.042)			(0.069)	
Sector: Private four-year (for-profit)		-0.702**			-1.051**	
		(0.211)			(0.361)	
Carnegie Classification: Masters			-0.157**			-0.191**
			(0.055)			(0.065)
Carnegie Classification: Baccalaureate			-0.099			-0.153
			(0.127)			(0.106)
R-squared	0.287	0.293	0.285	0.293	0.299	0.292
# of Groups	937	937	937	855	855	855
# of Observations	13,211	13,211	13,211	12,300	12,300	12,300
Institutional Level Covariates Included	Yes	Yes	Yes	Yes	Yes	Yes
County Level Covariates Included	Yes	Yes	Yes	Yes	Yes	Yes
Institutional Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Program Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
College × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
College × Program Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Program × Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes

*Notes. County-level robust clustered standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001;*

Table 6: Effects of CCB Adoption by Race/Ethnicity (lagged four-years)

	White			African American / Black			Hispanic			Asian / Pacific Islander		
	Overall	Sector	CC	Overall	Sector	CC	Overall	Sector	CC	Overall	Sector	CC
CCB Adoption	0.025	0.164+	0.095	-0.059	0.013	0.044	0.048	0.356**	0.192	0.171	0.260**	0.148+
	(0.085)	(0.088)	(0.074)	(0.052)	(0.100)	(0.069)	(0.143)	(0.114)	(0.143)	(0.104)	(0.089)	(0.083)
Sector: Private four-year (non-profit)		-0.149**			-0.083			-0.477***			-0.167	
		(0.043)			(0.094)			(0.060)			(0.157)	
Sector: Private four-year (for-profit)		-0.627**			-0.269			-0.590**			-0.254	
		(0.220)			(0.315)			(0.179)			(0.222)	
Carnegie Classification: Masters			-0.028			-0.129*			-0.477***			0.107
			(0.109)			(0.058)			(0.060)			(0.069)
Carnegie Classification: Baccalaureate			0.036			-0.175+			-0.590**			0.264**
			(0.172)			(0.091)			(0.179)			(0.072)
R-squared	0.211	0.215	0.214	0.322	0.322	0.315	0.384	0.392	0.385	0.557	0.558	0.562
# of Groups	804	804	725	765	765	701	769	769	702	645	645	596
# of Observations	9,832	9,832	9,364	8,523	8,523	8,205	8,069	8,069	7,752	5,524	5,524	5,313
Institutional Level Covariates Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Level Covariates Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Institutional Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Program Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
College × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
College × Program Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Program × Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes. County-level robust clustered standard errors in parentheses; + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001;*

Figures

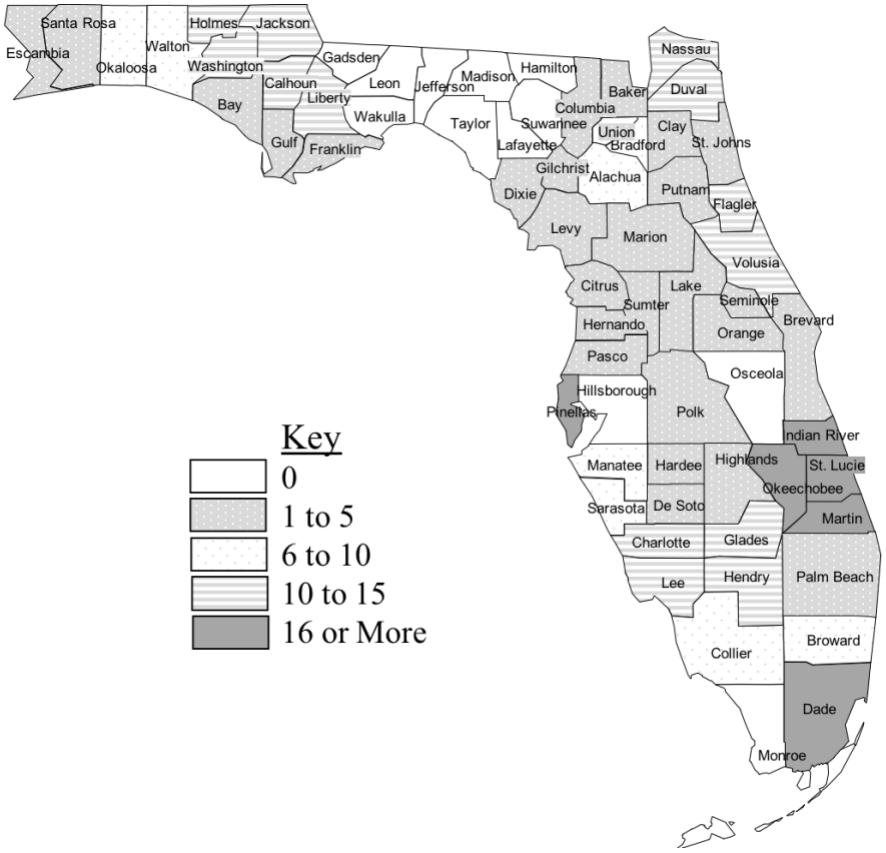

Figure 1: Distribution of CCB policies by county in Florida

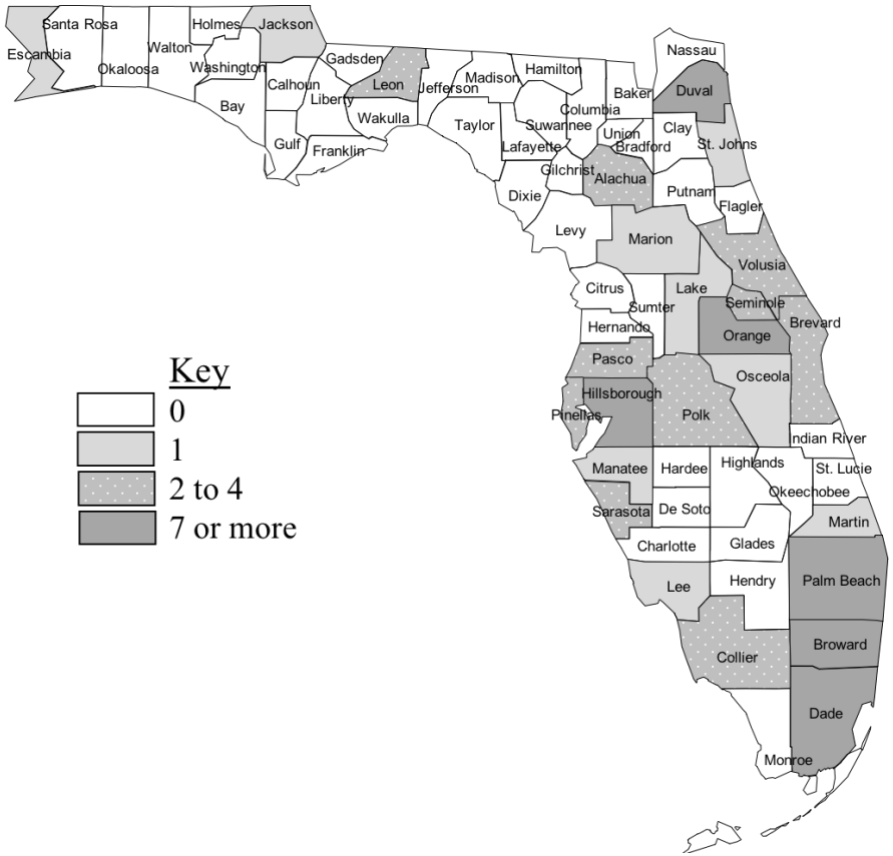

Figure 2: Distribution of all four-year institutions in 2015