

12-28-2021

Volume 24, Full Contents

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Staff, MSSJ (2021) "Volume 24, Full Contents," *Midwest Social Sciences Journal*: Vol. 24 : Iss. 1 , Article 15.

Available at: <https://scholar.valpo.edu/mssj/vol24/iss1/15>

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Volume 24, 2021

MIDWEST SOCIAL SCIENCES JOURNAL

A Publication of the Indiana Academy of the Social Sciences

MIDWEST SOCIAL SCIENCES JOURNAL

Volume 24 (2021)

<https://scholar.valpo.edu/mssj/>

Anthropology • Business • Criminology • Economics • History
Political Science • Psychology • Sociology • Environmental Studies
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The journal was published annually both in print and online in the autumn from Volume 14 to Volume 19. Beginning with Volume 20, the journal is available only digitally. Papers submitted for possible publication are subject to a double-blind review process using BePress. The coeditors alone are responsible for making the final decision on all manuscripts and content for publication in the journal. Their decision on publication content is not subject to review by any other member, officer, or body of the Indiana Academy of the Social Sciences.

EDITORS' NOTE

We are very pleased to present Volume 24, our first volume as coeditors of the *Midwest Social Sciences Journal*. We are committed to uphold the high standards set by our predecessors and to the goal that the journal serve as a channel for the dissemination of excellent scholarly work in the social sciences.

This year's volume includes papers on the themes of pedagogy, government policy, and firm behavior, from various social science disciplines and time periods. The first paper is an invited essay from Selena Sanderfer Doss on the patterns of black migration and the economic forces that drove them over a period of 400 years. In the 20th century, these forces have resulted in a return migration to the American South with greater political and socioeconomic progress for black Americans. Dr. Sanderfer Doss graciously stepped in to write this paper on a topic parallel to that of Dr. Diane Pinderhughes's 2021 keynote presentation at the annual meeting of the Indiana Academy of the Social Sciences.

In this volume, three papers address the effectiveness and significance of context in policy making. Dr. Viskupič investigates the impact of a country's perception of status on its foreign policy decisions. On the domestic policy front, Dr. Chang investigates the effects of variation in physical activity legislation across states on adolescent obesity rates. Using establishment-level survey data, Dr. Hsu's paper investigates whether tariff-reduction policies in Uruguay had similar impacts on importers in the manufacturing and service sectors.

Two papers explore the factors that influence the decision-making and behaviors of firms. Using customer transaction data from a large retailer in China, Sun and colleagues model the predictive powers of alternative machine algorithms on customer-relationship management as measured by customer lifetime value. Being able to pick the best algorithm gets firms closer to identifying profitable retail customers. Icka and colleagues examine the sustainability practices of Albanian small business enterprises using interview-based firm-level data. They find that despite the lack of regulation in Albania on minimum sustainability standards, firms are motivated to adopt these practices in order to better integrate with the more profitable markets in the European Union.

The COVID-19 pandemic has posed many challenges to higher education and learning, to which instructors have responded with varied pedagogical approaches. Shine and Brown describe challenges of curricular transformation when premature termination of criminal justice internships required conversion of internships to capstone experiences. Their paper describes pedagogical techniques that can be adopted across disciplines facing similar challenges. Clark describes the techniques of double-loop learning, i.e., learning that is productive and not defensive. Contrasting defensive-learning actions against productive-learning ones, he provides a model that can be adapted to varied contexts, including the current pandemic.

Several reviewers graciously agreed to provide authors with high-quality feedback, committed their time to reading multiple revisions, and helped *MSSJ* maintain the highest standards of scholarly work. We thank these reviewers, and we are pleased to recognize them by name at the end of the volume.

We are thankful for the editorial assistance of Stephanie Seifert Stringham, our copy editor, who continues to ensure that we meet the highest technical standards prior to

publication. We are also immensely grateful to our publishing advisor, Jonathan Bull, who has facilitated our transition to an open-access journal. He has managed the smooth functioning of our online submission portal, Digital Commons (powered by BE Press), to ensure smooth author submissions and editorial and peer-review processes. With his able assistance, authors can obtain instant access to and recognition for their work upon acceptance and do not have to wait for compilation of the full issue.

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During the past year, papers from *MSSJ* have been downloaded by more than 300 institutions. This year, there were 4,300 downloads. The following are the top most-downloaded papers (in order):

1. Monteiro, Delmira, and Mixalis Poulakis. 2019. "Effects of Cisnormative Beauty Standards on Transgender Women's Perceptions and Expressions of Beauty." *Midwest Social Sciences Journal* 22(1):10. <http://scholar.valpo.edu/mssj/vol22/iss1/10>
2. Mathna, Brooke E., Jennifer J. Roberts, and Marthinus C. Koen. 2020. "A Comparison of Self-Control Measures and Drug and Alcohol Use among College Students." *Midwest Social Sciences Journal* 23(1):6. <http://scholar.valpo.edu/mssj/vol23/iss1/6>

The George C. Roberts Award for best paper published in *MSSJ* was awarded to Evelyn D. Ravuri for her paper "Gentrification and Racial Transformation in One Neighborhood in the City of Cincinnati during the Great Recession" for Vol. 23 (2020) and to Vijay Lulla and Owen Dwyer for their paper "Racial Segregation in Indianapolis, 1990–2010: A Spatial Perspective" for Vol. 22 (2019).

In this, our first year as coeditors of the journal, we have moved *MSSJ* to a fully online format to continue expanding the journal's profile and to draw from a diverse group of authors and readers in the social sciences. To this end, we will also list it in the Directory of Open Access Journals (DOAJ). In 2022, we plan to bring out a special issue titled "Health and Society," with invited papers from scholars whose research specifically addresses health in the social sciences.

Lastly, we thank Jon Kilpinen, Dean of the College of Arts and Sciences at Valparaiso University, for his support of both the IASS and our assumption of the role of coeditors of the *Midwest Social Sciences Journal*.

Nirupama Devaraj and Bharath Ganesh Babu
Coeditors
Midwest Social Sciences Journal

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Invited Scholarly Essay

Looking for Better: A History of Black Southern Migrations*

SELENA SANDERFER DOSS
Western Kentucky University

ABSTRACT

A broad overview of migrations affecting black southerners is presented, including the Atlantic slave trade, the domestic slave trade, colonization movements to Sierra Leone and Liberia, the Exoduster movement, the Great Migration, and the Return South migration. Emigrants convey their experiences and motivations through testimonies and personal accounts. Surviving the trauma of forced migrations, black southerners organized numerous migration movements both outside and within American polities in search of better opportunities. In the late 20th century, black southerners also initiated a return migration to the American South and have since achieved notable socioeconomic and political progress.

KEY WORDS Slave Trade; Migration; South

The eminent historian Carter G. Woodson, also known as the Father of Black History, called the 20th century a century of Negro migration. Witnessing the early years of the African American Great Migration, he wrote, “The migration of the Negro from the southern states to those offering them better opportunities is nothing new” (Woodson 1918:1). Woodson’s prediction could not have been more accurate, and though writing more than one hundred years ago, his analysis of black southern migration movements from the 19th to the early 20th centuries is still credible. Black Americans, particularly black southerners, have long been a nation on the move, and their history has been one of successive migrations. Since the inception of the United States, they have been “looking for better.” They sought out better housing for their families, better wages with which to support those families, better schools for their children, better land to farm, better markets from which to buy and sell, better treatment from others, and better conditions in which to live and work—in short, better opportunities for themselves and their progeny.

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The first migration that blacks undertook, however, was not of their own volition. They were forced, beginning more than 400 years ago, on the coasts of West and Central West Africa. Originally published in 1789, Olaudah Equiano's autobiography is the earliest English literary work by an African author recounting the trauma of the Middle Passage:

The first object which saluted my eyes when I arrived on the coast was the sea, and a slave ship, which was then riding at anchor, and waiting for its cargo. These filled me with astonishment, which was soon converted into terror when I was carried on board. I was immediately handled and tossed up to see if I were sound by some of the crew; and I was now persuaded that I had gotten into a world of bad spirits, and that they were going to kill me. Their complexions too differing so much from ours, their long hair, and the language they spoke, (which was very different from any I had ever heard) united to confirm me in this belief. Indeed such were the horrors of my views and fears at the moment, that, if ten thousand worlds had been my own, I would have freely parted with them all to have exchanged my condition with that of the meanest slave in my own country. (p. 71)

During the Atlantic slave trade, from 1441 to 1884, approximately 12 million Africans were forcibly transported to Europe, the Caribbean, and the Americas. Before the 19th century, this movement of African peoples constituted the largest migration of peoples to the New World. In no small part because of forced African labor, Europeans were able to establish permanent settlements in what would become the United States, Brazil, and the other countries in the Western Hemisphere.

Enslaved Africans came from the Senegambia, along the Senegal and Gambia Rivers; the Bight of Benin, near the Ivory Coast; the Bight of Biafra, in Nigeria; the Windward Coast of Liberia and Sierra Leone; and Central Africa along the Congo Basin. Even after they survived the Middle Passage, black Americans' sojourn was not yet complete. Again separated from kin and communities, hundreds of thousands of black people, in an internal domestic slave trade, would be traded from colonies in the Chesapeake to the Old Southwest states of Alabama, Georgia, and Mississippi; to the Upper South states of Tennessee and Kentucky; and to the central American west states of Louisiana, Arkansas, and Texas. "Sold down river," black southerners resurrected new lives and communities in their forced migration westward (Berlin 2010:100–102).

Charles Ball recalled the scene in Calvert County, Maryland, when his mother was sold to a Georgia trader:

My mother then turned to him and cried, "Oh, master, do not take me from my child!" Without making any reply, he

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gave her two or three heavy blows on the shoulders with his raw hide, snatched me from her arms, handed me to my master, and seizing her by one arm, dragged her back towards the place of sale. My master then quickened the pace of his horse; and as we advanced, the cries of my poor parent became more and more indistinct—at length they died away in the distance, and I never again heard the voice of my poor mother. (Ball 1837:17–18)

Charles was four years old at the time, and although history does not record the age of his mother, if statistics are correct, she was probably not over the age of 29, as enslavers looked for “young and likely Negroes” who could perform hard labor right away.

Black Americans made roads where previously there had been no paths, made homesteads where before lay only wilderness, and made lives where others had decreed desolation. One can only imagine the feelings of angst, fear, and disconsolation from leaving loved ones and home, separated, never to see each other again. In some estimates, approximately one third of enslaved persons sold “down south” in a New Orleans slave market originated from the Chesapeake (Baptist 2014:175–79).

Each person sold carried with them, always etched into their mind, the memories of that dreaded day. Francis Fedric, who was born in Virginia and sold to Kentucky, recalled “men and women down on their knees begging to be purchased to go with their wives or husbands ... children crying and imploring not to have their parents sent away from them; but all their beseeching and tears were of no avail. They were ruthlessly separated, most of them for ever” (Fedric 1863:14–15). Children torn from parents, spouses ripped away from one another; the trauma of slavery lives on in black psyches.

In spite of these hardships, black southerners would begin anew: new paths, new communities, new families and lineages. After the forced migrations of the Atlantic slave trade and the United States’ internal trade, the Thirteenth Amendment to the United States Constitution in 1865 finally granted freedom to black Americans. Since then, for more than 150 years, they have been “looking for better,” and for black southerners in particular, *better* most often meant land and the economic independence that it entailed.

In 1868, blacks in Eufaula, Alabama, petitioned the U.S. Senate to help them emigrate out of the South: “Having been set free from slavery by the blessing of Almighty God and an act of Congress, we are desirous on account of the animosity evinced towards us a people, and the injustice and oppression to which we are obliged to submit, and which wrongs are likely to continue so long as we remain here” (“Petitions from Colored People” 1868). They could not remain, but where could they go? Where could better be found?

Some looked to Africa and the countries of Sierra Leone and Liberia, which had been founded by black southerners looking for better. The first southern black emigrants had left the American colonies to become free landowners during the Revolutionary War. Many of the black southern loyalists who allied with the British had originally settled in Nova Scotia in the 1780s. In the 1790s, they relocated yet again, this time to the west coast of Africa in the colony of Sierra Leone.

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David George was an early black leader in the movement of blacks from Nova Scotia to Sierra Leone. Born a slave in Virginia in the 1740s, George lived throughout the South, being bought and sold numerous times during his 40 years as an American slave, first in Virginia, then South Carolina and eventually Georgia. George is credited with helping found the first black Baptist congregation in the United States, the Silver Bluff Baptist Church, in South Carolina in 1775 and also with establishing the First African Baptist Church in Savannah in 1783. In his memoirs, he recalled the decision of blacks in Nova Scotia to go to Sierra Leone, stating, “The greatest part of us were pleased and willing to go” (George [1793] 2002:188).

If black southerners were unwilling to go to Sierra Leone with the British, then perhaps another African destination such as Liberia would suffice. Liberia was originally a colony of the American Colonization Society before gaining independence in 1847. Supported by both enslavers and abolitionists, it sought to colonize free blacks on the west coast of Africa south of the British Sierra Leone colony. Some prominent black leaders supported emigration to Liberia, including Bishop Henry McNeal Turner, the first AME bishop elected in the South, who led the AME Church during one of the most transformative periods in its history.

Bishop Turner did not hold any qualms about speaking critically of American race relations. In 1868, before the Georgia state legislature, the men who had overseen the mass persecution of blacks since the close of the Civil War and could likely violate his safety, he boldly exclaimed,

Mr. Speaker: Before proceeding to argue this question upon its intrinsic merits, I wish the members of this House to understand the position that I take. I hold that I am a member of this body. Therefore, sir, I shall neither fawn nor cringe before any party, nor stoop to beg them for my rights. Some of my colored fellow members, in the course of their remarks, took occasion to appeal to the sympathies of members on the opposite side, and to eulogize their character for magnanimity. It reminds me very much, sir, of slaves begging under the lash. I am here to demand my rights and to hurl thunderbolts at the men who would dare to cross the threshold of my manhood. There is an old aphorism which says, “fight the devil with fire,” and if I should observe the rule in this instance, I wish gentlemen to understand that it is but fighting them with their own weapon. (Turner 1868)

For this and undoubtedly other racial transgressions, Turner later received threats from the Ku Klux Klan. Those who did not live it did not understand the sheer terror that freed people had to endure. In 1871, Turner testified to the U.S. Congress about postwar conditions in the South:

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Question. How many murders do you suppose have been committed in this State, of colored people, since the spring of 1868?

Answer. If you will allow me to go a little behind that, to say from the time reconstruction commenced.

Question. Well, do that.

Answer. We held a Southern States convention week before last in Columbia, South Carolina, at which place there were delegates from all the Southern States. We met together at the request of the committee on murders and outrages, and according to the best of our knowledge and belief it was estimated that since reconstruction between fifteen hundred and sixteen hundred had been perpetrated.

Question. In the South?

Answer. No; in the State of Georgia.

Question. How many in all the Southern States?

Answer. It was estimated that there had been not less than twenty thousand. That number is what we all agree upon when considering that question. Every delegation made an estimate of the probable amount of murders in their respective States. Of course it was only an estimate, to the best of our belief. (U.S. Congress 1872:1041–1042)

Bishop Henry McNeal Turner, born and reared in the South, understood and spoke to the distresses of poor black southerners. Three years after his testimony about the appalling treatment of blacks in the region, Exoduster Fever and the migration to the American West began.

In times past, the western frontier was where traditional social mores and established racial etiquette receded while the hard work of forging a new nation was carried out. Taking its name from the Old Testament, the Exoduster Movement saw tens of thousands of black southerners from Mississippi, Tennessee, Louisiana, and Arkansas migrate to the areas of Kansas, Indiana, Oklahoma, and other western and midwestern regions. Kansas had a unique place in black collective memory. The home of radical abolitionist John Brown and of a vigilante war in the 1850s that foreshadowed the national conflict to come, Kansas held an esteemed place in the black southern imagination. During the 1870s and 1880s, tens of thousands set out for the new state (Painter 1994).

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In the mid-1870s, under the leadership of Pap Singleton, black Tennesseans began emigrating in ever-increasing numbers. Though Singleton focused on farming, his message had an innate political overture. He stated in a newspaper, “The whites had the lands and the sense, and de blacks had nothing but their freedom.” Singleton believed that blacks “ought to be trying to get homes of their own, lands of their own, instead of depending on renting from their former masters or subsisting” (Negro Exodus Papers). For Singleton and many other black southerners, political freedom was useless without the economic autonomy to ensure it could be exercised. Though the Exoduster Movement was a massive migration out of the South, another movement, a larger movement, was still to come.

Beginning during the World War I era, the Great Migration was the largest voluntary migration by black southerners. Proceeding in waves until the 1970s, it encompassed migrations not only from south to north but also from south to west and from rural to urban. By the end of the 20th century, for the first time, more black Americans lived in cities than in the countryside. As agricultural employment was cut by more than half, in part because of mechanization, black southerners looked for better beyond southern borders and sought to leave behind the poverty, unequal education, and Jim Crow policies that had circumscribed their childhoods.

Those who were the first in their families or communities to go paved the way for others to follow. They were quickly joined by younger brothers and sisters, distant nieces and nephews, cousins, and in-laws also seeking to establish themselves. As one potential emigrant from Houston, Texas, put it, he “wanted to leave the South and Go and Place where a man will Be any thing Except A Ker.” He looked for “a Good Place for a Comporedly young man That want to Better his Standing,” a place, in his eyes, “where a man is a man” (Scott 1919:298).

Perhaps better truly was located elsewhere, so black southerners purchased tickets and followed the rail lines. A direct line was the cheapest, accordingly. For people from the Carolinas, Florida, and Georgia, the destination was often on the East Coast: New York City, Boston, Baltimore, Pittsburgh, Buffalo, or Philadelphia. For those hailing from middle Tennessee or Alabama, the train stopped in Cleveland and Detroit; it was California for Texans and Louisianans; and Chicago and Milwaukee lay ahead for those black Mississippians and Arkansians brave enough and “sick and tired enough” to make the journey.

Near the close of the 20th century, yet another migration commenced—a return migration to the South. Today, black southerners are able to be not only landowners but also entrepreneurs and leaders in the land of their forefathers. Betrayed by the promises of equal education, affordable housing, and respectability in the North, many found not legal but de facto segregation in public schools, housing in racial ghettos, and communities rife with class prejudice. Black southerners returned to the South, to the land enriched by the blood and sweat of their ancestors, the land on which their fathers and mothers had been born, had toiled, and are buried.

Black prosperity has come home to the South. More black businesses are created and operate in the South than anywhere else in the United States, and the South is home to more black politicians—mayors, city council members, police chiefs, state representatives, and school board members (Reed 1984). Despite the South’s history of

racism, or perhaps because of it, southerners both black and white acknowledge a history of racial bias and evince policies to overcome it, arguably more so than other areas of the country. Likewise, in the South, where white property-holding men have always received privilege, it is worth noting that someone who was once called boy or girl for a large portion of their life is now referred to as sir and mister or ma'am and missus by the same folks who sought to demean them before. In the 21st century, perhaps, black southerners will not need to look for better but can rest easier and be satisfied in knowing that they have finally found it.

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Research Articles

Effects of States' Laws on Youth Physical Activity Participation and Obesity Prevalence*

CHAE YOUNG CHANG
Indiana University Northwest

ABSTRACT

The alarming prevalence of obesity and lack of physical activity among adolescents led to immediate policy action to address these concerns. Accordingly, many states introduced and enacted their own legislation to encourage physical activity in schools. Few studies have explored the effectiveness of the new legislation, however, especially at the state level. To answer the fundamental question of whether policy is effective and to describe the varying effects of state obesity policies, this study analyzed the Youth Risk Behavior Surveillance System from 2007 to 2017. Using the difference-in-differences method, this study found that legislative efforts to encourage physical activity had a significant and substantial effect on enhancing physical-activity participation and reducing adolescent obesity; however, subgroup analyses revealed that the effect was concentrated on female and white adolescents only. Additionally, the subsequent sensitivity analysis revealed that since 2015, when national attention started to divert to new health concerns (opioid abuse, for example), physical activity levels pulled back to 2009 levels. Rates of obesity and overweight have been on a sharp rise again since 2015. Lawmakers should reconsider changes in the law merging physical environments with digital environments, particularly for members of Generation Alpha, who will have ever more enticements for screen time.

KEY WORDS Adolescent Obesity; Adolescent Overweight; Physical Activity; State Law

The prevalence of obesity among adolescents has risen tremendously over the past four decades, a phenomenon commonly referred to as the obesity epidemic. According to Hales

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and colleagues (2017), for 2015–2016, 20.6 percent of adolescents aged 12–19 years were obese, defined as having a body mass index (BMI) greater than or equal to the 95th percentile for their age. The potential adverse effects of obesity on obese adolescents—such as increased morbidity and mortality (Daniels 2006)—and concurrent rising health-care expenditures (Trasande and Chatterjee 2009) as well as indirect social costs—such as increased school absenteeism and poor academic performance (Datar, Sturm, and Magnabosco 2004; Story, Kaphingst, and French 2006)—make it incumbent upon health professionals, policymakers, and researchers to come up with a comprehensive plan to reduce and reverse adolescents’ excess-weight problem.

Weight gain is usually explained as an outcome of a sedentary lifestyle and physical inactivity, though the exact causal mechanisms behind physical inactivity are unclear. In fact, numerous reports present that many young adults do not engage in recommended levels of physical activity (Eaton et al. 2010; Gordon-Larsen et al. 2000; Lowry et al. 2005). As a result, the provision of more opportunities to engage in physical activity at schools as a policy instrument has received a tremendous amount of national attention, media coverage, and parental support (Story et al. 2006). Legislative efforts are no exception. Congress enacted the Child Nutrition and WIC Reauthorization Act of 2004, which encourages state and local authorities to promote physical activities and requires schools participating in the National School Lunch Program and School Breakfast Program to design and implement local wellness policies. This law change at the federal level also coincided with a plethora of state legislation aimed at increasing physical activity in schools.

A fundamental but unanswered question is whether legislative action, especially at the state level, achieves its goal in tackling the obesity epidemic. Specifically, does the enactment of state law induce more physical activity and eventually contribute to reducing obesity among adolescents? Although a few studies have analyzed the effect of state physical education (PE) requirements on physical activity among adolescents (Cawley, Meyerhoefer, and Newhouse 2007; Kim 2012), little empirical research has been done to investigate whether the enactment of new state laws increases adolescents’ participation in physical activity and, consequently, contributes to reducing the prevalence of adolescent obesity.

This study, using the Youth Risk Behavior Surveillance System (YRBSS), finds that legislative efforts on encouraging physical activity have had a significant and substantial impact on enhancing physical-activity participation and reducing adolescent obesity. Despite such efforts, however, overall physical-activity participation has decreased and the rates of obesity and overweight began to increase again in 2015, when national attention diverted to the opioid epidemic. Urgent alerts should be recalled to reduce youths’ excessive-weight problems.

LITERATURE REVIEW AND RESEARCH QUESTION

The importance of physical activity in preventing obesity has been widely acknowledged in the literature. According to Goran, Reynolds, and Lindquist (1999), physical activity can restrain the development of obesity through several potential channels: (1) physical activity

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results in increased energy expenditure, ultimately restoring energy balance; (2) physical activity develops substrate metabolism, conducive to utilizing fat relative to carbohydrates, ultimately reducing body fat; and (3) physical activity may also have other positive spillover effects on food-intake regulation.

Though the causal mechanisms through which physical activity reduces and/or prevents obesity are less clear, recent research findings provide evidence indicating the positive impact of physical activity in reducing obesity-related measures (Lowry et al. 2005; Shaya et al. 2008; Story et al. 2006). Numerous studies have shown the positive impact of comprehensive school-based intervention on physical activity. For instance, analyzing the Planet Health program, Gortmaker and colleagues (1999) found that unbalanced nutrition, physical activity, and sedentary behavior (e.g., TV watching) are associated with the reduction of obesity prevention, especially among female middle school students. Nader and colleagues (1999) reported that children exposed to the Coordinated Approach to Child Health program exhibited more healthy behaviors, such as lower intake of fat and more physical activity, compared to their counterparts. Berkey and colleagues (2003), using the longitudinal Growing Up Today Study, found that physical activity over one year was associated with a relative decrease in BMI for girls and overweight boys. A recent study also confirmed the findings of the earlier studies. Schaefer and colleagues (2015), analyzing a community-based intervention program called Niños Sanos, Familia Sana (Healthy Children, Healthy Family), found that daily moderate to vigorous physical activity was associated with having a healthy BMI, particularly among girls.

A number of researchers have examined the effectiveness of specific interventions designed to increase physical activity within randomized experimental settings. For example, in a randomized experiment, Carrel and colleagues (2005) demonstrated that obese middle school children who participated in a school-based fitness program showed greater improvement in fitness, fatness, and insulin sensitivity compared to their counterparts who were enrolled in a standard gym class. Similarly, Jamner and colleagues (2004) reported significant improvement in cardiovascular fitness, lifestyle activity, and physical activity of female high school students who took special PE classes, although BMI, BMI percentiles, and psychosocial variables (e.g., self-efficacy, enjoyment, family support) did not change. In their meta-analysis of 52 studies published between 2000 and 2011, Vasques and colleagues (2014) found that intervention programs had a positive effect in enhancing physical activity and reducing obesity, particularly when combined with nutrition education in the school setting, when parents controlled leisure-time practice and food choice, and when the programs lasted for more than one year.

Reports have offered evidence that, despite the benefits of physical activity, many young adults do not engage in recommended levels of physical activity (at least 60 minutes of moderate to vigorous physical activity per day, according to the 2008 physical activity guidelines from the U.S. Department of Health and Human Services (USHHS)) and that participation in physical activities has decreased significantly over the past few decades. Gordon-Larsen, McMurry, and Popkin (2000), using data from the National Longitudinal Study of Adolescent Health, reported that only 21.3 percent of adolescents engaged in a weekly PE class. Lowry et al. (2005) reported that the percentage of high school students

attending PE class daily decreased significantly, from 41.6 percent in 1991 to 28.4 percent in 2003, and that only around 40 percent of high school students enrolled in PE class were actually engaged in moderate or vigorous physical activity on at least 3 days per week. Likewise, Li, Treuth, and Wang (2010) reported that only 34.7 percent of youth (25.6 percent of female adolescents) engaged in the recommended level of physical activity and only 30.3 percent of adolescents attended PE class daily in 2007. Turner and colleagues (2015) reported that 48 percent of high school girls did not participate in the five most common female high school sports and 29 percent of high school boys did not participate in the five most common male high school sports. Strikingly, one out of four high school students did not participate in at least 60 minutes of any kind of physical activity per week (Eaton et al. 2010; Li et al. 2010).

The reasons for lower physical activity levels among adolescents are not clear. Indeed, the factors contributing to low levels of physical activity are diverse. Marshall and colleagues (2004) suggested that sedentary behaviors, including screen time (particularly video games), crowd out physical activity time, though by a small amount. Robinson and colleagues (2017) suggested that digital media exposure not only displaces physical activity but also influences children's eating preferences and habits through advertisement, increases eating while viewing, and reduces sleep duration, which together result in obesity. Besides individual choice, environmental barriers may also be critical factors contributing to the decline in physical activity. For instance, Li et al. (2010) suggested that having fewer material resources and human resources, as well as less program support, may hamper adolescents' activity levels, especially within poor school districts. Story et al. (2006) brought up another important environmental barrier from the era of academic accountability, arguing that the No Child Left Behind Act of 2001, underscoring students' academic achievement as measured by standardized test scores in core subjects, was a major hurdle for the provision of PE in schools because PE was rendered of lower priority than students' academic performance.

The prevalence of obesity—and weight problems generally—and low levels of physical activity among adolescents calls for immediate policy action to address these concerns, especially in schools. Although students may frequently engage in after-school activities, schools are critical settings for policy intervention because school curricula have the potential to influence habitual physical activity and schools may also provide diverse tools to encourage physically active lifestyles, such as walking to school (Li et al. 2010; Lowry et al. 2005; Story et al. 2006; Taber, Chriqui, and Chaloupka 2012).

Legislative efforts are no exception. The Child Nutrition and WIC Reauthorization Act of 2004 encourages state and local authorities to promote physical activity and requires schools participating in the National School Lunch Program and School Breakfast Program to design and implement local wellness policies, including policies to improve levels of physical activity in schools.

States—which hold much of the authority over public health through legislative and regulatory power—also introduced and enacted their own legislation with regard to increasing physical activity in schools. It is, however, not surprising that the adoption and content of laws vary across states, considering that the enactment of a bill is significantly affected by the bill's specific characteristics as well as by a given state's contextual

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influences (Boehmer et al. 2009). For instance, bills mandating physical education and physical activity are less likely to be enacted than are bills with optional physical activity (Boehmer et al. 2009). Furthermore, a variety of policy endogeneity (e.g., public concern about the obesity rate) may influence the adoption of new interventionist policies (Cawley et al. 2007).

States' policy intervention through legislation raises a fundamental question about policy effectiveness and avenues for further improvements in policy through rigorous ex-post evaluation. Numerous previous evaluations have investigated the impact of school-based policy interventions within experimental settings. Though findings are heterogeneous, one general finding is that youth exposed to comprehensive intervention over a longer period show less frequent incidence and remission of overweight compared to their counterparts experiencing little or no intervention (Brown and Summerbell 2009; Cook-Cottone, Casey, and Feeley 2009; Khambalia et al. 2012). A well-designed experiment will be a useful tool for exploring the effectiveness of policy intervention, as such an experiment can manipulate and track the dose of intervention. To evaluate statewide policy interventions to reverse the obesity problem, however, one needs to investigate whether the policy tools bring about the policy's desired outcome. In other words, it is necessary to examine whether state legislation has induced a substantial increase in the level of physical activity to tackle the obesity problem among adolescents.

A handful of empirical studies examine the effect of state policy intervention on physical activity, albeit with inconsistent findings. Using national YRBSS data for 1999–2003 and PE credit requirements for 2001, Cawley et al. (2007) found that cross-state variation in PE credit requirements resulted in different amounts of time spent in physical activity among girls, although Kim (2012) observed that PE requirements stipulated by state law were not associated with either an increase in vigorous physical activity time among high school students or a decrease in weight outcome. In the same study, however, Kim (2012) found that PE requirements in schools were significantly correlated with physical activity time—though not BMI—among girls. This discrepancy in findings between the two studies may be due to the fact that each study adopted cross-sectional analyses investigating the impact of PE requirements pertaining to different time periods. Furthermore, both focused on the cross-sectional between-state variation, not reflecting longitudinal within-state variation.

To address the fundamental issue of policy effectiveness and to describe the varying effects of state obesity policies, this study, adopting difference-in-differences (DID) methods, examines whether the enactment of new state laws increases physical activity and decreases the risk of obesity or weight problems among adolescents.

DATA

This study uses data pooled from two sources: (1) state YRBSS for 2007–2017, containing information about high school adolescents' heights, weights, and other attitudinal-behavioral variables indicating levels of physical activity, and (2) the Centers for Disease Control and Prevention (CDC) Chronic Disease State Policy Tracking System.

The state YRBSS is a biennial school-based survey conducted by a state's health or education department. The questions are similar to those of the national YRBSS survey, except for minor modifications or omissions in the number of questions across states and years. The survey monitors the prevalence of risky youth behaviors, including those relating to obesity and physical activity. Several critical questions related to adolescents' physical activity ask about the number of days that adolescents are physically active (at least 60 minutes per day), the number of days they have PE classes, and the number of sports teams on which they played, for example. This study uses the number of days on which adolescents were physically active for at least 60 minutes per day, which meets the USHHS (2008) guidelines. (All data are available at <https://www.cdc.gov/healthyyouth/data/yrbs/data.htm>.)

Data about the introduction of new state laws were pooled from the CDC's Chronic Disease State Policy Tracking System. This study collected all state bills about physical activity that were enacted (excluding those dead or only introduced) between the years 2001 and 2017 and eliminated duplicate bills. During this period, a total of 1,890 laws about physical activity in the school setting were introduced; 729 were enacted (38.6 percent). Policy topics in each enacted law were diverse and included access to recreational opportunities, appropriations, built environment, bicycling, walking, safe route to school, school siting, physical education/activity requirements, public safety, initiatives and programs, parks and trails, and more.

Next, this study looked closely at the clauses of each law and selected 347 laws enacted for (1) specific physical education or physical activity requirements, including length or duration, and (2) subsequent appropriations. For instance, these laws stipulated provisions to

1. establish a task force or advisory committee to examine barriers facing schools in providing physical activity and make recommendations for overcoming those obstacles (IL SJR80);
2. regulate mandated physical education for graduation and retract PE exemptions (FL S610, ME H983, NM R5102, etc.);
3. provide students with healthy-weight pilot programs (GA H229, RI R3669) or substitutes such as interscholastic sports, JROTC, marching bands, and the like (MS R12463);
4. provide resources for physical activity instruction and assessment for health and PE teachers (CA S1016, PA H101, TX S226, etc.);
5. encourage school districts to share school facilities with local communities (NY S587); and
6. encourage stakeholders to create a strategic plan aimed at achieving and maintaining a healthy weight in children for their future (GA H229).

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This study then carefully identified states that had enacted laws regarding both physical activity requirements and appropriations in 2011. For example, in 2009, the state of Indiana enacted a law (R9382) requiring PE for students to receive diplomas but did not pass any appropriation laws implementing PE requirements. The state of Indiana therefore did not meet the selection criteria. Table 1 presents a brief summary of the enactment of state laws requiring physical activity and the appropriation of funds for physical activity. As can be seen in the table, 25 states met the selection criteria, and the majority of state legislation enacted was concentrated around the year 2011, which allows this study to utilize a DID method, or controlled before-and-after study.

Table 1. Summary of State Laws Regarding Physical Activity

State	Law Citation	Effective Year	Title
Alabama	H123	2011	Public Education and State Appropriation
Arkansas	S581	2011	Appropriation to the Department of Human Services
	H1743	2011	Health and Safety of Students in Public School
Arizona	SB1186	2011	Children's Physical Activity Grant (Appropriations and Physical Activity Requirement)
California	S70	2011	Education Finance: Budget Act of 2011
	S1016	2011	Education Finance
Delaware	S310	2010	State Appropriations
	R2740	2011	Junior High and Middle School Interscholastic Athletics
Florida	H7207	2011	Growth Management (Appropriations)
	S610	2008	Physical Education
Georgia	H229	2009	Student Health and Physical Education Act
	H77	2011	Supplemental Appropriations
Illinois	H684	2010	School Code (Appropriation)
	SJR80	2010	Daily Recess in Schools (Physical Activity Requirement)

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Table 1. Summary of State Laws Regarding Physical Activity, cont.

State	Law Citation	Effective Year	Title
Maine	H983	2009	Physical Education in Schools (Appropriations and Physical Education Requirement)
Missouri	H4	2009	Education Reform
	H2004	2010	Department of Revenue Appropriation
Mississippi	R12463	2010	Physical Education and Comprehensive Health Education
	H1078	2010	Healthier School Initiative
North Carolina	H2437	2007	Appropriation Act
	H901	2010	Health and Physical Education Classes
Nebraska	R1685	2009	Bonds (Appropriation)
	R1610	2009	School Accreditation
New Mexico	R5102	2009	Curriculum and Standards
	R5499	2010	Application/Grant Assistance Procedures
Nevada	SCR12	2009	Physical Fitness
	S92	2011	Redevelopment Agencies (Appropriations)
New York	R21731	2010	Qualified School Construction Bonds
	S587	2010	Chancellor of City School District (Physical Activity Requirement)
Ohio	H119	2007	Appropriations for Operation of State Programs
	S210	2010	School Nutrition and Health
Oklahoma	S1169	2010	Schools (Appropriations)
	S1876	2010	Schools Physical Education

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Table 1. Summary of State Laws Regarding Physical Activity, concl.

State	Law Citation	Effective Year	Title
Pennsylvania	H101	2010	Value Added Assessments and Dropout Prevention
	H1485	2011	Payment of Bills from the General Fund (Appropriations)
Rhode Island	R3669	2009	School Health Programs
	H5960	2011	Exeter and West Greenwich Regional School District (Appropriations)
South Carolina	SJR228	2005	Physical Education and Nutritional Standards
Texas	S226	2011	Student Physical Fitness Performance Reporting
	HR2723	2011	Conference Committee Jurisdiction (Appropriations)
Vermont	R1224	2009	Special Education Rules
	H446	2011	Capital Construction Appropriations
Washington	S5551	2009	School
	HB1115	2015	An act relating to the capital budget (Appropriations)
West Virginia	H2816	2005	Healthy Lifestyles

Source: CDC Chronic Disease State Policy Tracking System.

After compiling the data, this study identified 552,267 samples collected from 2007 to 2017 for 38 states as analytical samples. Not all states collected YRBSS data, and not all variables are available for every year. Table 2 indicates which states had YRBSS data available and which did not; Table 3 displays the description of the analytical samples; and Figure 1 illustrates the trend of physical activity, obesity rate, and overweight rates for adolescents.

Table 2. Treatment States vs. Comparison States

	Treatment-Group States (<i>n</i> = 15)	Comparison-Group States (<i>n</i> = 20)	Excluded States ^a (<i>n</i> = 3)
YRBSS data available (<i>n</i> = 38)	AL, AR, AZ, CA, DE, FL, IL, ME, MO, MS, NC, NY, NV, OK, RI	AK, CO, HI, IA, ID, KS, KY, LA, MI, MT, ND, NH, NJ, PA, SD, TN, UT, VA, WI, WY	NE, SC, WV
YRBSS data unavailable (<i>n</i> = 12)	CT, GA, IN, MD, MA, MN, NM, OH, OR, TX, VT, WA		

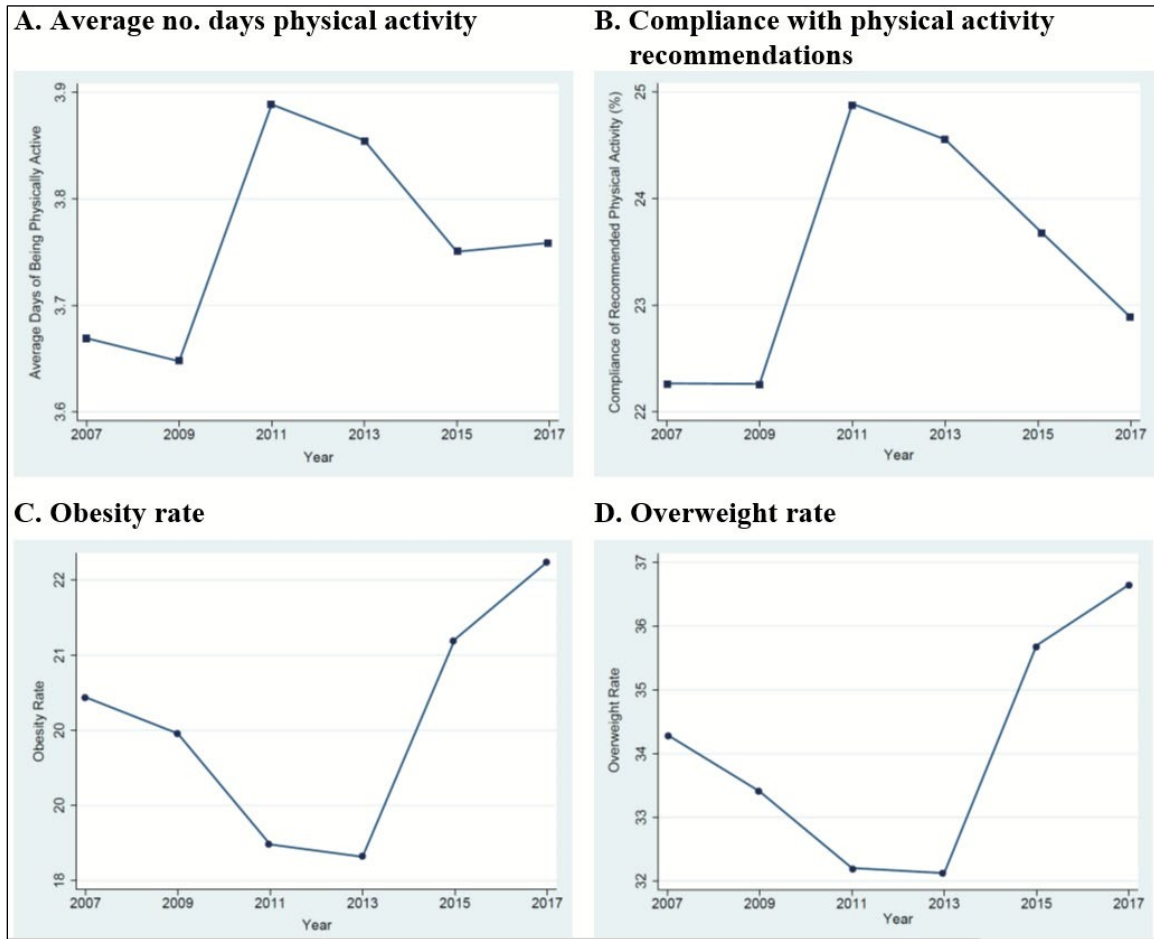
^a Excluded from empirical analysis because of ineligibility.

Table 3. Sample Description

	Treatment Group	Comparison Group
Average Physical Activity (No. of days physically active per week)	3.64	3.89
Required Physical Activity Compliance (≥1 hour of daily physical activity)	22.55%	24.21%
Obese (BMI ≥95th percentile)	22.50%	17.60%
Overweight (BMI ≥85th percentile)	36.43%	31.49%
Gender		
Male	48.72%	49.29%
Female	51.28%	50.71%
Grade		
9	28.04%	28.26%
10	27.26%	26.73%
11	24.58%	24.18%
12	20.12%	20.29%
Race		
White	46.63%	64.57%
Black	18.10%	7.70%
Hispanic	23.55%	11.34%
Other	11.73%	16.39%
Number of Observations	291,370	260,897

Source: Youth Risk Behavior Surveillance System (2007–2017).

Figure 1. Overall Adolescent Physical Activity, Obesity, and Overweight Rates, 2007–2017



METHODOLOGY

To examine the impact of states’ enactment of laws regarding physical activity and funding on the physical-activity participation and obesity/overweight rates of adolescents, this study employs DID methods, which are useful for analyzing the effects of policies in nonexperimental settings (Wooldridge 2015). The basic idea of the DID method is to examine the effect of an exogenous shock by comparing a treatment group with a comparison (control) group both before and after treatment, under the assumption that the difference between the treatment and control groups would remain the same over time in the absence of the treatment.

This study treats the enactment of state laws as an exogenous shock. For example, the state of Illinois enacted new state laws (SJR80 and H684) in 2010 that mandated physical education, created a Recess in Schools Task Force to examine barriers facing schools in providing daily recess and to design programs providing the opportunity for

youths to get physical exercise during the school day, and appropriated funds to support the programs. Naively, the effect of the new law on adolescents' physical activity can be examined by comparing the average number of days that the adolescents were physically active before and after the enactment of the new law, but environmental changes other than the law change may also affect adolescents' physical activity over that time. By using the comparison group, the DID method removes the effect of other environmental changes, assuming that such changes affect physical activity identically in both the treatment and comparison groups.

To address the research questions, the following DID regression model was constructed.

$$y_{it} = \beta_0 + \delta_1 D_i + \delta_2 T_t + \delta_3 D_i T_t + \mathbf{X}\boldsymbol{\beta} + u_{it}$$

In the equation, for adolescent i at year t , y_{it} is the outcome variable of interest, such as number of days of physical activity per week, compliance with USHHS recommendations, probability of being obese, and probability of being overweight, respectively. D_i is the dummy variable indicating states with new laws (1) or without new laws (0), and T_t is the dummy variable indicating the year (1 = 2011 or later, after enactment of new laws; 0 = 2009 or earlier, before enactment of new laws). Thus, δ_1 captures the baseline year difference between states with new laws and states without, and δ_2 captures the difference for before and after the laws' enactment. The key variable of interest is $D_i T_t$, an interaction term between the state dummy and the year dummy. The DID estimator, δ_3 , indicates the average treatment effect driven by the enactment of physical-activity laws:

$$\delta_3 = (\bar{y}_{trt,2011} - \bar{y}_{trt,2009}) - (\bar{y}_{cp,2011} - \bar{y}_{cp,2009})$$

\mathbf{X} is a vector of control variables that include gender, grade, race, and state of residence.

For the analysis, this study recoded states with the enactment of new state laws as a treatment dummy (1) and the year 2011, when the majority of new laws were enacted, as a time dummy (1). As seen in Table 2, of 38 states for which YBRSS data were available, 15 states were assigned to the treatment group and 20 states to the comparison group. The treatment-group states had enacted laws in 2011, whereas the comparison-group states had no enacted laws. Nebraska (NE), South Carolina (SC), and West Virginia (WV) were excluded because new laws in these states were enacted in or before 2009.

EMPIRICAL RESULTS

This section presents the longitudinal trend of physical activity, obesity, and overweight rates of adolescents visually. Figure 1A shows that the average number of days that adolescents were physically active rose from 3.65 in 2009 to 3.90 in 2011 but decreased thereafter. The percentage of youth reporting at least 60 minutes of vigorous or moderate

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physical activity daily also increased, from 22.2 percent in 2009 to 24.9 percent in 2011, and then decreased thereafter, as shown in Figure 1B. The results shown in Figure 1 also suggest that adolescents' physical activity levels and rates of obesity and overweight are negatively associated with each other. As physical activity levels increased, obesity and overweight rates decreased, and vice versa.

Figure 2 demonstrates the trends of physical activity and obesity and overweight rates for the treatment and comparison groups. Overall, the comparison group had higher physical activity and lower obesity and overweight rates, whereas the treatment group had lower physical activity and higher obesity and overweight rates. In treatment states, average number of days of physical activity was highest in 2011, as was the percentage of adolescents having at least 60 minutes of daily physical activity. The obesity and overweight rates for the treatment states were lowest in 2011, the year when new laws regarding physical activity requirements and subsequent fund allocation were enacted and went into effect. Interestingly, after 2011, physical activity decreased and obesity and overweight rates rebounded in these states. In the comparison states, average number of days of physical activity and compliance with daily physical activity recommendations was also highest in 2011, while obesity and overweight rates were still on the rise. These charts suggest that states with higher youth obesity and overweight rates passed new laws requiring physical activity and allocating funds for encouraging physical activity and that, consequently, youth physical activity levels in those states increased while obesity and overweight rates decreased. To verify this speculation, this study conducted statistical analyses using the model specified in the previous section.

Tables 4–7 present the estimated impact of states' enactment of new laws encouraging physical activity on the average number of days of physical activity, compliance with recommended physical activity, obesity rate, and overweight rate, respectively, after controlling for adolescents' gender, grade, race, and state of residency. The estimated coefficient of the treatment-state dummy captures the baseline-year (2009) difference between the treatment and comparison states. The estimated coefficient of the treatment-year dummy captures the year trend of physical activity. The estimated coefficient of the interaction term (State*Year) indicates the impact of states' enactment of physical-activity requirements and appropriations on the various dependent variables, assuming that the baseline difference between the treatment and comparison states would be the same if there had been no law change. The estimated coefficient of the interaction term is of interest in this study.

As shown in Table 4, states' enactment of these laws had a positive effect on adolescents' physical activity. In 2009, youth in the treatment states had 0.233 fewer days of physical activity than did youth in the comparison states. With other conditions remaining the same, youth in 2011 had 0.165 more days of physical activity compared to youth in 2009. Youth in the treatment states in 2011, however, had 0.079 more days of physical activity than youth in the comparison states in the same year; 0.079 ($p < .001$) more days can be interpreted as the effect of the new state law. The subsequent subgroup analysis, however, identifies that the effect was concentrated only on female and white adolescents. Female adolescents in the treatment states in 2011 had 0.129 ($p < .001$) more days of physical activity compared to their female counterparts in the comparison states.

White adolescents in the treatment states had 0.135 ($p < .001$) more days of physical activity in 2011 than did white adolescents in the comparison states. The effect of state laws on the average amount of physical activity per week was not statistically significant among male adolescents or among other racial groups.

Figure 2. Adolescent Physical Activity, Obesity, and Overweight Rates for Treatment vs. Comparison States, 2007–2017

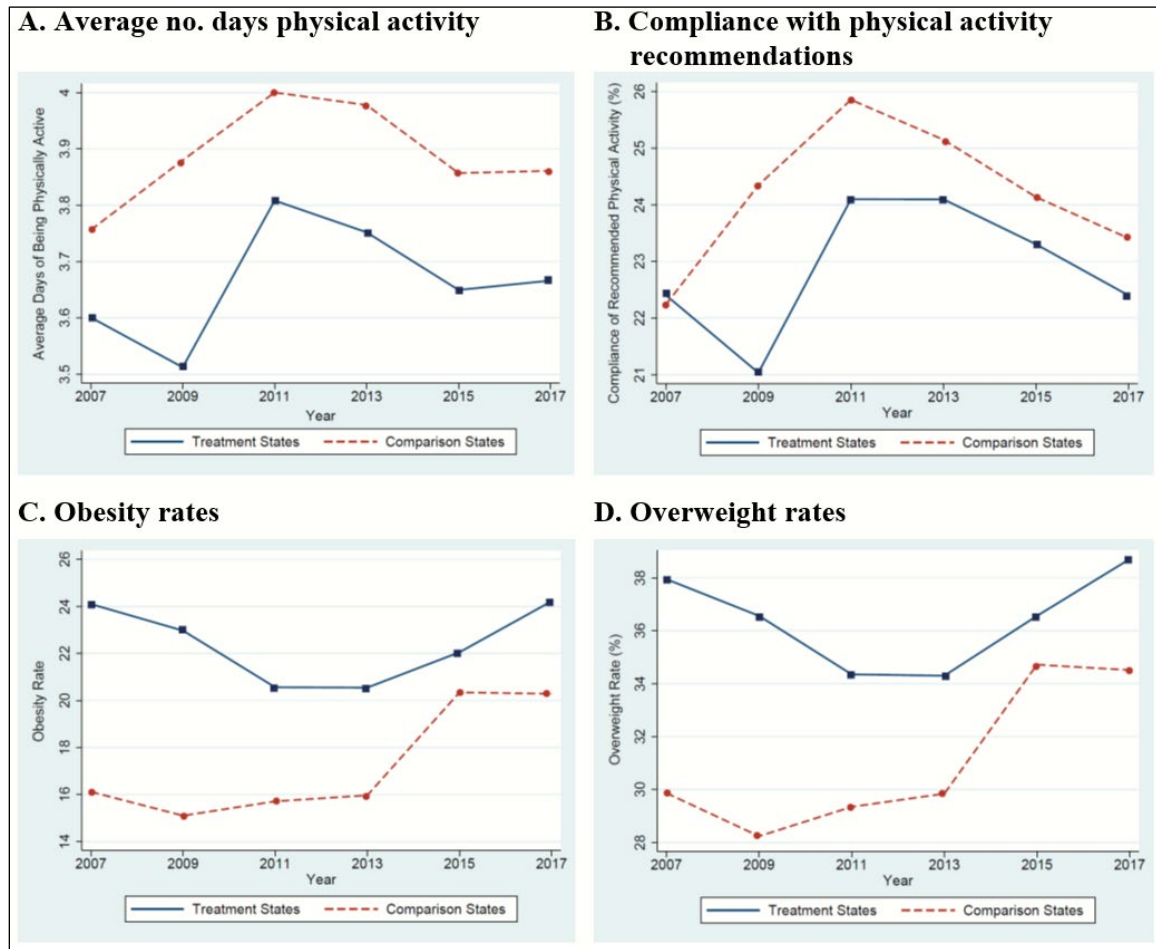


Table 5 displays the effect of the laws on adolescents having at least 60 minutes of daily physical activity. Because the dependent variable was a binary indicator of whether adolescents had a recommended level of physical activity, logistic regression controlling for gender, grade, race, and state of residence was employed. Youth in the treatment states in 2011 were 5.3 percent ($p < .05$) more likely to have at least 60 minutes of physical activity every day than were youth in the comparison states. The effect was concentrated only on female and white adolescents, however. Female adolescents in the treatment states in 2011 were 7.7 percent ($p < .05$) more likely to have at least 60 minutes of physical

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activity daily than were female adolescents in the comparison states. White adolescents in the treatment states were 14.8 percent ($p < .001$) more likely to engage in at least 60 minutes of physical activity daily than were their white counterparts in the comparison states. State laws had no statistically significant effect in enhancing physical activity to the recommended level among male adolescents or among other racial groups.

Table 4. DID Model Estimates for Average Number of Days of Physical Activity

	All	Gender		Race			
		Male	Female	White	Black	Hispanic	Other
Treatment-state dummy	-0.233*** (0.019)	-0.262*** (0.028)	-0.204*** (0.026)	-0.271*** (0.024)	-0.059 (0.065)	-0.326*** (0.055)	-0.097 (0.055)
Treatment-year dummy	0.165*** (0.020)	0.191*** (0.028)	0.143*** (0.027)	0.148*** (0.023)	0.256*** (0.077)	0.200** (0.061)	0.185*** (0.051)
State*Year interaction	0.079** (0.026)	0.019 (0.039)	0.129*** (0.036)	0.135*** (0.034)	-0.057 (0.089)	0.013 (0.073)	0.006 (0.075)
Male	0.910*** (0.013)			0.874*** (0.017)	1.071*** (0.039)	0.862*** (0.033)	0.977*** (0.036)
10th grade	-0.206*** (0.018)	-0.156*** (0.026)	-0.252*** (0.024)	-0.275*** (0.023)	-0.159** (0.053)	-0.076 (0.044)	-0.136** (0.049)
11th grade	-0.371*** (0.018)	-0.246*** (0.027)	-0.485*** (0.025)	-0.484*** (0.023)	-0.200*** (0.052)	-0.141** (0.046)	-0.343*** (0.050)
12th grade	-0.485*** (0.019)	-0.343*** (0.028)	-0.616*** (0.026)	-0.594*** (0.025)	-0.310*** (0.056)	-0.205*** (0.048)	-0.525*** (0.052)
White	0.585*** (0.019)	0.572*** (0.028)	0.598*** (0.025)				
Black	-0.069** (0.025)	0.038 (0.038)	-0.159*** (0.034)				
Other race	0.110*** (0.025)	0.151*** (0.037)	0.072* (0.034)				
Constant	3.269*** (0.025)	4.111*** (0.036)	3.328*** (0.033)	3.957*** (0.023)	2.905*** (0.068)	3.217*** (0.055)	3.271*** (0.052)
Number of observations	138,377	66,286	72,091	79,898	17,809	22,222	18,448
Adjusted R^2	0.056	0.018	0.030	0.044	0.046	0.036	0.045

Notes: Robust standard error in parentheses. Residency state is also controlled.

* $p < .05$ ** $p < .01$ *** $p < .001$

To answer the question of whether state laws achieved their intended goal of reducing rates of obesity and overweight among adolescents, the same model was run with dummy variables indicating being obese and being overweight as dependent variables. Table 6 presents the effect of the laws on obesity. In 2009, before the laws had been introduced, adolescents in the treatment states were 54.5 percent more likely to be obese than were adolescents in the comparison states; the obesity rate in the treatment states was 23.12 percent, compared to 15.10 percent in the comparison states. In both groups, adolescents in 2011 were 3.7 percent more likely to be obese than were adolescents in 2009; however, the coefficient of the interaction term indicates that in 2011, adolescents in treatment states were 19.4 percent ($p < .001$) less likely to be obese than were their counterparts in comparison states. Subgroup analyses reveal that both

male and female groups enjoyed the effect of the reduction in obesity rates. Additionally, all racial groups except “other races” in the treatment states benefited when compared to their counterparts in comparison states. For example, in 2011, white adolescents in the treatment states were 20.3 percent ($p < .001$) less likely to be obese than were white adolescents in the comparison states. Black adolescents in the treatment states were 25.1 percent ($p < .001$) less likely to be obese than were black adolescents in the comparison states.

Table 5. DID Model Estimates for Compliance with Recommended Physical Activity (Logistic Regression)

	All		Gender			
	β (SE β)	OR	Male		Female	
			β (SE β)	OR	β (SE β)	OR
Treatment-state dummy	-0.141*** (0.019)	0.869	-0.147*** (0.024)	0.863	-0.132*** (0.030)	0.877
Treatment-year dummy	0.107*** (0.019)	1.113	0.114*** (0.025)	1.121	0.098*** (0.030)	1.104
State*Year interaction	0.052* (0.026)	1.053	0.036 (0.034)	1.036	0.074* (0.037)	1.077
Constant	-1.652*** (0.025)		-0.828*** (0.031)		-1.576*** (0.037)	
Wald χ^2	5335.50		535.16***		468.68***	
Pseudo R^2	0.037		0.007		0.008	

	Race							
	White		Black		Hispanic		Other Race	
	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR
Treatment-state dummy	-0.177*** (0.024)	0.838	-0.093 (0.062)	0.911	-0.173** (0.055)	0.841	-0.001 (0.056)	1.001
Treatment-year dummy	0.085*** (0.023)	1.088	0.127* (0.072)	1.136	0.168** (0.060)	1.182	0.170*** (0.052)	1.185
State*Year interaction	0.138*** (0.033)	1.148	-0.060 (0.084)	0.941	-0.074 (0.073)	0.928	-0.065 (0.075)	0.936
Constant	-1.341*** (0.023)		-1.583*** (0.065)		-1.637*** (0.057)		-1.683*** (0.054)	
Wald χ^2	3336.54***		528.11***		626.14***		628.58***	
Pseudo R^2	0.038		0.030		0.029		0.033	

Note: Control variables include gender (male), grade, race, and state of residence.

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 6. DID Model Estimates for Obesity (Logistic Regression)

	All		Gender					
	β (SE β)	OR	Male		Female			
			β (SE β)	OR	β (SE β)	OR		
Treatment-state dummy	0.289*** (0.015)	1.336	0.286*** (0.022)	1.331	0.292*** (0.022)	1.339		
Treatment-year dummy	0.048** (0.016)	1.049	0.052* (0.023)	1.053	0.042* (0.024)	1.043		
State*Year interaction	-0.158*** (0.021)	0.854	-0.179*** (0.030)	0.836	-0.134*** (0.031)	0.875		
Constant	-0.727*** (0.020)		-0.471*** (0.027)		-0.718*** (0.027)			
Wald χ^2	3293.94		795.40***		2200.82***			
Pseudo R^2	0.015		0.007		0.021			

	Race							
	White		Black		Hispanic		Other Race	
	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR
Treatment-state dummy	0.363*** (0.020)	1.437	0.200*** (0.044)	1.222	0.249*** (0.041)	1.283	0.127** (0.044)	1.135
Treatment-year dummy	0.004 (0.021)	1.004	0.174** (0.047)	1.190	0.113* (0.047)	1.119	0.067 (0.042)	1.069
State*Year interaction	-0.137*** (0.029)	0.871	-0.290*** (0.055)	0.749	-0.178** (0.055)	0.837	-0.139* (0.060)	0.871
Constant	-1.219*** (0.021)		-0.706*** (0.042)		-1.637*** (0.057)		-0.911*** (0.042)	
Wald χ^2	1215.78***		76.47***		148.01***		132.90***	
Pseudo R^2	0.011		0.002		0.004		0.005	

Note: Control variables include gender (male), grade, race, and state of residence.

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 7 displays the effect of the state laws on rates of overweight. The result is similar to the rates of obesity. In 2009, youth in the treatment states were 33.6 percent ($p < .001$) more likely to be overweight than were youth in the comparison states. In 2011, youth were 4.9 percent ($p < .01$) more likely to be overweight than were all youth in 2009 overall, but youth in the treatment states were 14.6 percent ($p < .001$) less likely to be overweight than were youth in the comparison states. All subgroups in the treatment states saw reduction in excessive weight-gain problems because of the laws requiring physical activity.

Table 7. DID Model Estimates for Overweight (Logistic Regression)

	All		Gender			
	β (SE β)	OR	Male		Female	
			β (SE β)	OR	β (SE β)	OR
Treatment-state dummy	0.289*** (0.015)	1.336	0.286*** (0.022)	1.331	0.292*** (0.022)	1.339
Treatment-year dummy	0.048** (0.016)	1.049	0.052* (0.023)	1.053	0.042* (0.024)	1.043
State*Year interaction	-0.158*** (0.021)	0.854	-0.179*** (0.030)	0.836	-0.134*** (0.031)	0.875
Constant	-0.727*** (0.020)		-0.471*** (0.027)		-0.718*** (0.027)	
Wald χ^2	3293.94		795.40***		2200.82***	
Pseudo R^2	0.015		0.007		0.021	

	Race							
	White		Black		Hispanic		Other Race	
	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR	β (SE β)	OR
Treatment-state dummy	0.363*** (0.020)	1.437	0.200*** (0.044)	1.222	0.249*** (0.041)	1.283	0.127** (0.044)	1.135
Treatment-year dummy	0.004 (0.021)	1.004	0.174** (0.047)	1.190	0.113* (0.047)	1.119	0.067 (0.042)	1.069
State*Year interaction	-0.137*** (0.029)	0.871	-0.290*** (0.055)	0.749	-0.178** (0.055)	0.837	-0.139* (0.060)	0.871
Constant	-1.219*** (0.021)		-0.706*** (0.042)		-1.637*** (0.057)		-0.911*** (0.042)	
Wald χ^2	1215.78***		76.47***		148.01***		132.90***	
Pseudo R^2	0.011		0.002		0.004		0.005	

Note: Control variables include gender (male), grade, race, and state of residence.

* $p < .05$ ** $p < .01$ *** $p < .001$

This study also investigated whether the state laws had continuously enhanced physical activity levels and reduced obesity and overweight rates among adolescents even after 2011. To answer this question, additional analyses were run using data from 2013, 2015, and 2017. Results are presented in Tables 8 and 9. Note that the coefficients of the treatment-state dummy should be the same because they indicate the difference between the treatment and comparison states in the base year, 2009. As seen in Table 8, the average number of days of physical activity among adolescents in the comparison states increased by 0.165 ($p < .001$) in 2011 and by 0.098 ($p < .001$) in 2013, then dropped back to the level of 2009. Youth in the treatment states were increasingly more engaged in physical activity than were youth in the comparison states, however, with 0.102 ($p < .001$) more days of physical activity in 2013, 0.139 ($p < .001$) more in 2015, and 0.156 ($p < .001$) more in 2017.

Table 8. DID Model Estimates for Average Days of Physical Activity over Time

	Year			
	2011	2013	2015	2017
Treatment-state dummy	-0.233*** (0.019)	-0.233*** (0.019)	-0.233*** (0.019)	-0.233*** (0.019)
Treatment-year dummy	0.165*** (0.020)	0.098*** (0.019)	-0.023 (0.018)	-0.019 (0.018)
State*Year interaction	0.079** (0.026)	0.102*** (0.026)	0.139*** (0.025)	0.156*** (0.025)
Constant	3.269*** (0.025)	3.473*** (0.065)	3.496*** (0.065)	3.410*** (0.068)
Number of observations	138,377	151,209	168,883	160,334
Adjusted R^2	0.056	0.059	0.056	0.056

Notes: Base year: 2009. Control variables include gender (male), grade, race, and state of residence.

* $p < .05$ ** $p < .01$ *** $p < .001$

Youth in the treatment states were also 10.4 percent ($p < .001$), 14.3 percent ($p < .001$), and 12.2 percent ($p < .001$) more likely in 2013, 2015, and 2017, respectively, to have 60 minutes of daily physical activity than were youth in the comparison states, as seen in Table 9. Table 9 also shows that state laws encouraging physical activity contributed to restrain the resurging rate of obesity in adolescents. Surprisingly, the obesity rate among youth in the comparison states rose continuously. For example, youth in the comparison states were 44.0 percent ($p < .001$) and 37.2 percent ($p < .001$) more likely in 2015 and 2017, respectively, to be obese than were youth in the same states in 2009. Without the new laws, youth in the treatment states would have experienced more excessive weight-gain problems, but the laws significantly and substantially reduced the obesity rate for these youth. Youth in the treatment states were 19.4 percent ($p < .001$), 34.6 percent ($p < .001$), and 24.5 percent ($p < .001$) less likely in 2013, 2015, and 2017, respectively, to be obese than were their counterparts in the comparison states.

Table 9. DID Model Estimates for Compliance with Recommended Physical Activity and Obesity Rates over Time

	Compliance with Physical-Activity Recommendations				Obesity Rates			
	2011	2013	2015	2017	2011	2013	2015	2017
Treatment-state dummy	-0.141*** (0.019) OR: 0.869	-0.141*** (0.019) OR: 0.869	-0.141*** (0.019) OR: 0.869	-0.141*** (0.019) OR: 0.869	0.435*** (0.019) OR: 1.545	0.435*** (0.019) OR: 1.545	0.435*** (0.019) OR: 1.545	0.435*** (0.019) OR: 1.545
Treatment-year dummy	0.107*** (0.019) OR: 1.113	0.056** (0.018) OR: 1.058	-0.005 (0.018) OR: 0.996	-0.032 (0.018) OR: 0.969	0.037* (0.021) OR: 1.037	0.046* (0.020) OR: 1.047	0.336*** (0.019) OR: 1.440	0.317*** (0.193) OR: 1.372
State*Year interaction	0.052* (0.026) OR: 1.053	0.098*** (0.025) OR: 1.104	0.133*** (0.024) OR: 1.143	0.116*** (0.016) OR: 1.122	-0.204*** (0.026) OR: 0.816	-0.215*** (0.261) OR: 0.806	-0.425*** (0.024) OR: 0.654	-0.281*** (0.025) OR: 0.755
Constant	-1.652*** (0.025)	-1.666*** (0.025)	-1.624*** (0.024)	-1.604** (0.024)	-1.639*** (0.024)	-1.654*** (0.024)	-1.624*** (0.021)	-1.584*** (0.023)
Wald χ^2	5335.50	5493.32	5823.16	5441.99	3260.23	3258.62	3110.24	3279.56
Pseudo R^2	0.037	0.035	0.033	0.033	0.019	0.019	0.016	0.018

Notes: Base year: 2009. Control variables include gender (male), grade, race, and state of residence.

* $p < .05$ ** $p < .01$ *** $p < .001$

DISCUSSION

The prevalence of obesity among adolescents has increased dramatically over the past four decades. Well-known adverse effects of obesity on physiological and psychological health, health-care expenditures, and indirect social costs such as school absenteeism and poor academic performance have motivated health professionals, policymakers, and researchers to come up with more-comprehensive action plans to halt or reverse the obesity epidemic. Considering that not many adolescents meet a recommended level of daily physical activity, attention focused on the provision of more opportunities for adolescents to engage in physical activity and to avoid sedentary behaviors at schools as a policy instrument (Story et al. 2006). Legislatures responded by enacting laws. Both federal laws, such as the Child Nutrition and WIC Reauthorization Act of 2004, and newly enacted state laws mandate that schools provide students with more physical exercise and health information.

This study investigated 347 enacted state laws pertaining to physical activity, especially physical-activity requirements in schools and the allocation of funds. Although the language in each state law was different, these laws were intended to provide resources and incentives for physical activity and to deter unhealthy and sedentary behaviors. Those provisions, in general, include establishment of advisory committees regulating physical activity, mandatory PE, and/or voluntary physical-activity programs, provision of resources for the programs, and strategic planning, among others.

As Sallis and Glanz (2009) suggested, constructing a physical-activity environment stimulates physical activity and consequently contributes to reducing obesity. Few studies have explored the effectiveness of the new legislation, however, especially at the state level. Using the DID method and analyzing YBRSS data from 2007 to 2017, this study

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found that state laws induced adolescents to participate in more physical activity and consequently contributed to significantly reducing the prevalence of obesity. It is reassuring that state laws had some, albeit limited, effect in reducing obesity rates.

The results require legislatures to consider changes to these laws in order to address what they have previously overlooked, however. First, subgroup analyses revealed that the effect was concentrated on female and white adolescents, although all groups benefited from the laws in reducing obesity and weight problems. This finding is compatible with the findings of Gordon-Larsen and colleagues (2006), who explain that inequitably distributed physical-activity resources limit minorities' access to the facilities. Similarly, Zhu and Lee (2008) found that unsafe neighborhoods and poor street conditions limit the engagement of minority students in physical activities. It is unclear why the effect was concentrated in female adolescents. Considering that male adolescents already participated more in vigorous sports activities than did female adolescents, there may be a possibility that a sharp increase in physical activity was observed only among female adolescents in treatment states. Further investigation is recommended.

Second, it is worth noting that the average number of days of physical activity and the percentage of adolescents participating in the recommended level of physical activity increased even in the comparison states in 2011. This was the effect not of state laws but of adolescents' voluntary choices to be physically active, considering that numerous media and government reports started to warn of the risks and adverse effects of obesity, sedentary lifestyles, and unhealthy eating. Surprisingly, the subsequent sensitivity analysis revealed that since 2015, when national attention started to shift to new health concerns (opioid abuse, for example), physical-activity levels in comparison states fell back to 2009 levels. Rates of obesity and overweight have also been on a sharp rise since 2015; nevertheless, adolescents in the treatment states have continued to be more engaged in physical activity and have been less likely to be obese than have their counterparts in the comparison states. With that in mind, lawmakers should pay more attention to the recent sharp increase in obesity and should consider changing the laws with the aim to induce behavioral changes.

Third, few new state laws encouraging physical activity have been enacted since 2015. As mentioned earlier, previous studies warned that adolescents' physical activity levels have significantly declined due in part to changes in media time (Gordon-Larsen et al. 2000; Li et al. 2010; Lowry et al. 2005; Turner et al. 2015). It is expected that members of Generation Alpha will have ever more enticements for screen time and should be expected to continue with sedentary behaviors. Accordingly, lawmakers should invest resources in developing ways to merge old-fashioned physical environments with new digital environments. Interestingly, a new line of study provides evidence that social media reinforces physical activity (Shimoga, Erlyana, and Rebello 2019). Lawmakers should provide support for the creation of programs that lead adolescents to engage in physical activity more interactively, more responsively, and with more fun. At the same time, lawmakers should also invest in building infrastructure to overcome the digital divide and to enhance technological literacy.

Although this study contributes to the existing literature by using nationally represented cross-sectional data from the YBRSS, it is not free from limitations. First, like other survey methods, self-reported responses and inaccurate memory may hurt the internal

validity. Additionally, this study was able to use data from only 38 states. If a significant difference exists between the analytical samples and the missing data, the results could be biased. Second, this study could not control for individual dietary habits, which is one side of the energy-balance equation, in explaining obesity. This was partly because of survey questions being inconsistent over time and partly because of the mediating effect of dietary habits on the relationship between physical activity and obesity. Third, compared to randomized experimental studies, the DID method relies on the less strict assumption that unobserved differences between treatment and control groups are the same over time. If this assumption were not met, the estimated effect would be biased. A panel study that would cancel out individual unobservable heterogeneity should be developed for future study. Finally, because this study focused only on between-group comparison (i.e., treatment states vs. comparison states) over the years, this study could not account for within-group variation; thus, this study could not answer whether one law or provision was more effective than others. Further studies are needed to investigate the most effective way to enhance adolescents' physical activity.

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Double-Loop Learning and Productive Reasoning: Chris Argyris's Contributions to a Framework for Lifelong Learning and Inquiry*

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ABSTRACT

This article reviews social scientist and organizational researcher Chris Argyris's publications from the 1970s through the 2000s about organizational learning. In his role as an action scientist and consultant, working to facilitate learning in organizational contexts and drawing on earlier work in psychology from John Dewey and Kurt Lewin, Argyris developed his "theory of action" perspective on learning and interpersonal inquiry. According to Argyris, learning involves increasing the effectiveness of our actions so as to produce the intended results. He argued, however, that we are often unaware of the extent to which our actions *inhibit* learning in social contexts. Argyris sought to identify defensive routines that inhibit learning at the individual, group, intergroup, and organizational levels and promoted a shift from single-loop to double-loop learning and from defensive (Model I) to productive (Model II) reasoning. In this article, based on Argyris's work, I construct a general framework of principles and action heuristics for lifelong learning and inquiry, applicable across organizational, professional, and everyday contexts. After reviewing basic concepts of Argyris's theory of organizational learning, I identify principles and strategies for individuals seeking to develop in themselves, as well as to promote in others, an orientation of general lifelong learning and inquiry.

KEY WORDS Theory of Action; Double-Loop Learning; Productive Reasoning; Action Science; Lifelong Learning

Learning remains important throughout our lives (Noon 2017). Especially today, in an increasingly fast-paced and globally connected world, we must constantly adapt to change (Senge 2006). Technological changes, especially the internet and social media, have brought an explosion of information and an acceleration of its spread. With increasing globalization, we interact more often with others who have different cultural

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and moral perspectives (Greene 2013; Hofstede, Hofstede, and Minkov 2010). Professionally, we face seemingly endless demands to learn new knowledge and skills (Korunka et al. 2015), and as citizens, we are flooded with information mixed with “fake news” and “alternative facts,” requiring us to determine what is important, relevant, and valid. For humans, learning is a part of living (Wenger 1998); however, these changes require that we learn more intentionally. Such intentional learning is no longer only for children or students; it must be a lifelong endeavor.

This article is part of a broader project exploring diverse multidisciplinary perspectives on lifelong learning. New and varied perspectives or theoretical frameworks can provide deeper understanding, with each perspective highlighting different aspects of a conceptual domain (see Kuhn 2012; Lakoff and Johnson 2003; Senge 2006). The focus here is on the scholarly work of Chris Argyris (1923–2013). Argyris contributed to the organizational sciences—including organizational psychology, organizational behavior, and management science—from the 1950s through the 2000s (see Argyris 2003). In the 1970s, he began collaboration with Donald Schon and others to develop a “theory of action” perspective on organizational learning, with an emphasis on interpersonal dimensions of learning and inquiry in organizational contexts. A key claim of this article is that Argyris’s ideas are relevant for learning beyond more stable organizational contexts and can provide a useful framework for lifelong learning and inquiry.

This theory of action perspective emerged as part of a broader action science that built upon the work of John Dewey and Kurt Lewin (Argyris, Putnam, and Smith 1985). These theorists argued that science should not simply describe the status quo but should promote practical inquiry that can contribute to producing a better, more democratic and learning-oriented, society. Dewey explored the intersections of education, science, and democracy, and he sought to integrate education with everyday living and democratic citizenship. For Lewin, theories were to be practical and social problems (e.g., prejudice, aggression) were best understood by designing actions to try to change them (Argyris 1993).

Traditional theories of learning in psychology have focused on individual learners. In behavioral theories, learning is understood largely in terms of behavioral changes resulting from environmental contingencies of reinforcement and punishment. In contrast, cognitive theories have emphasized knowledge acquisition, information processing, and knowledge construction. Several well-known theories specifically addressing adult or lifelong learning have also reflected this focus on the individual learner. Examples include David Kolb’s theory of experiential learning and Jack Mezirow’s theory of transformational learning. For Kolb (1984), learning occurs as individuals engage in cycles of concrete experience, reflective observation, abstract conceptualization, and active experimentation. For Mezirow (1997), adult learning involves developing autonomous thinking through critical reflection and evaluation of the assumptions and frames of reference that define our world views.

Other theories, such as those of Lev Vygotsky and Etienne Wenger, have emphasized learning in a broader sociocultural context. Vygotsky (1978) studied the social and cultural origins of higher mental processes. In Vygotsky’s theory, cognitive development occurs as individuals learn to use cultural tools, with the help of more-

skilled cultural members. For Wenger (1998), learning is an aspect of social participation in communities of practice, consisting of individuals with shared interests who interact as they develop shared knowledge, perspectives, and identities. Although these theories provide significant contributions to our understanding of learning in a sociocultural context, Argyris's approach is distinguished by his detailed analysis of how the values and strategies that shape our conversations can enhance or inhibit learning in organizational contexts.

Argyris's work is likely familiar to many within the organizational sciences but not to a more general audience. His ideas seem relevant today for learning across broader society, however, as individuals seek personal growth and professional development and engage in collaboration and democratic citizenship. Hence, this paper has three goals. First, it aims to provide a general overview of Argyris's theory of action perspective that integrates ideas from across his large volume of work. Second, it seeks to present these ideas for a wider general audience and as relevant for a broader range of contexts beyond organizational settings. Finally, it organizes Argyris's ideas in a new framework of principles and action heuristics, relevant for facilitating lifelong learning and inquiry, individually and collectively, across everyday and professional contexts.

THE THEORY OF ACTION PERSPECTIVE

Argyris and Schon (1974, 1996) account for deliberate human behavior in terms of theories of action. In their view, humans design actions so as to be effective—that is, to achieve desired or intended consequences. Because real-life situations are complex and the human mind has limited information-processing capacity, humans use theories of action to decide what to do. These theories take the form “In situation *S*, if you want to achieve consequence *C*, do *A*” (Argyris and Schon 1974:5). They vary in terms of their generality. Whereas “microtheories” relate to specific situations, general “master programs” guide action design across a broad range of circumstances. For actors, theories of action are prescriptive, stating what a person should do to achieve desired results. For observers, these theories are used to explain observed behaviors or predict future behaviors in others (Argyris and Schon 1974, 1996).

There are two types of theories of action: espoused theories and theories-in-use. Espoused theories are stated explicitly to explain or justify what we say and do. In contrast, theories-in-use are the theories that actually govern our actions. Our espoused theories and theories-in-use are often incongruent, and we are often unaware of this fact. For example, individuals may say they value health, justice, and truth yet design actions to avoid exercise, maintain discriminatory policies, and cling to comfortable but unsupported beliefs. We can reveal espoused theories by asking individuals why they do what they do. Theories-in-use, however, are usually implicit or tacit; thus, they can only be inferred from observable patterns of behavior (Argyris and Schon 1974, 1996).

Argyris and Schon (1974, 1996) relate the distinction between theories-in-use and espoused theories to that between tacit and explicit knowledge of skilled performance. We can perform tacit skills, such as recognizing a face or riding a bike, without being able to explain how. Conversely, we can learn an explicit description of how to do

something without being able to implement it. Grammar provides another analogy (Argyris and Schon 1974:11). We learn the grammar of our native language tacitly as we internalize patterns from listening, practice, and feedback. Only later do some of us learn an explicit grammar to describe, at least partly, these patterns. This process may be reversed in learning a second language as we try to internalize an explicit theory.

Theories of action are composed of governing values, action strategies, and their consequences (Argyris 1982, 1993; Argyris and Schon 1974, 1996). A field of governing values (or variables) defines how actions should be designed for intended effect. We design actions to satisfy these governing values, to achieve our primary objectives while keeping other governing variables (e.g., anxiety, effort) in acceptable ranges. Actions are ineffective if they do not achieve their intended consequences or if they have undesirable side effects. Value conflicts can create dilemmas, where actions that raise one variable lower another. For example, a desire to learn may conflict with desires to maintain world-view stability or not upset others. Acknowledging these inconsistencies may threaten our self-esteem or sense of competence (Argyris and Schon 1974, 1996).

As an example, consider a professional seeking to keep up to date in their field by attending conferences. Such an action strategy will be judged effective to the extent it achieves its primary objective, professional learning. If other governing variables, such as cost, time, or safety concerns (e.g., due to a pandemic), however, fall outside of acceptable ranges, the likelihood of the professional attending the conference could be reduced. Dilemmas arise as values, such as learning versus cost, conflict. Other reasons for the professional attending the conference could include networking or visiting a new city. If someone says they are attending the conference to learn but then skips conference sessions to socialize with friends or visit tourist attractions, this is evidence that the person's espoused theory and theory-in-use are incongruent.

Learning for Effective Action

Argyris and Schon (1996) base their view of learning on John Dewey's pragmatic conception of inquiry. For Dewey, as actors engage in the world, they encounter problematic situations in which expectations differ from results. These situations create doubt, which stimulates inquiry into new ways of thinking and acting to resolve this doubt. As one problem is resolved, new problems often arise, and inquiry continues. Dewey also viewed inquiry as a social process, conducted with others according to rules and norms established within a "community of inquiry" (Argyris and Schon 1996:33).

In the theory of action perspective, learning is a form of inquiry that leads to more effective action. Effective action occurs when an action achieves its intended results, and these results persist without other undesired consequences. Learning then involves the detection and correction of errors (mismatches between intended and actual results) so as to increase competence—our capacity for sustained effective action (Argyris and Schon 1974, 1996). A learning cycle consists of four stages: (1) discovery (of a problem/error), (2) invention (of a solution/correction), (3) production (of the invention), and (4) evaluation (of the production) or generalization (to other settings; Argyris 1976a, 1982).

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When we recognize errors, we can change our action strategies or the governing values and assumptions behind these strategies. This is the basis for Argyris's distinction between single-loop and double-loop learning. Single-loop learning involves changing our action strategies so as to better satisfy existing values. Double-loop learning goes deeper by also examining these values and their prioritization, as well as any underlying assumptions. The classic example is a thermostat (Argyris and Schon 1974, 1996). A thermostat set at 68 degrees "acts" to maintain this preset temperature, using existing heating mechanisms. This reflects single-loop learning. Double-loop learning would entail asking what the temperature should be set at or if there is a better means of adjusting the temperature. A human example is someone faced with unanticipated conflict. Whereas a single-loop learner might try a new strategy to avoid the conflict, a double-loop learner could consider shifting priorities to use the conflict productively to promote learning by considering diverse viewpoints (Argyris and Schon 1974).

Although we typically think of learning as a task for individual learners, Argyris and colleagues extend the concept of learning to group, intergroup, and organizational levels. These higher-level entities can learn when they are organized for collective decision-making and acquire knowledge to enhance their capacity for effective collective action. According to Argyris and Schon (1996:16), organizational learning occurs "when individuals within an organization experience a problematic situation and inquire into it on the organization's behalf." Organizational knowledge (or memory) resides in the organization's structures, procedures, routines, norms, practices, and databases as well as in the collective memories of its members. In an increasingly complex and competitive world, it is widely recognized that an organization's sustained success depends on its ability to learn (Argyris 1991, 1999; Argyris and Schon 1978, 1996; Senge 2006).

Model I Theories-in-Use

In their work as researcher-interventionists, Argyris and colleagues diagnosed theories-in-use across a range of business, governmental, and educational contexts (Argyris 1976a, 1982, 1985, 1990, 1993, 2000; Argyris et al. 1985; Argyris and Schon 1974, 1996). Through helping clients write and discuss case studies of real-life problematic issues, they identified a general theory-in-use that they called Model I. Model I was found to be nearly universal, especially when individuals confronted challenging issues in interpersonal contexts with the potential for embarrassment or threat. Although espoused theories and specific behaviors varied, a Model I theory-in-use was shared across settings and demographic groups (e.g., age, gender, race/ethnicity, culture, education, social status). It appears that Model I is learned through socialization in childhood and is later reinforced throughout society. Most of us typically remain unaware of our use of Model I and how it limits our learning, however.

Model I reflects a desire to maintain unilateral control of the task and of others while protecting ourselves, and often others, from embarrassment or threat. Specifically, Argyris and Schon (1996:93) identified four Model I governing values: (1) "define goals and try to achieve them," (2) "maximize winning and minimize losing," (3) "minimize generating or expressing negative feelings," and (4) "be rational." When designing actions

based on these values, individuals establish goals and work to achieve those goals, without trying to collaborate with others to develop shared goals or possibly reframe the task. They advocate their ideas to persuade others, without encouraging inquiry (e.g., asking for feedback or alternative views). If they are successful and achieve their goals and/or persuade others, they consider it a win (which may mean others must lose).

People acting in accord with Model I use action strategies aimed at maintaining control while protecting themselves and others. This includes trying to be rational (i.e., objective, unemotional) and suppressing negative feelings. In Model I, being upset is viewed as a sign of weakness or incompetence. Moreover, upsetting or offending others is considered impolite (and risky if there are power differences). As a result, individuals often engage in defensive behaviors, such as denial, avoidance, and face-saving (e.g., withholding criticism, “smoothing over” negative reactions), to protect themselves and others from embarrassment and threat (Argyris and Schon 1974, 1996).

When someone is acting according to Model I, control and protection take priority over valid information, free and open inquiry, and learning. A common result is that information is withheld, distorted, or stated ambiguously. Individuals may conceal or distort their intentions and withhold information to maintain the upper hand, what Argyris and Schon (1996:94) call mastery through mystery. Assumptions, evaluations, and attributions are kept hidden, to avoid risk of error or embarrassment, or are stated abstractly, without being illustrated with concrete examples. Such high-level inferences (e.g., “her work was pretty good” or “he is not trustworthy”) reduce one’s vulnerability to being challenged or held accountable on specifics; however, they also create ambiguity. Individuals may additionally suppress feelings and censor negative feedback to be diplomatic or polite and to not upset others (Argyris 1982, 1993; Argyris and Schon 1996).

A Model I theory-in-use further inhibits the production of valid information because it causes individuals to avoid publicly testing assumptions and inferences; if testing occurs at all, it is usually private. This can lead to misunderstanding, error escalation, and self-sealing processes. Reasoning is self-sealing when assumptions, attributions, and evaluations are maintained without being subjected to attempts at disconfirmation (Argyris 1982, 1985, 1990, 1993; Argyris and Schon 1996). For example, a person may not challenge others because of the untested assumption that others cannot handle criticism (e.g., “I can’t question his views, or he will explode”; Argyris 1993). These self-sealing processes can become self-fulfilling. To illustrate, if A believes B is defensive and acts cautiously toward B, B is also likely to act cautiously toward A, seemingly confirming A’s prior belief (Argyris and Schon 1974:77). In Model I, without prioritizing valid feedback and public testing of ideas, open inquiry and learning (especially double-loop learning) are significantly inhibited (Argyris and Schon 1996).

Model I Limited Learning Systems

Theories of action have consequences for the behavioral patterns that arise as we interact with others. At an organizational level, individuals’ theories-in-use help create learning systems that include these behavioral patterns and organizational structures (e.g., information and incentive systems) that influence learning and inquiry in an organization.

Such systems can enhance or inhibit learning, depending on whether they encourage or discourage confrontation of important issues and dilemmas and the public testing of inferences and assumptions (Argyris and Schon 1974, 1978, 1996).

Individuals with Model I theories-in-use tend to create groups and organizations with similar Model I norms and practices that further reinforce their Model I theories-in-use. This results in what Argyris and Schon (1996:90) called organizational limited learning systems, with self-reinforcing processes that inhibit organizational learning. These limited learning systems are characterized by organizational defensive routines—organizational norms, policies, and practices designed to eliminate embarrassment or threat while also avoiding the embarrassment or threat’s underlying causes (Argyris 1985, 1990, 1993; Argyris and Schon 1996). These Model I defensive routines, including self-censorship, ambiguous messages, blame of others, and face-saving behaviors, affect one’s behavioral world. Individuals’ attempts to maintain unilateral control and to win produce competitive group dynamics, with intergroup (e.g., departmental) rivalry, polarization, and political games of deception. Self-censoring, face-saving, and self-sealing processes create an environment characterized by mistrust, lack of openness, conformity, and risk aversion (Argyris 1982, 1985, 1990; Argyris and Schon 1996). This can increase defensiveness and can further reinforce Model I theories-in-use and strategies.

Such defensive and competitive dynamics have significant implications for learning. When the goal is protection and control, rather than learning and open inquiry, people typically either remain blind to errors or do not acknowledge them publicly. Defensive routines inhibit learning, as errors are bypassed to avoid embarrassment or threat, and this bypass is covered up (moreover, the cover-up is covered up). People hide ambiguity, conflict, self-censorship, inconsistencies, and ineffectiveness from themselves and/or others through layers of defensive camouflage. Norms then develop against discussing these issues openly (Argyris 1985, 1987, 1990, 1993).

The consequence of bypass and cover up is that discussions are superficial, especially for important and challenging topics. Individuals avoid stating what they really think, and threatening issues become “undiscussables.” Moreover, the undiscussability of these issues also becomes undiscussable, as individuals avoid confronting defensive routines for fear of opening a “can of worms” that could make things worse. What learning does occur is likely to be single-loop, but rarely double-loop, as questioning existing values, assumptions, and norms is deemed too risky (Argyris 1982, 1985, 1990, 1993).

Defensive routines thus become resistant to change—even when such change is desired—for two reasons. First, these routines are well-learned skilled actions, applied automatically and unreflectively based on a taken-for-granted Model I theory-in-use. This results in what Argyris (1986, 1990) called skilled incompetence, in which we become experts at acting in ways that inhibit learning and maintain ineffectiveness. Second, attempts to interrupt or confront defensive routines activate (and further reinforce) these routines. This can lead to “fancy footwork,” in which, according to Argyris (1990:46), individuals “use all the defensive reasoning and actions at their command in order to continue the distancing and blindness without holding themselves responsible for doing so.” Individuals may feel caught in a double bind: continue with ineffective strategies or risk raising threatening issues (Argyris 1990, 1993). As bypass and cover-up routines

escalate, they may be accepted as natural and inevitable, leading to cynicism, further mistrust and distancing, and a sense of helplessness (Argyris 1990:30).

Toward Model II Theories-in-Use and Productive Learning Systems

Is there an alternative to Model I? In response to this question, Argyris and colleagues sought to help their clients and students develop a Model II theory-in-use that would promote effective learning. They identified Model II governing values as valid information, free and informed choice, and internal commitment (Argyris and Schon 1996:118). Model II emphasizes “the norm of responsible belief” (Argyris et al. 1985:265). Individuals acting according to a Model II theory of action seek useful and relevant information based on verifiable (i.e., directly observable) data and publicly tested inferences. They strive to create contexts in which they and others can make choices that are free (based on their values, beliefs, and desires) and informed (based on relevant valid information) and to which they are internally committed. Internal commitment includes acceptance of personal responsibility for one’s choices and for monitoring their implementation. These values are interconnected: Valid information supports informed choice, free choice fosters internal commitment, and commitment motivates individuals to seek valid feedback for further learning (Argyris and Schon 1974, 1996).

Model II avoids the unilateral control and protection strategies associated with Model I, as these actions can deprive people of valid information and free choice. Instead, Model II action strategies emphasize crafting statements so as to encourage inquiry and public testing (Argyris 1982, 1993; Argyris and Schon 1996). Responsibility for defining goals and framing the task is shared, to support free choice and internal commitment. Whereas Model I results in defensive reasoning, Model II promotes productive reasoning. As described by Argyris (1993:56), productive reasoning includes illustrating claims with directly observable data, making inferences explicit, encouraging inquiry into one’s views, and seeking disconfirmation through public testing. Although both Models I and II use advocating, attributing, and evaluating, the latter combines these with illustrating, testing, and inquiring.

Model II provides a basis for creating productive organizational learning systems that minimize defensive routines, support free and open inquiry, engage embarrassment and threat, and promote double-loop learning (Argyris 1993:54). Just as Model I strategies reinforce Model I values and norms, Model II strategies reinforce Model II values and norms. With the latter, there is a shift from competitiveness, mistrust, manipulation, and concealment to cooperation, trust, free choice, and open inquiry. Model II is not self-sealing, as it promotes double-loop learning; its governing values, action strategies, and consequences can be openly discussed. Individuals are committed to their views, but they are also open to having their views tested and challenged by others (Argyris and Schon 1974:91). Learning occurs as individuals publicly test ideas, “surface” threatening issues, consider alternative views, and risk making mistakes.

Model II specifically supports double-loop learning by providing a context for open discussion of difficult issues and dilemmas. An important difference from Model I is in how individuals react to conflict and negative feelings. With Model I, individuals often

avoid conflict, and when frustration builds, they may explode in unproductive ways. With Model II, conflict and feelings of threat or frustration can be explored and tested by others. Although conflict is not necessarily reduced, individuals should have better strategies for discussing it, as well as more confidence that they can address conflict productively so as to promote learning (Argyris et al. 1985). Trust is developed not by being overly protective or positive but by committing to learning and to Model II values (Argyris 1993).

Model II inquiry is most needed for complex and uncertain situations, in which such confidence and trust are needed because of the higher potential for conflict, embarrassment, and threat. Learning Model II is difficult, however, even for the highly motivated and learning-oriented. Many people espouse Model II values, but few internalize them as a theory-in-use. Use of Model II strategies will likely trigger defensive routines, as individuals' sense of competence may depend on their comfort with the skillful use of Model I. Gaining awareness of this skilled incompetence, however, provides opportunities for reflection and inquiry. To promote learning, defensive routines must be interrupted and undiscussables must be made discussable. Individuals need practice to develop the capacity for double-loop learning and to move Model II from an espoused theory to a theory-in-use (Argyris 1982, 1990; Argyris and Schon 1996).

IMPLICATIONS FOR LIFELONG LEARNING AND INQUIRY

The theory of action perspective suggests that lifelong learning and inquiry can be promoted by shifting emphasis from Model I to Model II theories and learning systems. Based on a review of 15 books and more than 40 articles by Argyris, four theory of action principles have been identified as a framework for lifelong learning and inquiry. Each principle is linked with two action heuristics to guide its effective implementation (Table 1). A key claim of this article is that these principles and heuristics have relevance for promoting learning and inquiry not only in organizational settings but also in other professional and everyday interactions as we seek to learn collaboratively with others.

Table 1. A Framework for Lifelong Learning and Inquiry

General Principle	Action Heuristics
<i>COMMIT to a learning orientation</i>	1. Promote double-loop learning 2. Choose Model II values
<i>SURFACE learning inhibitors</i>	3. Evaluate theories-in-use 4. Identify defensive routines
<i>DEVELOP productive reasoning</i>	5. Illustrate and test inferences 6. Combine advocacy with inquiry
<i>PRACTICE and redesign actions</i>	7. Reframe errors as learning opportunities 8. Engage in reflective experimentation

Committing to a Learning Orientation

In the theory of action perspective, a learning orientation entails committing to double-loop learning and a Model II theory-in-use, which support each other and should be pursued together. Double-loop learning is necessary for consideration of new Model II values that can enhance learning and effectiveness. Conversely, a Model II theory-in-use is needed to promote a sustained capacity for double-loop learning, especially under conditions of potential embarrassment or threat (Argyris and Schon 1996).

Heuristic 1: Promote double-loop learning. Most individuals are skilled at single-loop but not double-loop learning (Argyris et al. 1985). Single-loop learning, aimed at achieving objectives based on existing values, assumptions, and norms, may be sufficient for routine tasks (Argyris and Schon 1974), but more challenging issues call for double-loop learning, in which values, assumptions, and norms can be reconsidered through personal and collaborative reflection and inquiry. According to Argyris and colleagues (1985), such inquiry is needed to explore “liberating alternatives” that challenge the status quo, including taken-for-granted norms, values, and beliefs.

We can also direct double-loop learning toward learning itself, by questioning underlying values, assumptions, and norms that influence learning. Argyris and Schon (1996) called this deuterolearning (or “second-order learning”). Here, we reflect on and inquire into how our theories-in-use and learning systems inhibit or enhance learning. For example, rather than avoiding errors and protecting ourselves from embarrassment, we can try risking mistakes in order to create learning opportunities. A theory of action perspective encourages us to commit to “learning how to learn” for greater effectiveness.

Heuristic 2: Choose Model II values. Most individuals lack competence in double-loop learning and find it threatening. They have become experts at designing actions, based on a Model I theory-in-use, in ways that inhibit learning (Argyris 1976b, 1982, 1993; Argyris and Schon 1996). Efforts to engage in double-loop learning are thus not likely to be sustained without a new theory-in-use that supports such learning. Meaningful change requires shifting to a Model II theory-in-use that prioritizes valid information, free and informed choice, and internal commitment, and in which strategies, values, group processes, and norms are all open to criticism (Argyris 1982, 1993).

Argyris and Schon (1974:97) claimed that Model II values are often espoused but rarely acted upon. For example, individuals may espouse commitment to truth but act as if they value truth only when it is not threatening (Argyris 1990). A learning orientation thus involves more than just an explicit acceptance of Model II; individuals must commit to enacting a learning orientation as a theory-in-use (“walking the talk”). This is challenging, as it requires new values and skills and the individual often receives little support from others. Nonetheless, an espoused Model II theory of action can define an ideal toward which individuals strive and a standard for evaluating progress toward greater capacity for learning and inquiry.

Model II also requires a change in the meaning of social values or virtues, such as concern and respect for others (Argyris 1990; Argyris and Schon 1996). Most individuals learn Model I meanings of these values in childhood that perpetuate defensive reasoning

and inhibit double-loop learning. In a Model I world, we demonstrate concern and respect for others by helping them feel good and using face-saving behaviors to protect them from embarrassment and threat. We may offer praise and approval while minimizing criticism and conflict so as not to upset them. Social norms dictate that we be polite and diplomatic and avoid confronting others, even when we disagree, to protect them from hurt feelings (Argyris 1982, 1990; Argyris and Schon 1996). In Model II, the goal of concern and support shifts from making individuals feel good to helping them reason productively and learn. Respect is demonstrated not by agreeing with or deferring to others but by interacting with them as if they are capable of such reflection and inquiry.

Strength and integrity are also reframed in a shift to Model II. In Model I, these values are associated with control; strength involves advocating and winning, and integrity occurs by maintaining consistent values and principles. Errors, inconsistencies, and feelings of vulnerability, considered to be weaknesses, are hidden and kept private (Argyris and Schon 1978). The cost, however, is inhibition of both learning and good performance. In Model II, strength is not winning by advocating a position strongly but occurs by encouraging inquiry and being vulnerable to errors, and integrity does not mean being consistent (“sticking to” your beliefs and values) but means making choices based on valid information and open inquiry (Argyris 1990; Argyris and Schon 1996).

Surfacing Learning Inhibitors

Double-loop learning requires changing our Model I theory-in-use and the limited learning systems that are created by and, in turn, reinforce it (Argyris 1982, 1990, 1993). Most individuals continue to employ defensive routines and a Model I theory-in-use even when espousing Model II values; however, becoming aware of (or “surfacing”) this incongruence through reflection and inquiry can motivate learning. Given that many individuals have difficulty reflecting in action, it is often necessary at first to slow down the process and reflect on actions (including what we say) after the fact. Further, most people recognize ineffective action more easily in others than in themselves. Thus, collaborating with others who are able to offer constructive feedback can help surface learning-inhibiting theories-in-use and defensive routines (Argyris 1982, 1993).

Heuristic 3: Evaluate theories-in-use. Although a theory-in-use need not be stated explicitly to be effective, such explication is important for critical reflection, theory testing, and considering alternatives (Argyris and Schon 1974, 1996). Theories of action can be judged in terms of their effectiveness in producing intended results and the value of the learning systems they help create. When assessing our actions (what we *actually* say and do), we can ask, “Are we promoting our own learning and learning in others?”

Three additional criteria for evaluating theories of action are internal consistency, congruence, and testability (Argyris and Schon 1974). Internal inconsistencies arise from contradictions among governing values. For example, someone who values learning but also values minimizing effort or avoiding mistakes or conflict may find it difficult to achieve these simultaneously. Incongruence refers to mismatches between espoused theories and theories-in-use. This typically involves

espousing Model II values while acting according to Model I. Finally, without testability, assumptions and inferences can be self-sealing (maintained without attempts at disconfirmation). These criteria can reveal dilemmas, in which desires for learning and effective action conflict with desires for theory constancy or error avoidance. When surfaced, inconsistencies and dilemmas can motivate learning.

Heuristic 4: Identify defensive routines. Defensive routines aim to protect individuals from potential embarrassment or threat, but they also inhibit learning, as errors, inconsistencies, and dilemmas remain unrecognized or unacknowledged. In Argyris's (1993:15) words, these routines are "antilearning and overprotective." To overcome defensive routines, we must first become aware of our use of them and of how they inhibit learning and reduce our effectiveness.

Common defensive routines identified by Argyris and colleagues are presented in Table 2. Routines such as unilateral advocacy, self-censoring, self-referential logic, and fancy footwork inhibit public testing of ideas and inquiry into alternative views (Argyris 1982, 1990; Argyris et al. 1985). Distancing may succeed at self-protection, but it eliminates opportunities for learning and for examining one's responsibility for defensive routines. Face-saving behaviors, such as "easing in" and "rescue moves," do not help others confront, learn from, or take responsibility for their errors and are often based on the untested assumption that others need protection. Moreover, if people are given distorted (e.g., incomplete or overly positive) feedback, they will learn not to trust feedback. Thus, these behaviors can contribute to Model I limited learning systems that inhibit learning.

Developing Productive Reasoning

Once individuals commit to learning-enhancing Model II values and become aware of learning-inhibiting Model I theories-in-use and defensive routines, they still need to be able to invent and produce Model II action strategies. Individuals may want to talk openly and constructively about issues yet not have the skills or confidence to do so (Argyris 1990, 1993). Thus, a learning orientation requires developing the capacity for productive reasoning, which includes illustrating and testing inferences and combining advocacy with inquiry. These action strategies must be based on Model II values.

Heuristic 5: Illustrate and test inferences. With Model I, high-level inferences are often formed automatically and accepted as obvious. Self-censoring often involves being secretly judgmental. Defensive reasoning is the norm, and many claims are not illustrated or tested. In contrast, with Model II, productive reasoning prioritizes valid information in a context that supports free choice and internal commitment. To achieve this, individuals should avoid private untested assumptions, attributions, and evaluations and should instead clearly state their assumptions and inferences, illustrate claims with directly observable data, and make their reasoning explicit. This allows others to examine what would otherwise be left unstated and untested (Argyris 1982, 1985, 1993).

The ladder of inference provides a useful metaphor for making reasoning explicit and examining the data and reasoning on which inferences are based. As presented by

Argyris (1982, 1993), the bottom rung on the ladder represents directly observable data, the second rung represents culturally accepted meanings, and higher rungs reflect more personal or abstract meanings. The higher up the ladder you go, the farther removed inferences are from publicly verifiable data and the more likely they are to produce disagreements based on different reasoning processes or interpretations of the data.

For example, suppose that in a meeting, after presenting a new initiative, you conclude that your colleague will not support it. Using the ladder of inference, you could state that this inference is based on your colleague's frown and lack of comments during the meeting, which you interpreted as her rejecting what you proposed. If you make this reasoning public, it can be tested. Perhaps she was frowning at someone else or was preoccupied with a personal issue, or maybe she had concerns about a minor issue but overall thinks the initiative has promise. Using this tool, misunderstandings can be clarified, gaps in reasoning can be examined, disconfirming data can be provided, and alternative interpretations can be explored (Argyris 1993; Argyris and Schon 1996).

Table 2. Common Defensive Routines

Defensive Routine	Brief Description
<i>Unilateral advocacy</i>	Stating views without encouraging open inquiry, confrontation, or alternative perspectives
<i>High-level inferences</i>	Making general or abstract assertions not illustrated with or tested against directly observable data
<i>Self-censoring</i>	Keeping assumptions and inferences private in order to protect oneself and others from embarrassment or threat
<i>Distancing</i>	Avoiding errors, inconsistencies, or potential threats, as well as responsibility for their continuation
<i>Self-referential logic</i>	Claiming that inferences are valid based solely on one's own reasoning processes (e.g., "Trust me, I know.")
<i>Mixed messages</i>	Stating inconsistencies/ambiguities that are not acknowledged (e.g., "Do what you think is best, but be careful.")
<i>Easing in</i>	Asking questions to lead others to understand what you don't want to say explicitly, in an attempt to protect them from negative feedback
<i>Rescue moves</i>	Redirecting attention from errors, or "smoothing over" criticism to help others avoid embarrassment or threat
<i>Undiscussables</i>	Making threatening topics undiscussable and making the fact that they are undiscussable also undiscussable
<i>Fancy footwork</i>	Switching defensive strategies without acknowledging doing so, creating a moving target for critics

Sources: Argyris (1982, 1985, 1990, 1993), Argyris et al. (1985), Argyris and Schon (1996).

Heuristic 6: Combine advocacy with inquiry. The ladder of inference should not be used only to advocate a position; others should also be encouraged to question our views. A Model II strategy thus combines advocacy with inquiry, stating your position, giving your reasoning, and inviting testing and inquiry (Argyris et al. 1985). For example, statements can be crafted something like “Here is what I am thinking and why. Does that make sense? Do you agree?” or “This is my view. I think it’s right, but I might be wrong, so let’s take a look at it” (Argyris et al. 1985:331). The validity of claims and assumptions can then be examined collaboratively (Argyris and Schon, 1974, 1996).

When advocacy is combined with inquiry, there is a shift from unilateral attempts to defend one’s view and win, to collaborative efforts to explore multiple perspectives and learn. Open testing and “constructive confrontation” of assertions and assumptions is encouraged, while defensiveness and face-saving are minimized (Argyris and Schon 1996:119). When others disagree with us, we can ask them to illustrate their views (e.g., “What did X say or do that led you to infer that?”) and encourage them to test our views or propose alternatives. Model II does not seek conformity or consensus. Conflicting perspectives are seen as resources that provide an opportunity to enhance mutual understanding; other people are seen as potential sources of valid information rather than as competitors who threaten one’s ability to win or with whom one must save face (Argyris and Schon 1974, 1996).

Practicing and Redesigning Actions

Implementing Model II strategies is very challenging, especially at first, as this requires disrupting automatic Model I responses while employing new skills in real-time situations (Argyris 1982, 1993). Thus, individuals need continued practice in recognizing defensive reasoning, learning from errors, and moving toward productive reasoning. It is important to have reasonable expectations for success and to recognize progress, even if slow, as challenges and errors will likely trigger doubt, anxiety, embarrassment, and confusion (Argyris 1990, 1993). In accord with Model II values, the goal should be to learn and improve, not to be right and win (Argyris et al. 1985).

Heuristic 7: Reframe errors as learning opportunities. In Model I limited-learning systems, errors are avoided, but when they do occur, they trigger defensiveness and may go unrecognized or become undiscussable. Errors can further escalate as individuals blame others without recognizing their own responsibility for their defensive routines. The more potentially embarrassing or threatening the issue, the more threatening it becomes to confront these routines (Argyris et al. 1985). In contrast, with Model II, we strive to surface and take responsibility for errors and inconsistencies, make them discussable, and use them for learning (Argyris and Schon 1996).

Argyris and colleagues (1985:277–78) distinguished between protective and reflective orientations. Those with a protective orientation fear mistakes and seek to protect themselves from the risks of learning. They view errors as crimes, to be avoided but, if “committed,” to be covered up if they want to escape “punishment” (Argyris et al. 1985:280). People with this protective orientation become ashamed of past errors and

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afraid of new ones. They avoid taking risks or experimenting with new ideas or actions, especially if they lack confidence. When protective-oriented individuals discover errors, they act “as if they believe that they are not only wrong but wrong for being wrong” (Argyris et al. 1985:287). A protective orientation may also be accompanied by a sense of brittleness, in which the individual experiences high feelings of failure or despair when making errors (Argyris et al. 1985:287). This can lead to reinforcing cycles of lower confidence, poorer performance, and greater fear of failure.

In contrast, if we adopt a reflective orientation, we recognize that mistakes are a necessary part of learning and we reframe errors as “puzzles” that invoke curiosity and are to be engaged as learning opportunities. With a reflective orientation, individuals are more likely to reflect on their mistakes and to experiment with alternative actions in order to learn how to be more effective. In taking responsibility for their learning, they are more likely to make their reasoning explicit, ask for clarifications, and acknowledge feelings, uncertainties, and dilemmas as pieces of the puzzle to examine. As when learning a new skill, errors inform the individual about current performance, not about overall competence or worth. Success is not about avoiding mistakes but about learning from them.

Heuristic 8: Engage in reflective experimentation. A reflective orientation facilitates reflective experimentation—reflecting on and testing ideas and actions in ongoing practice and learning from the consequences. This can promote greater competence and confidence in learning-oriented (Model II) action strategies (Argyris et al. 1985:279). We must act as if our theory is true, while being willing to change our theory if evidence argues against it. We should accept personal responsibility for defensive patterns and recognize our skilled incompetence and any incongruence between espoused theories and theories-in-use. Learning will occur as we test our theories and open ourselves to alternative interpretations (Argyris and Schon 1974, 1996).

In reflective experimentation, individuals often face a core dilemma: a conflict between their desires to learn (by surfacing errors, inconsistencies, and dilemmas) and to protect themselves (by keeping these hidden). This makes learning challenging, and individuals need realistic expectations about the difficulty of internalizing Model II. At first, learners should expect “hybrids” that integrate aspects of Model II with Model I. With a reflective orientation, a person is more vulnerable to error but is also more open to learning and to long-term success. Those individuals most ready to learn Model II are able to listen to feedback about their errors with minimal defensiveness and to persist through the challenges of learning. They are able to be “vulnerable without feeling weak” (Argyris and Schon 1996:148).

Extended Example: Reopening Schools in a Pandemic

To further illustrate the application of the above principles and heuristics in everyday interactions, this section provides a more extended example. At the time of this writing, we are in the midst of the COVID-19 pandemic and there is much debate about the reopening of businesses and schools. Assume that you are about to discuss whether

schools should reopen for in-person learning. As you have been following the scientific advice from public health experts, you have some concerns about reopening schools too quickly, but you expect your conversation partner, X, to minimize these health concerns.

In *committing to a learning orientation*, you could approach the conversation focused on what you can learn about school reopening as well as on the concerns of those with different views. Instead of seeking to win the argument or keeping your views private to avoid conflict, you could strive to share your views while encouraging testing and inquiry and to learn about X's views while respecting their free choice. Double-loop learning could involve questioning the assumption that we must choose either student learning or health, and this could open the door to exploring ways to promote both. The conversation could be viewed as an opportunity for you to not only learn about the school-reopening issue but also practice promoting more learning-oriented conversations.

Surfacing learning inhibitors requires reflecting on conversations to identify use of a Model I theory-in-use or of defensive routines that inappropriately inhibit learning. For example, you might recognize that, despite your best intentions, you have begun arguing against school reopening without inquiring into the other person's views (unilateral advocacy), or you may have stated that you have safety concerns without providing concrete examples (high-level inferences), or you may have avoided mentioning X not wearing their mask correctly because it was sensitive (self-censoring). Such reflection may occur as the conversation unfolds, in which case adjustments can be made, but because this reflection in action is difficult, it may also occur after the fact, in which case it can provide a basis for improving the next time. Note that this framework does not imply that learning need always have top priority, but reflection can help us prioritize these values and be more intentional in our conversations.

Suppose X states that we need to reopen schools so the pandemic does not disrupt our lives. You might try *developing productive reasoning* by saying, "This is an important but difficult issue. I think I have a different view on this and would be happy to share my thoughts, but I would also like to understand where you are coming from. Would you be willing to explore this further?" If X responds that people against reopening just don't recognize the problems with online learning, you might clarify that you share concerns about online learning but are also worried about safety issues. Here, you could illustrate this with concrete examples (e.g., concern about community spread of the virus if students do not wear masks and keep a six-foot social distance). Then you could inquire, "Do you agree that these are safety concerns?" Through such testing, you might learn that X does have safety concerns but that because they cannot afford to lose their job, the alternative for them to school reopening is daycare, where such safety concerns are worse. You could combine advocacy with inquiry by stating, "I think there are ways to have some in-person learning while addressing these safety concerns. Do you agree?" This might direct the conversation toward a solution that could promote both effective learning and health or safety concerns.

As Argyris notes, because most of us have learned to rely on Model I defensive reasoning and a protective orientation since childhood, implementing Model II productive reasoning and a reflective orientation will be challenging. This is true even in the best of circumstances, as Argyris found when working with a highly motivated group

guided by his skilled facilitation. Thus, when you attempt to *practice and redesign actions*, you should expect setbacks, which are even more likely when implementing these strategies in everyday interactions, where others may not prioritize learning. If you notice yourself slipping into comfortable habits of advocacy without inquiry or being overprotective, or if you become frustrated or lose confidence in using these strategies in real time, you can reframe these “errors” as further learning opportunities. With reflective experimentation and practice, you can hopefully increase the learning potential of your conversations and possibly provide a model of a more reflective and learning-oriented approach for others.

CONCLUSION

Chris Argyris’s theory of action perspective was part of his broader action science project that engaged individuals in transforming practice through collaborative learning and critical inquiry. As a facilitator, Argyris was able to demonstrate improvement toward Model II theories-in-use and learning systems through long-term intervention with executives and consultants (Argyris 1982, 1993; Argyris and Schon 1996). For Argyris, sustained meaningful change is likely only when Model I skilled incompetence and defensive routines are disrupted and there is a shift to Model II double-loop inquiry and productive reasoning (Argyris and Schon 1996).

The goal of this article has been to demonstrate the value of Argyris’s key ideas for promoting lifelong learning and inquiry. In a rapidly changing world, skilled professionals need to learn not only how to apply their techniques but also how to learn. Otherwise “smart” individuals may have difficulty with such learning if they have never learned or have forgotten how to learn from “failure” (Argyris 1991:100). Thus, professionals can benefit from developing a Model II learning-orientation, with capacities for double-loop learning, productive reasoning, and reflective experimentation. A learning orientation is, however, also needed for all productive and responsible citizens, who ideally make decisions based on valid information in consultation with others. Especially in polarized times, we need to develop our collective capacity for learning and inquiry among those with different viewpoints (Greene 2013; Haidt 2012). Learning and inquiry are essential if we as a pluralistic democratic society are to be able to make decisions and set public policy using evidence-based reasoning and to explore “liberating alternatives” for the problems we face (e.g., climate change, poverty, discrimination).

Three topics that could be given only limited attention in this article define possible directions for future research. First, what possibilities and challenges arise when trying to apply Argyris’s ideas in more informal groups and everyday interactions? According to Argyris, it is difficult for individuals to adopt a Model II theory-in-use within Model I learning systems that reinforce defensive routines. Thus, when individuals act outside the confines of a group already committed to working together, with the help of a skilled facilitator, to improve their learning, which strategies are most effective? What are their limitations in these contexts?

For example, one challenge that individuals may confront in everyday contexts is how to promote learning and openness while following traditional norms of

politeness, which are likely expected by those not informed by or committed to Argyris's views. Consider "easing in" and other face-saving behaviors; Argyris's concern is that these strategies emphasize protecting others, based on the untested assumption that others need protection. Further, because these strategies typically must remain private (telling someone you are easing in or trying to help them save face likely negates the intended effect), this adds layers of undiscussables that inhibit learning. There may be ways to start conversations following these politeness norms, however, and then, if others seem open to further testing and inquiry, one could move toward a more direct learning-oriented strategy. Such hybrid approaches could be tested in ongoing practice through reflective experimentation.

The second important area for further study concerns the implications of cultural differences for implementing Argyris's ideas. Is the prioritization of learning over control and protection inconsistent with the core values of some cultures? Are there ways to adapt his ideas to accommodate these differences while still emphasizing individual and collective learning? One possible framework for exploring such questions is that of Geert Hofstede. Hofstede and colleagues (2010) have identified five dimensions along which cultures vary: individualism-collectivism (prioritizing of individual vs. group interests), power distance (the extent to which power or status differences are accepted), masculinity-femininity (an emphasis on achievement and competition vs. relationships and cooperation), uncertainty avoidance (the extent to which individuals feel threatened by uncertainty or ambiguity), and time orientation (a short-term vs. long-term focus).

Argyris's goal of shifting from Model I to Model II theories of action depends on valuing learning over control and protection from conflict and negative feelings. Some cultures may not accept Argyris's prioritization of learning over these other values, and his framework would thus be less relevant or appropriate. For example, collectivist cultures may place more emphasis on group harmony than on learning, high-power-distance cultures may not accept openness or questioning from those of lower status, and short-term-oriented cultures may focus more on honoring traditions and maintaining existing relationships (through face-saving) than on future-oriented learning goals. In other cases, cultures may seek to prioritize learning but may require accommodations to also keep other values in acceptable ranges. For example, those from cultures high on what Hofstede calls masculinity may be less willing to be openly vulnerable and cooperate than they are to maintain control and to compete to win. Finally, those with high uncertainty avoidance may be especially uncomfortable with the risk and unpredictability associated with openly expressing ideas and encouraging public testing and inquiry. These are just some tentative connections that could be explored in further research.

Finally, the purpose of this article has been to present Argyris's ideas as a useful framework for understanding and promoting lifelong learning and inquiry; however, this is not a comparative claim that his is better than or should replace other learning theories. Thus, a final direction for future research is to explore relations between Argyris's and other approaches. In what ways does the theory of action perspective complement other perspectives? Where do conflicts or inconsistencies arise? In this article, I have argued that Argyris provides one valuable perspective. Ideally, however,

it should be combined with other perspectives for a deeper understanding of lifelong learning and inquiry, one that will be needed to realize Argyris's vision of a more learning-oriented democratic society.

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Input Trade and Service Industry Productivity Growth*

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ABSTRACT

In this paper, I address two questions: (1) Does reducing tariffs for manufacturing inputs affect productivity in service industries? (2) Does the effect of input trade liberalization differ for importers in service and manufacturing industries? To answer these questions, I used an establishment-level survey of Uruguayan service industries from 1998 to 2005, a period in which the country reduced its tariffs on manufactured products. I found that service establishments that import inputs from abroad experience a larger increase in productivity relative to non-importers when input tariffs are reduced. Furthermore, the effects of trade liberalization are as significant in the service industries as in manufacturing.

KEY WORDS Input Trade; Productivity; Service Industry; Uruguay

A well-established channel on how international trade affects productivity is the idea of technology diffusion. Theoretical approaches such as those of Ethier (1982), Markusen (1989), Grossman and Helpman (1991), Rivera-Batiz and Romer (1991), and Eaton and Kortum (2002) suggest that when a country lowers its barriers to trade, the variety and the quality of inputs it uses will improve as a result of specialization.¹ The basic idea behind this channel is that when a domestic firm purchases a manufactured product to use as an input (hereby referred as *manufacturing input*), any technology embodied in the input can be “spread” to different countries. Furthermore, the technology embodied in these inputs is nonrival; any firm can access the same technology by buying the identical input. Input trade therefore allows developing countries that do not have a comparative advantage in research and development

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Acknowledgments: I am grateful to Javier Pereira, William Rieber, Akira Sasahara, Dietrich Vollrath, and four anonymous referees, as well as to participants at the Midwest Economics Association and Western Economics Association annual conference for their valuable comments. I also thank Carlos Casacuberta, Diego Garcia, and Nestor Gandelman for their assistance on interpreting and constructing the data, and the National Statistics Institute (INE) of Uruguay for providing the census data. Any errors are my own.

(R&D) to move closer to the global technology frontier through input trade, allowing them to access the embedded technology without paying the R&D cost to acquire it.

This paper addresses two questions: (1) Does reducing tariffs for manufacturing inputs affect productivity in service industries? (2) Does the effect of input trade liberalization differ for importers in the service and manufacturing industries? The paper aims to fill the gap in current empirical evidence on the technology-diffusion hypothesis by focusing on the productivity gains from input trade for service industries. So far, the empirical evidence on productivity gains from input trade focuses on the impact for manufacturing firms,² although service industries may also benefit from input trade liberalization through their usage of foreign manufacturing inputs. Imported inputs account for a non-negligible percentage of all inputs used by service industries. For example, World Bank's enterprise survey found that among 87 developing countries, the average level of imported inputs equals 37 percent.³ Furthermore, while service industries are growing in importance relative to manufacturing in most developing nations, the impacts of trade liberalization on service industries is relatively unknown. To obtain a complete picture of the consequences of trade policies, it is therefore crucial to evaluate the effects on service industries.

Two things motivate this paper: (1) the attempts that have been made to liberalize trade in Uruguay and (2) the importance of service industries to Uruguay's economy. Since the late 1980s, Uruguay has gone through a series of reforms that have reduced tariffs on imported products. In 1998, the country joined the trading bloc MERCOSUR, which aims to create a customs union in South America. As a member of MERCOSUR, Uruguay adhered to the convergence scheme in the union and began the process to reduce its common external tariff (CET) to the level of other MERCOSUR countries. The result was that by 2005, 86 percent of all items imported to Uruguay from non-MERCOSUR countries was subject to CET (Vaillant 2005), higher than the average of all MERCOSUR countries. Service industries accounted for the majority of Uruguay's production and employment. For example, from 1998 to 2005, the service industry's value added on average accounted for 61.7 percent of the country's GDP and for 66.8 percent of the country's total employment (World Bank 2021a, 2021b). The country's accession to MERCOSUR and the importance of its service industry justify the understanding of how trade liberalization contributes to productivity growth in its service industries.

To answer both research questions, this paper uses a firm-level panel survey for Uruguay provided by the National Statistics Institute (INE) from 1998 to 2005 that contains information on importing status, value of production, and usage of inputs for firms in both manufacturing and service industries and adopts a fixed-effect estimation strategy to test the technology-diffusion channel among firms in the service industry. To be consistent with the channel, the effects of input-tariff reduction should be amplified by the share of imported intermediate input. In other words, firms that import more should grow productivity by a larger amount than others. Given the availability of data, however, this paper uses the share of capital inputs imported from abroad (hereby referred to as *imported capital share*) as a

proxy for the share of imported intermediate inputs (hereby referred to as *imported input share*). Although imported capital share is not a perfect measure for imported input share, it is an adequate proxy for the latter, as both shares are somewhat correlated.⁴ Furthermore, using imported capital share is still consistent with the technology-diffusion story, as imported capital itself also embeds production technology from abroad.⁵

The main result is that for firms in service industries, higher imported capital share magnifies the productivity gains from input tariff reduction. The effects are robust to alternative measures of productivity, the addition of country-sector-year varying controls, and alternative econometric specifications. Another result suggests that the effects of input trade liberalization for importers are as strong in service industries as in manufacturing industries.

These results support the idea that international trade promotes technology diffusion. As in Eaton and Kortum (2001), the gains from input trade follow a simple Ricardian idea: when all countries in the world specialize based on their respective comparative advantages, countries without a comparative advantage in research and development can import inputs incorporating R&D efforts from abroad. The results also highlight another potential benefit for enabling developing countries to integrate themselves into global supply chains as users of intermediate inputs. Whereas traditional trade theory focuses on the consumption gains (i.e., the welfare effects) from trade, the technology-diffusion channel highlights the *production* gains from trade. For developing countries, the integration implies increased access to the R&D efforts from other countries in the form of higher quality input. This allows developing countries to achieve the productivity gains necessary for further gains in employment and wages, which are among the most important objectives under the United Nations' Sustainable Development Goals.

The results in this paper are consistent with studies investigating the liberalization of trade in manufacturing goods on productivity in the service sectors. Dehejia and Panagariya (2016) look at how trade liberalization in Indian manufacturing sectors contribute to labor productivity growth in the service sectors and the spillover effects of such productivity growth on the Indian manufacturing sectors. Malchow-Moller, Munch, and Skaksen (2015) study the effects of manufacturing inputs and service inputs in the productivity for Danish manufacturing and service industries using firm-level data. Both papers find that reduced tariffs and increased imports in manufacturing inputs can positively affect the productivity of the service industry. In addition, this paper complements the macroeconomic-level studies on input trade restrictions and productivity growth such as those by Coe and Helpman (1995) and Estevadeordal and Taylor (2013) by examining and comparing the growth effects between firms in both the service and manufacturing industries.

The next section of this paper explains the empirical strategy. The paper then introduces the data used and presents the results before concluding.

ESTIMATION STRATEGY

Measuring Productivity

Following the standard assumption in studies on productivity growth, all firms have the following Cobb–Douglas production function:

$$Y_{eit} = A_{eit} K_{eit}^{\beta_{1i}} L_{eit}^{\beta_{2i}}, \quad (1)$$

where the value added (Y) for firm e in industry i at time t is a function of capital (K) and labor (L). Equation (1) suggests that within all service industries, the elasticities of capital and labor with respect to output (β_1 and β_2) are identical across firms and remain constant over time, although the elasticities can be different from those in manufacturing industries. The productivity measure in this paper is total factor productivity (TFP), which is the unobserved factor that represents how efficiently the firm uses its production factors K and L . TFP is represented by A_{eit} in Equation 1. A rise in TFP implies that production factors K and L are used more efficiently in the production process, as the same amount of K and L result in higher production Y .

TFP for each firm is constructed as the residual from running a regression based on Equation 1.⁶ In particular, TFP for each firm is equal to the following:

$$tfp_{et} = y_{et} - \hat{\beta}_1 k_{et} - \hat{\beta}_2 l_{et} \quad (2)$$

One concern with this estimate is that the decision to employ capital and labor is endogenous to productivity shocks. In this case, the coefficients in Equation 2 are biased because they capture the effects of the shocks. To address this potential issue, this paper follows the Levinsohn and Petrin (2003) estimation method to control for the simultaneity problem in which the input choice of a surviving firm depends on its productivity level. This method addresses the issue by using other intermediate inputs to act as proxies for the shocks. The identifying assumption behind the method is that firms increase their use of certain inputs following a positive shock to productivity and as a result, the unobserved shocks can be estimated with the observed usage of inputs. Once the unobserved shocks are proxied, the estimated coefficients in Equation 2, and thus the TFP measure, should be consistent. This paper uses the consumption of materials deflated by the producer price for intermediate goods as the proxy.

Table 1 presents the regression results from estimating Equation 2 using both OLS and Levinsohn–Petrin methods. The coefficients for capital and labor in Equation 2 in the Levinsohn–Petrin method are smaller as compared with OLS, although they remain statistically significant.

There are a few issues remaining with respect to the TFP measure. One issue is that measured productivity may capture the differences in markups across firms rather than capturing actual efficiency. To address the issue, this paper uses the measures of output, capital, and spending using industry-level prices because firm-level prices are not

available. As De Loecker et al. (2016) argued, however, trade liberalization may allow the firm that trades to gain market power over time relative to others in the same industry. As long as the industry is not perfectly competitive, the firm can charge a higher markup for its output than the industry average, which increases its measured TFP even when its efficiency does not improve.

Table 1. Estimating TFP

	(1)	(2)	(3)	(4)
Method	OLS	OLS	Levinsohn–Petrin	Levinsohn–Petrin
Sector	Services	Manufacturing	Services	Manufacturing
Log capital	0.221*** (0.005)	0.269*** (0.008)	0.091* (0.055)	0.040 (0.039)
Log labor	0.734*** (0.009)	0.835*** (0.017)	0.682*** (0.027)	0.564*** (0.045)
Number of observations	12393	4900	5197	4787

Notes: TFP=total factor productivity.

Dependent variable is value added. The first column uses the OLS method to estimate TFP, the second column uses Levinsohn and Petrin method to estimate TFP. Standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

In addition, because there is no data on the composition of workers, the TFP estimates may also capture the changes in human capital stock rather than the overall efficiency. To address issues related to unmeasured inputs such as human capital, this paper also uses labor productivity (defined as value added per worker) as an alternative measure of productivity. Although the measure captures the efficiency of workers rather than the efficiency of all inputs, the advantage of labor productivity is that it is not sensitive to the aforementioned measurement issues.

As another robustness check, this paper also follows Amiti and Konings (2007) by controlling for industrial concentration to serve as proxy for unobserved markups. The rationale is that if some firms are charging higher markups after trade liberalization, their sales should expand relative to those of other competitors; hence, an increase in the concentration of sales within an industry implies an increase in the markups.

Uruguay's Trade Policy

Uruguay's ascension to the MERCOSUR implies that the nation's trade policies have to (1) liberalize trade between members of the trading bloc and (2) converge to a common trade policy for trade with nonmembers. For goods that do not meet the rule-of-origin

requirement (i.e., nonnative products), a CET will be applied. Although the goal of MERCOSUR is to create a customs union that jointly sets and enforces CET, the members were allowed to include a national exception list in which the convergence to CET could be delayed (Vaillant 2005). All countries in MERCOSUR negotiated an exception list, which results in differences in applied CET across countries. For example, the average applied CET for all products in MERCOSUR was 10 percent in 2004, while in Uruguay it was 9.1 percent (Vaillant 2005).

While it is possible that less-productive manufacturing industries may have more incentive to lobby for their goods to be put on the exception list in order to reduce foreign competition, this paper assumes the tariffs on manufacturing inputs are exogenous to any particular firm's productivity. The first reason is that the service firms, especially the ones that import inputs, actually have incentives to lobby *against* higher CET, which may potentially offset the manufacturing industries' lobbying effort. Also, Uruguay actually outperformed its MERCOSUR counterparts in applying CET, as 86 percent of all imported items from non-MERCOSUR countries are subject to CET rather than on the exception list. Furthermore, although MERCOSUR members began negotiations to liberalize service trade, no major policy actions took place in the sampled period. Besides an increase in private participation in the service sector, there were no other simultaneous service trade-liberalization policies in Uruguay.⁷ These support the hypothesis that Uruguay's tariff rates on manufacturing inputs are not directly affected by firm productivity in service industries.

Another feature of Uruguay's trade policy is the temporary admission regime for exporters, which allows tariff-free importing of certain materials and manufactured inputs, provided the final good is re-exported (Terra 2006). The regime may affect exporting and non-exporting firms differently; however, as noted in Terra (2006), the beneficiaries of this policy are primarily firms producing manufactured final goods rather than services. This paper will control for the effect of such a regime on particular industries and the overall economy through industry and time fixed effects while assuming that the regime's effect did not vary across firms within the same industry, given that the beneficiaries of this policy were not from service industries.

Input Trade and Productivity

This paper estimates the following equation to test the relationship between input tariffs and productivity:

$$tfp_{eit} = \gamma_0 + \gamma_1 tfp_{ei,t-1} + \gamma_2 T_{it} + \gamma_3 imp_{eit} + \gamma_4 T_{it} imp_{eit} + \alpha_i + \alpha_t + \epsilon_{eit}, \quad (3)$$

where T_{it} is the tariff of imported inputs faced by industry i in year t , and imp_{eit} is a time-varying measure of the importing status of establishment e . Given the data availability, imported capital share is used as a proxy for the share of inputs imported from abroad.⁸ The assumption is that imported capital share is positively correlated with imported input share; that is, the more capital a firm imports, the more intermediate inputs it will also

import. The equation also controls for lagged TFP ($tfp_{ei,t-1}$), as suggested by the Levinsohn and Petrin (2003) method, as well as for unobserved time-invariant characteristics of each industry (α_i) and common time trends that affect all firms within the country (α_t).

This paper employs a fixed-effect estimation strategy to estimate Equation 3. Under this strategy, the coefficient γ_2 captures the average effect of input tariff on all firms within the same industry. A negative estimate of γ_2 suggests that removing restrictions on trading inputs has a positive effect on average productivity growth among all firms. In addition, γ_3 in Equation 3 captures any fundamental differences in productivity explained by import shares, and γ_4 is the coefficient of interest. Given the estimation strategy, the coefficient should be interpreted as the additional contribution of import shares on the productivity gains from input trade liberalization. A negative estimate of γ_4 is therefore consistent with the technology-diffusion hypothesis: when firms import more capital (and therefore more intermediate inputs) from abroad, they receive larger productivity gains following a reduction in input tariffs.

The biggest macroeconomic shock for Uruguay occurred from 2002 to 2003, when the country suffered from massive recession and sharp currency depreciation. Although the inclusion of the common time trends controls for macroeconomic fluctuations that affect all firms in any given year, the effects of these shocks can affect firms of different types and sectors heterogeneously; for example, firms that relied more on domestic sales or incurred more foreign-currency-denominated trade credit would be disproportionately worse off. The survey data do not suggest a big change in the intensive and extensive margin among service providers, as the percentages of imported capital inputs and of firms that imported these inputs are comparable before and during the recession of 2002–2003.⁹ This paper also estimates Equation 3 separately for years 1998–2001 and 2002–2005, however, and compares the effects as a robustness check to account for differential effects during the recession years.

Other underlying assumptions in Equation 3 are that (1) imported inputs improve importers' productivity as soon as the inputs are utilized and (2) all other simultaneous shocks that affect productivity and importing decisions are addressed by the fixed effects. These assumptions are based on the observation that firms in developing countries face technological constraints due to inadequate access of inputs, so when the restrictions on imported inputs are loosened, firms will respond immediately to the new policy. A well-established finding in the trade literature, however, is that firms may select themselves to import inputs, and the input importing status may hence be endogenous to tariffs.¹⁰

Although the industry and country fixed effects control for industry-wide factors and macroeconomic shocks that may affect importing decisions, tariffs, and productivity simultaneously, they do not fully address the endogeneity of input importing status arising from firm-level characteristics. This paper therefore employs two alternative strategies to address issues with assumptions 1 and 2. The first is to lag all the independent variables in Equation 3 by one period. The idea is that firm productivity in the current period (t) should not have a direct impact on the firm's importing decisions in the *past* ($t - 1$). This addresses the reverse causality issue and at the same time allows the possibility that the full effect of policy shock on productivity may take longer to be

realized. Another alternative strategy is to replace time-varying importing status (imp_{eit}) with a time-invariant importing status that is equal to the firm's importing status in its first year in the sample (imp_{ei0}). This strategy addresses the possible dynamic relationship between trading decisions and productivity¹¹ by eliminating the endogenous variation in importing status over time.

DATA

Tariff data on manufacturing products come from the United Nations' Conference on Trade and Development (UNCTAD) database obtained from the World Bank (2018). Tariff rates are available on an annual basis for all types of manufacturing goods at the six-digit Harmonized System industry level, the most detailed industrial classification possible.¹² The tariff rates are then aggregated to the two-digit Global Trade Analysis Project (GTAP) industry level, with the weights equal to the share of imports for each six-digit good in the total imports for the corresponding two-digit good. The reason to aggregate is that the input-output tables used in this paper, which details the usage of domestic and foreign inputs, are available for only the two-digit manufacturing and service industries.

This paper follows the method by Amiti and Konings (2007) on computing the imported input tariff that each industry faced as the weighted average of tariff rates on manufactured goods:

$$T_{it} = \sum_j s_{ij} t_{jt} \quad (4)$$

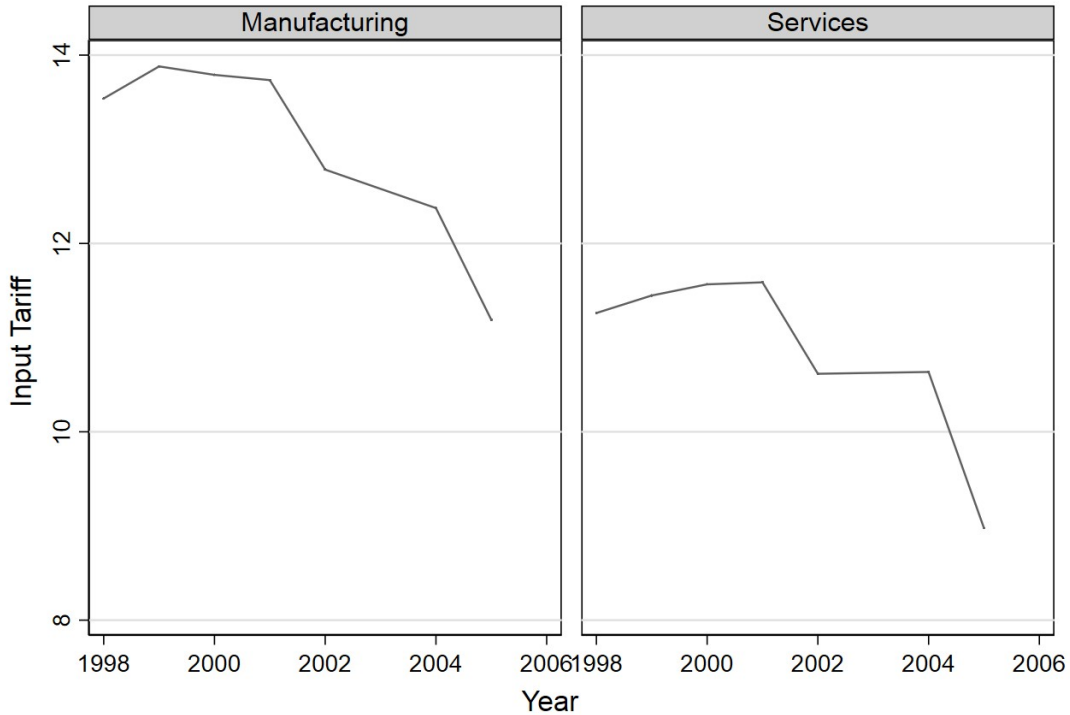
where T_{it} is the tariff on manufacturing inputs faced by industry i in period t , t_{jt} is the tariff on manufacturing goods produced by industry j in period t , and the weight (s_{ij}) is industry i 's spending on input j as a percentage of industry i 's total spending on manufacturing inputs. In other words, T_{it} is a weighted average of tariffs on manufacturing inputs used by industry i . For example, if the transportation sector allocates 55 percent of total input spending to motor vehicle inputs, then tariffs on vehicles should account for 55 percent of the overall input tariff for the transportation sector.

The weights vary at the industry level rather than at the firm level. As Amiti and Konings (2007) argue, using the weights at the firm level may cause additional issues if input-importing firms are able to purchase inputs at lower prices from abroad and are thus able to achieve higher measured productivity than are the others. Because the survey does not provide firm-level details on the type of inputs used, this paper uses the input-output table from the seventh version of the GTAP from Purdue University to compute the weights.¹³ This paper fixes the weights over time because variation in input spending over time may be driven by productivity growth.¹⁴

Figure 1 shows the changes in average input tariffs over time for manufacturing and services. Input tariffs fell by slightly more than two percentage points on average for both manufacturing and service industries from 1998 to 2005, while service industries faced

lower input tariffs, on average, during this period than did manufacturing industries. Table 2 details the rate of input tariffs for each two-digit service and manufacturing industry.

Figure 1. Input Tariffs for Manufacturing and Services



Note: Input tariffs for manufacturing and services are the simple averages of input tariffs in all manufacturing industries and all service industries.

The main takeaway is that input tariffs fell by different proportions for the sectors depending on each sector’s import usage. For example, tariffs for air transportation fell by only 1.5 percentage points from 1998 to 2005, but tariffs for wholesale and retail trade fell by 2.3 percentage points. This implies that the tariffs for manufacturing inputs that were used more heavily in air transportation industries fell by a smaller amount relative to the tariffs for other inputs.

Productivity data come from the Encuesta Anual de Actividad Económica (Economic Activity Survey) compiled by the INE of Uruguay for 1998 to 2005.¹⁵ For the Uruguayan survey, all firms in the manufacturing and service industries with more than 50 employees were included, and some with fewer than 50 employees were randomly selected. The same firms were surveyed annually. In place of firms that ceased doing business, the INE added new ones into the sample to replace them. This paper uses 1998 as the starting year because it is the first year for which survey data are available. The final year is 2005 because a major revision to survey methodology and firms sampled

occurred in 2006 and it was not possible to uniquely identify the firms included in both the pre- and post-2005 surveys.

Table 2. Input Tariffs by Industry

Sector	1998 Tariff (%)	2005 Tariff (%)
Services		
Gas distribution	11.28	8.86
Water	11.84	9.47
Wholesale and retail trade	13.54	11.21
Other transport	7.32	6.38
Water transport	11.67	9.70
Air transport	9.29	7.80
Post and telecommunications	8.28	5.57
Other business services	10.45	7.64
Other services	12.06	9.70
Manufacturing		
Meat processing	12.86	10.23
Vegetable oil	12.81	11.23
Milk	13.44	10.90
Other food	13.72	11.46
Beverage and tobacco	14.54	11.89
Textiles	15.01	12.30
Wearing apparel	19.25	16.01
Leather	15.38	12.03
Lumber	15.51	12.42
Paper & paper products	13.86	11.30
Petroleum & coke	12.34	9.87
Chemical rubber products	12.27	10.00
Nonmetallic minerals	13.44	10.51
Iron & steel	12.34	10.51
Fabricated metal products	12.71	10.69
Motor vehicles and parts	13.85	12.03
Other transport equipment	18.73	15.17
Electronic equipment	10.36	7.86
Other machinery & equipment	11.67	9.39
Other manufacturing	12.78	10.66

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The variables used in this paper include value added, number of workers, value of capital stock, value of materials used, and industry of each firm. Aggregated country-level GDP deflator as well as material and capital prices are used to deflate revenue, material, and capital inputs, given that no firm-level price indexes were available in the survey.¹⁶ Price indexes were obtained from Banco Central de Uruguay (2018). The measures for value added and labor input are straightforward to compute. For capital stock, this paper uses the perpetual inventory method to calculate capital stock because of data availability, assuming a constant depreciation rate over time for all firms in the same sector.¹⁷ The data comprise an unbalanced panel of firms in 19 manufacturing and 9 service industries. Appendix Tables A1 and A2 list the number of firms included in the sample for each year and the number of observations among firms in the sample, and Appendix Tables A3 and A4 present the summary statistics for all firms and for firms in the service and manufacturing industries.

RESULTS*Do Service Firms Benefit from Input Trade Liberalization?*

Table 3 presents the baseline results. The first column shows the average effect of input tariff on TFP calculated by the Levinson–Petrin method. Column 1 estimates the average effects from input tariff reduction, and column 2 shows the regression results from estimating Equation 3 for both manufacturing and service-industry firms. The coefficients for input tariff and import share all display expected signs, suggesting that input-tariff reductions are positively associated with TFP growth, while firms with a higher share of imported inputs also have higher productivity. The coefficient for the interaction term is negative, suggesting that the productivity gains from input tariff reduction is magnified by the firms’ usage of imported inputs. To put the estimates in perspective, a one-standard-deviation increase in import share increases the effect of a one-standard-deviation decline in input tariff on TFP by 0.28 percent.

Columns 3 and 4 of Table 3 estimate Equation 3 for service firms and manufacturing firms separately. Similar to the main results in column 2, results in column 3 suggest that import share further increases the productivity gains from input tariff reduction for firms in the service industry. The coefficient suggests that among service firms, raising the share of imported inputs by one standard deviation magnifies the increase in TFP from a one-standard-deviation decline in input tariff by 0.29 percent. Column 4 shows that among manufacturing firms, the same pattern also holds, although the effects are less statistically significant. The results from the final two columns suggest that a reduction in tariffs on manufacturing inputs affects not only the manufacturing sector but also the productivity of firms in the service sector, and the effect is stronger when firms increase their use of imported inputs.

Table 3. Baseline Results Using TFP Estimated by Levinsohn–Petrin Method

Industry	(1) All	(2) All	(3) Services	(4) Manufacturing
Dependent variable: $\text{Log}(\text{TFP})_{eit}$				
TFP $_{t-1}$	0.387** (0.183)	0.387** (0.182)	0.201* (0.106)	0.673*** (0.134)
Input tariff	-0.523 (0.435)	-0.470 (0.417)	-0.732 (0.625)	-0.660 (0.508)
Import share		1.971** (0.814)	2.138*** (0.687)	1.251 (0.892)
Input tariff \times Import share		-0.744** (0.334)	-0.873*** (0.265)	-0.431 (0.359)
R^2	0.25	0.25	0.13	0.48
Number of observations	14102	14102	10193	3909

Notes: TFP=total factor productivity.

All regressions include sector and year dummies. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

The evidence from Table 3 supports the hypothesis that international trade contributes to international technology diffusion through intermediate inputs. Furthermore, the results for service firms are similar to the findings for manufacturing firms and plants. As firms in service sectors may use inputs from manufacturing sectors, liberalizing manufacturing trade may also have additional benefits in service sectors, and vice versa. The results are also robust to alternative definitions of productivity. For example, Table 4 reestimates the same equations as in Table 3, with output per worker as the productivity measure. The coefficients from Table 4 are consistent with those from the main results, suggesting that the results are not sensitive to productivity measures.

One issue with the main results is that the amount of imported inputs may be endogenously determined. For example, a well-established finding in the trade literature is that firms with higher productivity are more likely to participate in international trade. To control for the possibility, this paper uses two alternative import-status measures: an import dummy equal to 1 as long as the firm imports in a given period, and an initial import dummy equal to 1 if the firm imports in the first year of observation. Both measures eliminate the endogenous variations in the intensive margin of imports, and for the initial import dummy, the time variations in importing status are entirely removed. Columns 1 and 2 of Table 5 present the results for service firms. The interaction terms are similar in magnitude to the main results, indicating that firms' self-selection into imports does not entirely drive the productivity gains from importing inputs.

Table 4. Baseline Results Using Labor Productivity

Industry	(1) All	(2) All	(3) Services	(4) Manufacturing
Dependent variable: $\text{Log}(\text{VA}/\text{L})_{eit}$				
$(\text{VA}/\text{L})_{t-1}$	0.002 (0.017)	0.002 (0.017)	-0.000 (0.020)	-0.018 (0.032)
Input tariff	-0.120 (0.200)	-0.091 (0.200)	0.001 (0.227)	-0.690 (0.533)
Import share		1.223*** (0.321)	1.093*** (0.276)	2.673* (1.282)
Input tariff \times Import share		-0.482*** (0.128)	-0.435*** (0.112)	-1.037* (0.501)
R^2	0.10	0.10	0.09	0.12
Number of observations	19908	19908	14822	5086

Notes: All regressions include sector and year dummies. Dependent variable is value added per worker. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

Column 3 in Table 5 addresses other possible explanations for the main results by including an exit dummy that equals 1 if the firm is no longer included in the subsequent surveys after year t ,¹⁸ as well as the competitiveness of the industry, measured by the Herfindahl index constructed at the two-digit industry level. The rationale behind including these variables is that (1) the main results may capture survival bias and may overestimate the true effects of tariff reduction on importers, and (2) if less-productive firms leave the market, the productivity gains from importing inputs may instead be capturing increasing market power by remaining firms. The coefficient for the interaction term in column 3 is comparable to those coefficients in Table 3, implying that the main results are still robust after controlling for these variables.

Another set of robustness checks deals with simultaneity issues among productivity, contemporaneous import decisions, and input-tariff rates, as well as the significant macroeconomic shocks during the sample period. Table 6 addresses these issues by estimating Equation 3 with lagged independent variables. Using lagged independent variables also accounts for the possibility that more time may be required to realize the effect of input-tariff reduction. The coefficients for the interaction terms remain negative and statistically significant for firms in the overall economy and within service industries, implying that input tariff reduction has a stronger effect on *subsequent* productivity growth for firms importing a larger amount of inputs. Table 7 reestimates Equation 3 for service firms in two subperiods—1998–2002 (column 1) and 2003–2005 (column 2)—to test whether the results remain robust after the major economic recession of 2002–2004. The recession may have affected import decisions and productivity

differently across firms, which may in turn have affected the impact of import shares on the trade-growth relationship after recession if only the more productive firms survived the macroeconomic shock. The results from Table 7, however, suggest that there are no differential impacts before and after recessions, although the coefficients for the interaction terms become less statistically significant.

Table 5. Alternative Import Definition and Adding Control Variables

	(1)	(2)	(3)
Dependent variable: $\text{Log}(\text{TFP})_{eit}$			
TFP _{t-1}	0.201* (0.106)	0.202* (0.106)	0.201* (0.106)
Input tariff	-0.701 (0.612)	-0.722 (0.651)	-0.742 (0.625)
Import dummy	1.751*** (0.606)		
Import dummy × Input tariff	-0.699*** (0.230)		
Initial import dummy = 1 × Input tariff		-0.538* (0.290)	
Import share			2.140*** (0.684)
Input tariff × Import share			-0.873*** (0.264)
Herfindahl index ^a			0.227 (0.376)
Exit dummy ^b			-0.063 (0.095)
R^2	0.13	0.13	0.13
Number of observations	10193	10193	10193

Notes: TFP=total factor productivity.

^a Calculated at the two-digit industry level.

^b Exit dummy=1 if firm is not in the sample in period $t + 1$.

All regressions include sector and year dummies. TFP is estimated using Levinsohn–Petrin method. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

Table 6. Alternative Specifications: Lagged Independent Variables

	(1)	(2)
Industry	All	Services
Dependent Variable: $\text{Log}(\text{TFP})_{eit}$		
TFP_{t-1}	0.387** (0.183)	0.203* (0.108)
Input tariff $_{t-1}$	0.515 (0.407)	0.640 (0.498)
Import share $_{t-1}$	2.007*** (0.587)	1.846*** (0.516)
Input tariff $_{t-1} \times$ Import share $_{t-1}$	-0.748*** (0.227)	-0.661*** (0.200)
R^2	0.25	0.13
Number of observations	14103	10193

Notes: TFP=total factor productivity.

All regressions include sector and year dummies. TFP estimated using Levinsohn–Petrin method. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

Table 7. Alternative Specifications: Different Time Periods

	(1)	(2)
Period	1998–2002	2003–2005
Dependent variable: $\text{Log}(\text{TFP})_{eit}$		
TFP_{t-1}	-0.083 (0.182)	0.129*** (0.002)
Input tariff	-1.437 (1.170)	-0.112 (0.224)
Import share	2.574 (1.752)	1.592 (0.999)
Input tariff \times Import share	-1.042 (0.686)	-0.651 (0.399)
R^2	0.04	0.22
Number of observations	5081	5112

Notes: TFP=total factor productivity.

All regressions include sector and year dummies. TFP estimated using Levinsohn–Petrin method. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

The final set of robustness tests (Table 8) looks at alternative econometric specifications to test whether the results are sensitive to these specifications. Columns 1 and 2 use two-year averages (year t and the prior year) for dependent and independent variables, and columns 3 and 4 use the two-year growth rates. The reason for using two-year rates instead of longer periods is to maximize the number of observations, because the sample period from 1998 to 2005 is only seven years. The primary result—that input trade disproportionately benefits firms with higher imports—remains statistically significant. Overall, these results further verify that the productivity growth from manufacturing-trade liberalization was stronger for service firms that used more foreign inputs. The effect is robust to alternative econometric specifications that control for potential endogeneity issues, as well as to alternative definitions of importing status.

Table 8. Alternative Specifications: Average Tariffs and Tariff Growth Rates

Industry	(1) All	(2) Services	(3) All	(4) Services
Dependent variable: $\Delta\text{Log}(\text{TFP})_{ei(t,t-2)}$				
Import share	5.334** (2.015)	4.891** (2.289)	-0.032 (0.138)	0.338* (0.189)
Average tariff ^a	2.950 (3.025)	4.122 (4.639)		
Average tariff \times Import share	-2.075** (0.791)	-1.890* (0.927)		
Tariff growth ^b			-0.842 (0.706)	-1.046 (0.831)
Tariff growth \times Import share			-9.754*** (2.634)	-5.615** (2.413)
R^2	0.03	0.04	0.04	0.04
Number of observations	5504	3968	5504	3968

Notes: TFP=total factor productivity.

All regressions include sector and year dummies. TFP estimated using Levinsohn–Petrin method. Sector-clustered standard errors are shown in parentheses.

^a Two-year average of input tariffs (in logs).

^b Two-year growth rate of input tariffs.

* $p < .10$ ** $p < .05$ *** $p < .01$

A couple of potential explanations cannot be tested because of limitations of the data. One potential direction for future research is for understanding the dynamic effects of technology diffusion through alternative channels. For example, Keller (2004) argued that international economic activities such as trade also lead to additional contacts with

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foreign firms and individuals who may possess advanced technological knowledge. This increased interaction may contribute to technology diffusion through (1) domestic firms learning the foreign technology through foreign firms and individuals, (2) imitation of this technology by domestic firms, and (3) original innovation by domestic firms, in addition to adoption of the technology embodied in the intermediate good itself. Given the time span of the survey, the dynamic effects from learning foreign technology cannot be isolated from the contemporaneous gains from input trade, as the latter mechanism tends to take more time to realize the effects. Furthermore, MERCOSUR also provided Uruguayan firms access to larger markets through exports, which can also directly affect the firms' productivity. This hypothesis cannot be isolated, however, because of a lack of information in the survey about the intensive and extensive margin of exports, although the time-specific dummies would capture the economy-wide effects of wider access to the export market.

Does Trade Liberalization Have Larger Effects on Service Sectors than on Manufacturing Sectors?

Because reductions in input tariffs also increase the productivity of service firms that import, this paper tests whether the marginal effects from importing inputs on the trade-growth relationship are different for service and manufacturing firms. The test is motivated by the possible differences in the mechanisms for how input tariffs may affect manufacturing and service industries. The effects may also differ based on the differences in the input-output structure between the two importers. For example, if the quality of certain inputs contributes to the measured productivity of manufacturing firms more than it contributes to that of service firms, importing such inputs with higher quality should increase productivity more in manufacturing relative to services.

To answer this question, the following equation is estimated:

$$\begin{aligned}
 tfp_{eit} = & \beta_0 + \gamma_0 tfp_{ei,t-1} + \gamma_1 T_{it} + \gamma_2 imp_{eit} + \gamma_3 serv_i + \\
 & \gamma_4 T_{it} imp_{eit} + \gamma_5 T_{it} serv_i + \gamma_6 imp_{eit} serv_i + \\
 & \gamma_7 T_{it} imp_{eit} serv_i + \alpha_e + \alpha_t + \epsilon_{eit},
 \end{aligned} \tag{5}$$

where $serv_i$ is a dummy that equals 1 if the firm is in one of the service industries. Other variables in Equation 5 are the same as those in Equation 3.

In Equation 5, γ_7 is the main coefficient of interest. It captures the difference between service and manufacturing firms on the differential impact of import shares (imp_{eit}) on the productivity gains from input tariff reduction. A negative γ_7 implies that the marginal effect of import share on the productivity gains from input tariff reduction is stronger for service firms than for manufacturing firms, whereas a positive γ_7 suggests otherwise. Other terms capture the fundamental differences in productivity between different types of firms. For example, γ_3 captures the fundamental differences in

productivity between service and manufacturing firms, γ_4 captures the average effect of import share among all firms, γ_5 captures the differences in the average effect of tariffs for manufacturing and service firms, and γ_6 captures the average differences in import share on productivity between service and manufacturing industries.

Table 9. Triple-Difference Results

	(1)	(2)	(3)	(4)
Period	1998–2005	1998–2005	1998–2002	2003–2005
TFP _{t-1}	0.387** (0.182)	0.387** (0.182)	-0.305* (0.151)	0.106*** (0.028)
Input tariff	-0.639 (0.489)	-0.647 (0.486)	-0.593 (1.221)	-0.170 (0.328)
Import share	3.629** (1.735)	3.634** (1.741)	3.778 (5.169)	0.144 (1.677)
Service dummy	-0.807 (0.705)	-0.816 (0.697)	-0.904 (3.823)	-0.285 (0.757)
Input tariff × Import share	-1.335** (0.631)	-1.337** (0.633)	-1.293 (1.823)	-0.071 (0.685)
Service × input tariff	0.205 (0.295)	0.211 (0.293)	0.181 (1.421)	-0.018 (0.315)
Service × Import share	-1.332 (1.949)	-1.336 (1.953)	-3.952 (5.190)	1.586 (2.008)
Service × Input tariff × Import share	0.381 (0.727)	0.383 (0.728)	1.299 (1.830)	-0.654 (0.823)
Herfindahl index		0.072 (0.260)		
Exit dummy		0.029 (0.281)		
R^2	0.25	0.25	0.12	0.07
Number of observations	14102	14102	4967	7070

Notes: TFP=total factor productivity.

All regressions include sector and year dummies. Sector-clustered standard errors are shown in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

Table 9 presents the results from estimating Equation 5. Column 1 suggests that, similar to the main results, the impact of input tariff reduction on productivity is enhanced by the share of imported inputs. The coefficient for the triple interaction term is

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not significantly different from zero, however, suggesting that importers in service industries enjoyed additional benefits from tariff reduction similar to those enjoyed by their manufacturing counterparts. Column 2 controls for the possibility of exit and industry concentration. Similar to column 1, controlling for these additional variables does not affect the results significantly. Columns 3 and 4 look at the subperiods 1998–2002 and 2003–2005 and also find no evidence indicating a stronger impact of productivity growth differences between service and manufacturing industries.

To summarize, not enough evidence exists to support the supposition that the effects of tariff reductions on importers versus nonimporters differ between service and manufacturing firms. Although both service and manufacturing importers were affected by tariff reductions, the evidence suggests that any additional mechanisms by which tariffs affect manufacturing importers were not significant enough to generate any differential effects between the importers in the different sectors.

CONCLUSION

This paper looked at how input tariff reduction affected productivity for service and manufacturing firms in Uruguay. This is one of the first studies to estimate the effects of input trade on service industries and to compare the effects between service and manufacturing firms. The results showed that input tariff reduction disproportionately benefits importers; in particular, the more manufactured inputs a service firm imports from abroad, the bigger the increase in the service firm's productivity. The effects are robust to alternative measures of productivity, the addition of country-sector-year varying controls, and alternative econometric specifications. Furthermore, the effects of tariff reductions on importers are similar between service and manufacturing industries.

The results support the theoretical possibility that input trade is crucial for productivity gains by allowing production technology to spread across international borders. They also highlight the service industry's contributions to overall productivity growth from trade-liberalization policies. One possible direction for future research is in further understanding the technology-diffusion channel—in particular, isolating the contribution of immediate technology acquisition through imported inputs from other potential channels, as in Keller (2004). Another possible direction is in testing the complementarity between input trade liberalization and other policy reforms. For example, Halpern, Koren, and Szeidl (2015) find that the productivity benefits from importing foreign inputs are larger for foreign-owned manufacturing firms than for domestic ones, as the former have more information about foreign markets and therefore have more knowledge about matching the suitable input supplies with demand. Testing whether the complementarity also applies for service industries is crucial, as these industries account for an increasing share of production in developing nations.

ENDNOTES

1. Also see Keller (2004) for a summary of studies related to technology diffusion.

2. For some examples of input trade and productivity growth among manufacturing firms, see Pavcnik (2002), Bernard et al. (2003), Amiti and Konings (2007), Kasahara and Rodrigue (2008), Goldberg et al. (2010), Topalova and Khandelwal (2011), and Halpern, Koren, and Szeidl (2015).
3. See Amin, Islam, and Wong (2014) for more information.
4. For example, Caselli (2018) finds that among Mexican manufacturing industries, those with higher shares of plants importing intermediate inputs also have higher shares of plants importing capital inputs.
5. Empirical evidence from Caselli (2018), Bempong Nyantakyi and Munemo (2017), and Estevadeordal and Taylor (2013) suggests that imported capital inputs have a relatively larger impact on productivity than do material inputs.
6. As a check of robustness, this paper also estimates TFP by assuming that both service and manufacturing industries have identical elasticities. This assumption does not change the results.
7. See World Trade Organization (1998) for a detailed description about the trade-liberalization policies.
8. As a robustness check, this paper also uses an indicator dummy equal to 1 if the firm imports any amount of its capital goods, and the results are similar.
9. For all firms included in the sample for 2001–2003, the share of firms importing from abroad fell from 5.5 to 3.5 percent, but the share of imported inputs fell from 8.7 percent to only 8.5 percent.
10. See Bernard et al. (2003), Vogel and Wagner (2010), and Kasahara and Lapham (2013) for evidence regarding productivity differences between trading and nontrading firms.
11. As Aw, Roberts, and Xu (2011) find, given the trade costs, as companies become more productive, they are more likely to engage in international trade.
12. The UNCTAD data do not include tariff rates for 2003. This paper therefore uses tariff data from the World Trade Organization (WTO) to compute tariff rates in 2003. The tariff rates from the WTO data are comparable to UNCTAD's data at the six-digit industry level.
13. This paper chooses 2004 as the base year to compute the input-output table.
14. For example, suppose that as productivity in the transportation sector grows, the sector may spend relatively more on automobiles and/or other transportation equipment and relatively less on other inputs. In this case, productivity growth affects input spending and the weights for input tariffs.
15. Refer to National Statistics Institute of Uruguay (2005) for details on the methodology.
16. An aggregate price deflator is subject to the markup argument as discussed in De Loecker (2011), in that the measured productivity increase may capture the higher markups rather than true productivity growth in industries where the degree of competition declines. This paper attempts to address the issue by controlling for industrial concentration, as outlined in the estimation strategy section, but acknowledges that this issue cannot be fully controlled, given the available data.

17. Capital stock data are available only for years 2004 and 2005, whereas data on gross capital formation are available for all years. Although estimating capital stock retrospectively with the perpetual-inventory method is subject to survival bias, no alternative measures of capital stock are available in the data.
18. According to the INE of Uruguay, firms not included in the surveys were not necessarily out of business; they may not have been included in subsequent surveys because they failed to respond to earlier surveys or because they were no longer included in the random sample selected by the INE. The exit dummy is therefore not a perfect indicator of whether a firm was out of business; it only suggests that the firm was not included in subsequent surveys.

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APPENDIX

Table A1. Panel Data Summary: Observations per Year

Year	Observations
1999	1149
2000	1177
2001	1239
2002	1516
2003	1696
2004	1709
2005	1707
Total	10193

Table A2. Panel Data Summary: Observations per Firm

Total Observations	Firms
1	114
2	228
3	681
4	1176
5	460
6	408
7	7126
Total	10193

Table A3. Summary Statistics for Uruguay

Sector	Mean	SD
Value added in millions, 1997 pesos	18.95	100.92
Value added per worker	0.27	0.96
Capital stock	56.10	378.69
Number of workers	88.43	299.32
Import dummy ^a	0.10	0.30
Import share ^b	0.05	0.19
Input tariff	12.32	2.28

Notes: Number of observations = 14102.

^a Import dummy = 1 if the firm directly imports any of its capital inputs from abroad.

^b Import share = spending on imported capital inputs / spending on capital inputs.

Table A4. Summary Statistics for Uruguay: Manufacturing vs. Service Firms

Manufacturing	Mean	SD	Observations
Value added in millions, 1997 pesos	25.13	82.87	3909
Value added per worker	0.28	1.10	3909
Capital stock	81.11	305.92	3909
Number of workers	90.49	154.86	3909
Import dummy ^a	0.24	0.43	3909
Import share ^b	0.11	0.26	3909
Input tariff	13.17	1.83	3909
Services	Mean	SD	Observations
Value added in millions, 1997 pesos	16.58	106.94	10193
Value added per worker	0.26	0.89	10193
Capital stock	46.51	402.73	10193
Number of workers	87.63	338.75	10193
Import dummy ^a	0.05	0.22	10193
Import share ^b	0.03	0.14	10193
Input tariff	12.00	2.36	10193

^a Direct import dummy = 1 if the firm directly imports capital goods from abroad.

^b Import share = spending on imported capital goods / spending on capital goods.

***Environmental Sustainability Practices of Albanian Microenterprises
and Small and Medium Enterprises****

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ABSTRACT

There is a growing global awareness about the importance of sustainability practices. Some major reasons for this growing awareness include increased legal requirements by governments, customer demands, and political/societal pressure. This paper discusses environmental sustainability practices of microenterprises and small and medium enterprises (SMEs) in Albania. Nine Albanian SMEs were interviewed about their sustainability practices, and the results are discussed. The results of this study show that even though Albania has a lack of detailed sustainability requirements, many SMEs are aware of environmental sustainability and are beginning to implement sustainability practices. For some Albanian SMEs and microenterprises, the implementation of sustainability practices is viewed as a requirement for accessing lucrative international markets, such as the European Union.

KEY WORDS Sustainability; Microenterprises; SMEs; Albania

Sustainability policies such as the development of industry regulations and education about sustainability practices are not well developed in Albania. Although Albania has been moving to enact environmental laws and regulations that approximate those in the European Union, progress in implementation has been slow (European Commission 2019). The government has not developed sustainability standards or incentives for

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industries (World Bank 2015). In addition, a lack of resources exists for monitoring and ensuring full compliance with environmental standards. Growth in implementation of sustainability practices by Albanian businesses is constrained by a lack of knowledge concerning environmental issues. Albanian microenterprises and small and medium enterprises (SMEs) are often unaware of environmental management practices (European Investment Bank 2016).

Little is known about implementation of sustainability practices by Albanian micro businesses and SMEs. A survey conducted by Shyle (2018) discovered the low level of knowledge by students and business owners in Albania of the concepts of sustainability development; so far, the lack of knowledge has resulted in misunderstanding the importance of sustainability activities. More specific statements and actions taken are more difficult to agree with, and a certain gap between attitudinal statements and actual initiatives is apparent (Dewhurst and Thomas 2003), and there is a need for measures to improve (Shyle 2018).

There is no universal definition of sustainability. One literal definition is the ability to continue a defined behavior indefinitely. For this paper, we define sustainability as “leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems” (Inskip 1998:21).

One purpose of this paper is to assess the status of sustainable development and implementation among a small group of Albanian microenterprises and SMEs. Another purpose of this research is to identify drivers and motivators of the adoption of sustainability practices for a developing country such as Albania. For this paper, a total of nine Albanian microenterprises and SMEs were interviewed about sustainability practices in their organizations and supply chains. A conceptual model of supply chain environmental sustainability development is discussed, based on Hayes and Wheelwright’s (1984) four-stage operations development model. The four-stage model presented is specifically based on sustainable development in supply chain activities in microenterprises and SMEs (Khoja et al. 2019). This model is used to assess and classify sustainability practices of Albanian microenterprises and SMEs in our sample of businesses.

MICROENTERPRISES AND SMES IN ALBANIA

The definition of SMEs differs around the world. In the European Union, a small enterprise is defined as a firm with fewer than 50 employees, annual turnover of less than 10 million euros, and an annual balance sheet of less than 10 million euros. Medium-sized businesses are firms having from 50 to 249 employees, an annual turnover of 10 million to less than 50 million euros, and an annual balance sheet of 10 million to less than 43 million euros (European Commission 2003).

The Albanian definition for SMEs is similar to the EU’s in employee numbers, but the annual turnover level is lower (Table 1):

Microenterprise: 0–9 employees, annual turnover or balance sheet of 0–10 million ALL (Albanian Leke; ~95,000 USD)

Small Enterprise: 10–49 employees, annual turnover or balance sheet of 50 million ALL (~475,000 USD)

Medium Enterprise: 50–249 employees, annual turnover or balance sheet of 250 million ALL (~2,375,000 USD)

Table 1. EU and Albanian Definitions of Microenterprises and SMEs

	Enterprise Type	No. of Employees	Annual turnover (max)	Annual turnover (max) in Euros
EU	Micro	1–9	2M Euro	2M
	Small	10–49	10M Euro	10M
	Medium	50–249	50M Euro	50M
Albania	Micro	1–9	10M ALL	80,000
	Small	10–49	50M ALL	400,000
	Medium	50–249	250M ALL	2M

Note: 100ALL = 0.82 Euro (as of November 2, 2018; Bank of Albania).

Sources: INSTAT (2019), Muller et al. (2017), Albanian Law No. 1042 (2008).

The mountainous country of Albania is in southeastern Europe on the Adriatic Sea. Since the fall of the communist regime in 1992, Albania has been a multiparty democracy with a market-based economy. In 2009, Albania joined NATO and is a potential candidate for EU membership. Over the past 10 years, the Albanian economy has shifted from agriculture toward industry and services, and this growth has allowed for greater development in the microenterprise and SME sector. Services were 46.7 percent, industry and construction 21.1 percent, and agriculture 19.9 percent of GDP in 2016 (INSTAT 2018a). Albania ranks low in business growth and competitiveness compared to peer countries in the Balkan region (European Investment Bank 2016).

At 99.8 percent, microenterprises and SMEs are by far the most common business organizations in Albania (Table 2). Of this 99.8 percent, the trade sector constitutes 41.4 percent, and other services constitute 20.8 percent. Extractive industries, such as mining, have the lowest percentage, at 0.4 percent, followed by electrical power, water supply, and waste management, at 0.6 percent (INSTAT 2019). The average Albanian business has 3.7 employees, which is smaller than businesses in the EU, which average 4.3 employees. SMEs account for 80.3 percent of total employment in Albania, of which the trade sector has 29.2 percent of SME employees, the other-services sector has 19.6 percent, and the processing sector has 18.7 percent (INSTAT 2019).

According to official Albanian government data (Table 3), micro businesses comprise 95.1 percent of all business organizations in Albania, small enterprises comprise 3.9 percent, and medium enterprises comprise 0.9 percent (European Investment Bank 2016). The Albanian Ministry of the Economy reports that SMEs represent 73 percent of Albanian GDP). Albanians are employed by SMEs by 13.7

percent more than are workers in the EU. This is explained by the fact that large domestic businesses cover 13.9 percent more of the EU labor market than the Albanian labor market. Microenterprises and SMEs employ most of the workforce in Albania, whereas in the rest of the world, big businesses and public administration have a larger share of the employed.

Table 2. Active Albanian Microenterprises and SMEs, 2018

Enterprises	No. of Employees	Annual turnover (max, ALL)	Annual turnover (max, Euros)	No. of Businesses, End of 2018
Micro	1–9	10M	80,000	154,067
Small	10–49	50M	400,000	6,801
Medium	50–249	250M	2M	1,967

Note: 100ALL = 0.82 Euro (as of November 2, 2018; Bank of Albania).

Source: INSTAT (2018b).

Table 3. EU–Albania Microenterprise and SME Comparison, 2017

		Micro	Small	Medium	Total Micro and SME	Large (+250 employees)
EU (28 members)	% of total businesses	93.0	5.8	0.9	99.8	0.2
	% of total employment	29.8	20.0	16.7	66.6	33.6
Albania	% of total businesses	94.4	4.4	1.0	99.8	0.2
	% of total employment	39.1	19.4	21.7	80.3	19.7

Sources: INSTAT (2019), Muller et al. (2017).

Microenterprises and SME organizations often lack resources and have high failure rates, but they can have advantages over larger organizations, such as having informal management structures that are flexible and are able to quickly respond to market changes. SMEs often suffer from several significant disadvantages, however, such as lack of financial resources and management specialists, often leaving individual managers responsible for several functions. SMEs also can lack leverage with suppliers and have a short-term focus with no formal documented business strategy (Adams et al. 2012; Hanks and Chandler 1994). In 2013, the Institute of Business Ethics in London presented a business case for social responsibility in SMEs, and the website Sustainability4SMEs.com

had resources supporting the economic benefits of sustainability for SMEs (Sustainability4SMEs, 2013). There has been significant research on sustainable business practices in SMEs (see, for example, Ayuso et al. 2013; Sashi et al. 2018); overall knowledge of sustainability practices in small organizations is somewhat lacking compared to that in large organizations, however.

THEORETICAL BACKGROUND

Drivers and Barriers to the Implementation of Sustainability Practices by Albanian Businesses

Business Sustainability Practice. In the sustainability literature, some authors refer to sustainability using a three-pillar approach: social, economic, and environmental. Economic sustainability is the ability economically and financially to indefinitely support a defined level of production. Social sustainability is the ability of a social system to function indefinitely at a defined level of social well-being. Finally, the third pillar, environmental sustainability, means that things such as rates of harvest, pollution creation, and resource depletion can be continued indefinitely. In business operations, environmental sustainability has the largest impact. The sociocultural, environmental, and economic realms are interdependent, and the aim of a sustainably managed business should be the optimization of all three (Elkington 2004; Hitchcock and Willard 2009). Business organizations often focus attention particularly or primarily on environmental issues regarding sustainability and therefore fail to acknowledge the holistic principle of sustainable development (Sharpley 2000; Swarbrooke 1999).

Drivers of Sustainability. The benefits of sustainable business practices are related to the medium and long range, and as the first step, they should be introduced with the initial investments of the business. Improvements in company reputation, customer loyalty, and employee commitment are a few of the many intangible benefits a company can seize by integrating environmental strategies into its operations (Esty and Winston 2009). The operations and supply chain management activities of a business have some impact on economic and social aspects of sustainability, but the main sustainability impact of supply chains is environmental. As a result, the major focus of this study is on environmental sustainability activities in Albanian SMEs. Tangible benefits of the implementation of sustainable supply chain management practices in the operations of an organization include efficiency improvements and production cost reductions. External drivers of sustainability practices are legal and regulatory requirements. Additionally, customer requirements can be an important driver of sustainability practices. Not just consumers but also shareholders, nongovernmental organizations, investors, and governments are increasingly requiring information about corporate social and environmental performance (Willard 2005).

Barriers to Sustainable Practices. Barriers to implementing sustainability practices include lack of information on how to implement sustainability practices and of

knowledge of the benefits of such practices to business organizations. Research by Shyle (2018) indicates a high reluctance in businesses toward adopting sustainability practices. Sixty-two (62) percent of respondents saw no reason to implement sustainability practices because they were not required to do so and they saw no benefit to the practices. Other barriers to implementing sustainability practices are lack of organizational resources and competing organizational strategies for capital and management resources. Relating to the occurring and differing demands of the business, sustainability often loses out because it is not an immediate need and requires a longer-term focus.

In Albania, the issue of cost as the main barrier of sustainable practices should be evaluated from the point of view that investing in sustainability in the long run improves quality and reduces costs. A study conducted by Frooman (1997) revealed that negative environmental behavior by companies was negatively correlated with shareholder wealth. According to Shyle (2018), “Most ... companies (65) answered that the barriers for implementing sustainability strategy are high cost of implementation, the government does not offer stimuli (45%), lack of interest by the customer (40%), [and] investors did not estimate these initiatives (38%).”

Model of Sustainable Development

A conceptual model of supply chain environmental sustainable development is presented in this paper, based on the four-stage operations development model from Hayes and Wheelwright (1984). The four-stage sustainability model used in this paper is based specifically on sustainable development in supply chain activities in SMEs (Khoja et al. 2019). The supply chain sustainability model uses the Hayes and Wheelwright model stages of relative development, going from a negative state of contribution to an advanced state of contribution to the firm’s goals and objectives.

The four stages in the supply chain sustainability model (from Khoja et al. 2019) are

1. reactive sustainability,
2. awareness sustainability,
3. emergent strategic sustainability, and
4. advanced strategic sustainability.

Stage 1: Reactive Sustainability. The reactive sustainability level consists of the following traits: sustainability is not on the active agenda of management and is likely not in the firm’s business objectives; the business may be unaware of environmental and sustainability legal requirements; and what sustainability activities exist, if any, are limited to legal or customer-required actions.

Stage 2: Awareness Sustainability. For a firm at stage 2, sustainability activities are not a high priority and are not linked to the firm’s strategy, but the business is aware of sustainability as a potential or an actual organizational objective, and the business is attempting to meet legal requirements and is identifying industry best practices.

Stage 3: Emergent Strategic Sustainability. In the emergent strategic sustainability level of development, supply chain sustainability is linked to and is part of the firm's business strategies. Performance-monitoring systems are used to measure progress in sustainability implementation, and industry best practices in sustainability have been implemented. Because of the implementation of sustainability practices, a temporary competitive advantage may be achieved.

Stage 4: Advanced Strategic Sustainability. At this level of sustainable development, the business is taking a lead role in supply chain sustainability strategies in its industry. The organization has a long-term perspective on sustainability activities and is developing innovations for supply chain sustainability. As a result of its sustainability efforts, the business enjoys improved efficiency, customer satisfaction, and public image, which gives the organization a sustained competitive advantage.

RESEARCH OBJECTIVES

The purpose of this research is twofold. The first and primary purpose is to assess the status of sustainable development and implementation among a small group of Albanian microenterprises and SMEs. The second objective is to develop and conceptually test an approach to assess sustainability practices of Albanian microenterprises and SMEs.

METHODOLOGY

The approach to identify current supply chain sustainability practices in small organizations consists of applying the four-stage model of strategic contribution to sustainability practices from Khoja et al. (2019). Because of resource and time constraints, only a small number of local businesses could be interviewed. Nine Albanian SMEs were interviewed; these businesses were selected from the authors' Albanian contacts in the Pogradec region. Businesses in this region of Albania are often involved in food processing, services, or light manufacturing. The size of the firms ranged from 2 to 175 employees. Most of these businesses focus on the production of food products, and the oldest was created in 1992, one year after the fall of communism in Albania (Table 4).

From the interviews, we learned the status of sustainable supply chain activities in these organizations. We then compared these results with the stages of the sustainability model to assess the degree of progress.

The following questions were asked of the businesses to determine their level of sustainable development.

Stage 1: Reactive sustainability

- Is sustainability on the active agenda of our supply management activities?
- Is sustainability included in documents or other forms of supplier interactions?
- Are we aware of legal requirements that affect us pertaining to sustainability?
 - Are we engaging in any sustainability activities because of customer requirements?

Stage 2: Awareness sustainability

- Is sustainability a potential or actual objective of our firm?
- Is sustainability a high priority in our firm?
- Is sustainability linked to our firm's business strategies?
 - Are we attempting to meet legal requirements and to identify best practices in sustainability in our industry?

Stage 3: Emergent strategic sustainability

- Is supply chain sustainability linked to and part of the business strategies of our firm?
- Do we use performance-monitoring systems to measure sustainability implementation progress?
- Have we implemented industry best practices in supply chain sustainability?
 - Are we achieving any competitive advantage as a result of our sustainability practices?

Stage 4: Advanced strategic sustainability

- Is our firm taking a lead role in supply chain sustainability strategies in our industry?
- Do we have a long-term perspective on sustainability?
- Are we developing innovations for supply chain sustainability?
 - Do we enjoy improved efficiency, customer satisfaction, and public image as a result of our sustainability activities?

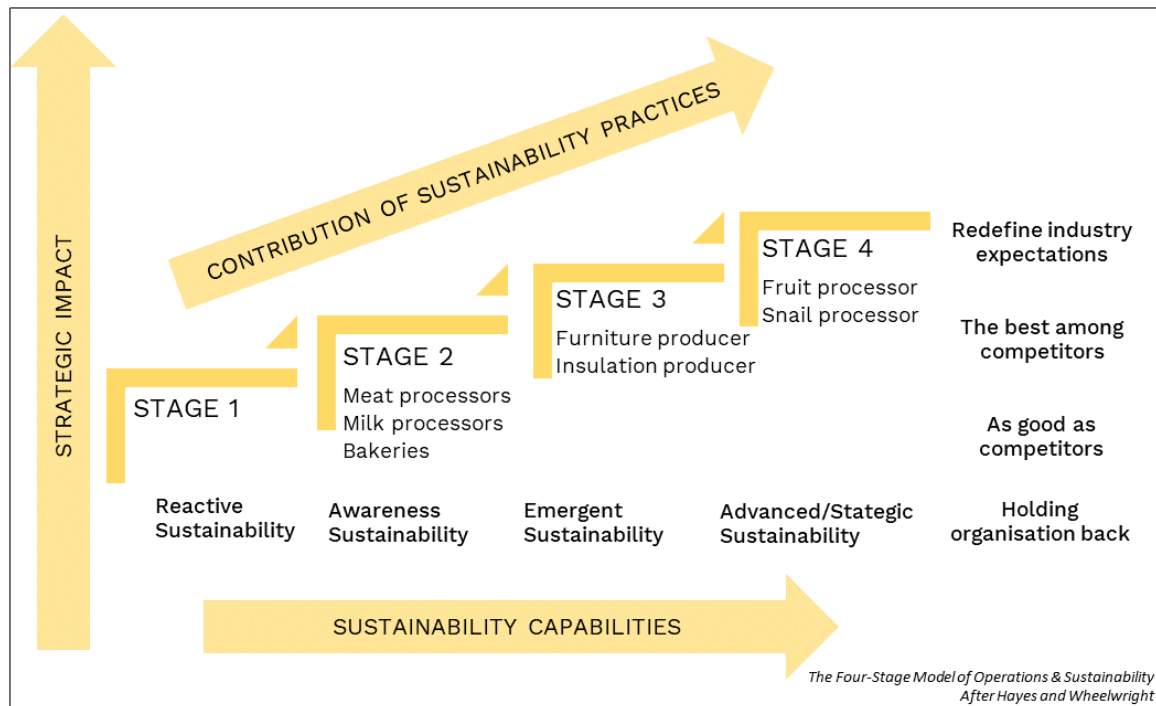
Table 4. Business Demographics

	No. of Employees	Business Type	Year Founded
1	133	Meat processing	1992
2	175	Milk processing	1994
3	91	Meat processing	2003
4	10	Bakery	1994
5	6	Bakery	2012
6	2	Insulation company	1999
7	6	Furniture production	1998
8	42	Fruit juice production	1999
9	40	Processing snails for food	2009

RESULTS

The interviews revealed that all the firms were aware of sustainability and that many were considering or implementing sustainability activities. Agriculture and food products that export seemed to be the most focused on sustainability activities. Some of the companies were working with their suppliers on sustainability efforts. This may have been because of the nature of their business and because of customer requirements. Almost all the businesses indicated that government regulations had a large impact on their sustainability activities. All the businesses were at least considering investment recovery, and most were beginning to implement programs in this area. Customer requirements had a large impact for some of the SMEs, but not so much for others (Figure 1).

From our discussions with Albanian microenterprises and SMEs, we found little to no difference regarding sustainability awareness and implementation between production and service businesses. Sustainability is not required by many customers of Albanian microenterprises and SMEs and is therefore not a major concern for the owners. For small organizations with more direct contact with foreign markets, however, it is of increased importance. Tourism is a growing business in Albania, and as Ball et al. (2007:107) point out, “environmental impacts are often exacerbated as tourism expands, and these impacts in turn are likely to adversely affect the tourism product and demand.”

Figure 1. Business Sustainability Levels

Summary of Albanian Microenterprise and SME Interviews

All the surveyed businesses were at or above the first stage of sustainable development. All of the businesses were fairly young; the oldest was founded in 1992 and the latest in 2012. These organizations had survived by meeting the needs of the Albanian marketplace and adopting their operations to satisfy market needs. Laws and regulations in Albania or in key customers' countries were the most important factor in determining sustainability practices. The businesses were meeting the current limited Albanian laws and regulations. Sustainability for all the businesses was more than a concern; it was a future risk they had to face in order to survive.

Most of the businesses in this study had advanced to the second and third stages of sustainable development. The increase in the contribution of sustainability practices was in response to customer feedback, which increased the direct competition between meat processors, milk processors, and bakeries. Market leadership went to the organization that invested more in sustainability practices. Each investment was in line with standard requirements that satisfied the EU in addition to national applied standards. This will help them adopt new market requirements the moment Albania is accepted into the European Union.

Two organizations that focused strongly on their updated and revised strategies based on the external environment—the furniture producer and the insulation company—were in stage three. These businesses had a small part of their customers in neighboring

countries North Macedonia and Kosovo. This meant they were facing global market standards for their finished products. Their market was international, and some sustainability practices had been implemented.

Two businesses were in stage four and had customers in the EU that demanded a high level of environmental practice. Sustainability practices were a natural process relating to the consistency of their operations, traceability of their suppliers, implementation of ISO standards, and the like. At this advanced stage were the snail processor, which exported its entire produced capacity, and Agrofruit, the fruit processor. Agrofruit exported only 1 percent of its product, but its Albanian customers considered it a premium product. The fruit processor had clear traceability of its raw materials and controlled all tiers of suppliers. Its biggest issue was developing the capacity to meet the demand of the EU market.

The results of this study show that even though the Albanian government lacks detailed sustainability requirements, many SMEs are aware of sustainability activities and are beginning to implement them. For Albanian businesses, the implementation of sustainability practices should be considered an important part of the long transition of the economy and society toward the country becoming a member of the EU. It is important for the Albanian government to develop sustainability standards that will help businesses become more aware of sustainability activities.

IMPLICATIONS

The implementation of sustainable practices is especially important if Albania is to successfully complete the EU membership process. According to Prochazkova (2007), one of the basic tools for sustainability implementation is citizens' education, schooling, and training. Bos-Brouwers (2012), in a report of research for innovative solutions, stated that SMEs are estimated to be responsible for 80 percent of industry's destructive environmental impacts and more than 60 percent of commercial waste.

Of sustainability drivers analyzed by Aghelie (2017), government regulations are the most important. According to Aghelie, the most challenging barriers to implementation of such practices are access to finance and lack of adequate training and consultancy by authorities. In Albania what is also missing is the existence and enforcement of sustainability regulations. According to a 2015 World Bank report, it is important for Albanian law to move toward and harmonize with EU legislation and standards. (The government says it is moving toward this goal.) The 2019 report of the European Commission on Albania explicitly states, "The lack of a secondary legal framework is hampering the establishment of an adequate process and assessment of environmental liability for damage to the environment." Legal and administrative support toward environmental sustainability first must be seen from a long-term point of view to improve customers' and consumers' living standards, and then support the long-term development of businesses as stakeholders in the process.

Other challenges in improving sustainability practices in Albania include the weak capacity of the environmental authorities at both the central and regional levels, and

a lack of resources for monitoring and ensuring full compliance with environmental standards (World Bank 2015). Shyle (2018) recommends creating a legal draft in which each business would be required to implement at least the initial initiatives toward sustainability practices. As Albania increases requirements for sustainable practices that ensure a continuous long-range interrelated process, the circular process itself starts and ends with suppliers (Kearny 2013). Suppliers are considered the easiest barrier for SMEs and microenterprises to overcome (Aghelie 2017).

The connection of sustainability with the niche market, where the customer is extremely important to a company's reputation, is important in the export activities of Albanian small organizations such as the snail processor. The example of Agrofruit shows that customers with high concerns for natural products are the ones targeting the niche products, although the company's market share in Albania is 1 percent. If the green business is further developed, the consolidated purchasing practices and the economies of scale will lead to higher generated income and more investments in sustainability activities.

The benefits of implemented sustainability programs show that being unsustainable can be detrimental to a business in both the short and long terms: "It is not surprising that tougher environmental standards impose costs on companies. The aim of such standards, after all, are to force polluters to internalize costs previously inflicted on society" (Cairncross 1994). Sustainability itself means higher quality that in short and average time frames could seem costly but that is definitively perceived and considered as adding value to society in the long term.

Traceability of supply sources is an important aspect to ensuring sustainability practices within food supply chains. Unfortunately, traceability can be difficult for Albanian small organizations. According to Schwägele (2005), "tracing is the ability to identify the origin of an item or group of items, through records, upstream in the supply chain." Additionally, "traceability is a concept relating to all products and all types of supply chain" (Regattieri et al. 2007). The only successful business interviewed that had control of the upstream supply chain was Agrofruit, which achieved vertical integration to control its suppliers. This is not only an Albanian concern; Kros et al. (2019) noted that organizations today face significant visibility and supply chain issues due to the length and complexity of global supply chains. In Albania, businesses need investment and also support from expert institutions, which can facilitate access to products in the global supply chain. These issues can be exacerbated by poorly managed or nonexistent traceability systems within firms and throughout their supply chains (Kros et al. 2019).

CONCLUSION

This paper provides information on the status of environmentally sustainable supply chain management practices in Albanian microenterprises and SMEs. Additionally, the model presented in this paper can serve as a planning tool for sustainable development in Albanian SMEs and microenterprises. The first step to increase sustainability activities in Albanian businesses is developing laws and regulations that require the implementation of green business practices. Regulations and customer requirements can provide

motivation for individual businesses to implement green practices that will help Albania integrate its business activities into the EU. To achieve the regulatory framework, laws should be prepared in line with the ongoing EU practice. Next, management of businesses needs to be convinced of the importance of sustainability practices, because “the most serious barriers to change in business are attitudinal” (Dewhurst and Thomas 2003). Information through training can lead to better acceptance and implementation of sustainability concepts. Customers and potential export markets such as the EU are an important driver of sustainability activities. Opportunities such as agrotourism in Albania and food exports to the EU will stimulate the need for better sustainability practices. Government regulations are also a factor that force manufacturing firms—especially food manufacturing firms—to implement traceability (Skees et al. 2001).

Finally, as one of the most important stakeholders, the community must understand and accept the importance of sustainability practices. Sociocultural sustainability is concerned with the social interaction, relations, behavioral patterns, and values between people (Mason 2003; Roberts and Tribe 2008). A tool that may help with this is the recently introduced ISO 26000, which defines how an organization can contribute to the full spectrum of sustainable development through socially responsible behavior, with an aim of a sustainable global system.

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***Transforming Criminal Justice Internships into Capstone Courses:
A Response to the Challenges of the COVID-19 Crisis****

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ABSTRACT

The COVID-19 pandemic resulted in the declaration of a national emergency that closed universities across the nation in March 2020. With no warning, faculty were required to change classes from face-to-face to completely online instruction. This situation posed many difficulties, particularly for faculty who were teaching and supervising students completing internships. Interns were removed from their internships abruptly as agencies and departments moved to essential personnel only. Faculty scrambled to create online learning experiences that met academic learning outcomes and the goals of criminal justice students enrolled in these courses. This paper details our experiences with these challenges, particularly as we revised criminal justice internship courses and developed capstone courses to replace face-to-face internship experiences. Although the challenges we faced involved criminal justice internships, they were not unique to the major, and the approaches taken and lessons learned are likely applicable to a host of disciplines.

KEY WORDS Internship; Capstone Course; COVID-19

Internships are a valuable part of the undergraduate criminal justice curriculum. Whether completed as requirements for the degree or as electives, internships provide students with personal, professional, and practical benefits (Kuh 2008; Lei and Yin 2019). Internships, one example of a high-impact practice (HIP) in institutions of higher education, lead to deep learning, enhanced student engagement in their learning, persistence in college, and increased graduation rates (Kuh 2008, 2013; O'Donnell 2013). Additionally, for many students, internships are the first practical exposure to a potential

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career in criminal justice. Students who have never experienced firsthand the work of the criminal justice system such as policing, courts, corrections, and other related work are able to utilize internships as a mechanism to evaluate their career interests and to determine whether the career is a good fit for them. Students who complete internships are presented with the opportunity to connect with and build relationships and networks with criminal justice practitioners. Further, students completing internships are able to develop soft skills that come with working in a professional environment (e.g., time management, professional etiquette, enhanced communication; Lei and Yin 2019); thus, internships provide hands-on integrative and collaborative learning, build connections to the community, build professional relationships and experience, bridge the gap between theory and practice, increase student learning of academic subject matter, allow students to explore career options, and potentially lead to job offers upon graduation (Callanan and Benzing 2004; Crain 2016; Finley and McNair 2013; Knouse, Tanner, and Harris 1999; Kuh, O'Donnell, and Schneider 2017; Murphy and Gibbons 2017; O'Neill 2010; Schneider 2015; Taylor 1988).

The COVID-19 crisis created havoc for postsecondary institutions worldwide. Virtually overnight, faculty had to transform face-to-face classes into online courses. This created numerous challenges, particularly for faculty supervising internships. Many students were informed that they would not be able to continue working as interns for the agencies, departments, and courts at which they had been placed. This change was due in part to agencies being restricted to essential employees only and in part to the concerns that universities had about allowing internships to continue, even when agencies approved the internships' continuation, because of the increased risk to the students' health and well-being. Faculty had to rush to find online alternatives to these valuable applied-learning experiences, and administrators and faculty had to navigate the murky bureaucratic policies and procedures of academia in a relatively short time to implement the necessary changes.

This paper is based on one case study, our experience at one Midwestern university, and discusses the practical and academic concerns of moving students from internships to alternative methods of instruction while still achieving an HIP that allowed students to achieve the course learning objectives. Although ours is one story of many across the nation, we believe that sharing our experience and insight from the COVID-19 crisis may help others learn from how we managed the crisis and the challenge it presented, and that we can begin a conversation to learn together how to respond should another pandemic or other disaster require similar conversions in the future.

THE CHALLENGE

The COVID-19 pandemic created numerous concerns for academia at every level. One such concern was the effect of the closure of university campuses and the requirement that students and faculty learn and work remotely (Times Higher Education N.d.). Faculty, many with no prior online teaching experience, were instructed to convert their on-campus classes to a remote/online format in the middle of the semester. This was an enormous challenge for all instructors and courses across campus, particularly given the

urgency of the situation; however, internships presented special challenges. Most students completing internships during the spring semester of 2020 were told they would not be able to complete their internships on-site; thus, faculty and administrators were required, with little notice, to determine how to revise field-placement internships into online learning experiences that met student learning goals, fulfilled the requirements of HIPs, and kept students engaged.

Fortunately, much like criminal justice practitioners, educators are afforded a certain degree of freedom in our work. In mid-March of 2020, during the COVID-19 crisis, faculty were able to work creatively with colleagues to identify revisions to the courses that addressed academic concerns about maintaining achievement of course learning objectives as well as students' (particularly graduating seniors') natural concern and trepidation over losing valuable experience that enhanced their understanding of the field and provided many practical benefits toward achieving their career goals. Most students were particularly understanding, given the gravity of the situation and that events unfolding were not due to the choices of the instructors, university administrators, or internship-site practitioners. Students were able to see that the COVID-19 crisis had abruptly and severely interrupted our academic and personal lives in ways that were largely unforeseeable in the time preceding the crisis, and they were willing to work with faculty to achieve their academic goals in ways different from those originally planned. In short, students were largely cooperative and understanding rather than resentful and critical of the changes that instructors had to make to classes.

THE SETTING

Our campus is a regional campus of a Big Ten university. Approximately 3200 students were enrolled in classes during the 2019–2020 academic year. The student-to-faculty ratio is 16:1. The campus offers more than 60 degrees, including undergraduate and graduate degrees. With approximately 140 majors, criminal justice is one of the largest on campus. Students enrolled in criminal justice are required to complete a capstone experience as part of the Bachelor of Science in Criminal Justice degree requirements. They may choose from either an internship (the most common choice) or a research practicum, depending on their career goals and interests. Thirteen students were enrolled in the internship course during spring semester 2020. Six of these had completed all their required internship hours prior to the COVID crisis and the subsequent cancellation of internships or were able to continue with their placements after the campus was closed. Thus, seven students had to abruptly end their field placements and complete the course online.

THE SOLUTION

The most pressing issue that the pandemic presented to the faculty supervising internships during the 2020 spring semester was how to replace students' lost internship hours. The most logical response was to convert internships into online capstone courses, as both are HIPs (Kuh 2008, 2013; Kuh et al. 2017; O'Donnell 2013). They are

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also similar in other regards (Durel 1993; National Leadership Council 2007). For example, both internships and capstone courses build on students' entire college careers, culminating in experiences that allow students to apply knowledge in the discipline and to personally reflect on ways to creatively solve real-world problems.

Applied internships and academic capstone courses foster similar skills, including synthesizing the knowledge gained over collegiate careers and bridging the gap between theory and practice (Parilla and Smith-Cunniën 1997; Steele 1993). A critical distinction between the two, however, is the practical work experience that students gain through internships when they are placed with an agency, department, or court in the criminal justice field and are required to complete meaningful work that contributes to the overarching mission or goals of the agency. Students gain experience in professional settings and learn practical and professional skills. Students in capstone courses, in contrast, must generally produce a product (e.g., report, project, paper, portfolio) that synthesizes, integrates, and applies the knowledge they have acquired over the course of their academic careers. Criminal justice capstone courses allow students to use the totality of the knowledge they have gained in criminal justice courses to critically evaluate and creatively engineer solutions to real criminal justice problems (Kuh 2008; Schneider 2015). The challenge, then, for criminal justice faculty and administrators during the COVID-19 crisis in March 2020 was to revise internships in which students could not continue to work for agencies and to provide students with similar experiences in an online capstone course. The most logical solution was to create alternative assignments within the capstone course that adhered to the stated course objectives.

After consulting with stakeholders at the department and school levels, faculty decided to replace students' outstanding internship hours with weekly position papers. Topics were selected to expose students to critical issues and current events in criminal justice. When possible, topics varied according to students' internship assignments, so the content covered pertained to a student's initial placement. In general, students intern in one of the three components of the system: policing, courts, or corrections. Weekly topics were chosen based on critical issues within each of these components and were assigned to students based on their original placements. For example, one week's topics included "Broken Windows Policing & Its Effectiveness" for policing interns, "The Impact of Race on Sentencing Outcomes in the U.S." for students interning with courts, and "Risk & Needs Assessment—What, Why, and How" for corrections-related internships.

Position papers were required to be data-driven, to reference a minimum of two scholarly articles, and to be at least 600 words in length (excluding cover page and references). The papers required students to synthesize empirical literature on the topics and to integrate and apply what they learned to real-world issues. This problem-centered inquiry is at the heart of preparing students to enter a complex and uncertain world and aligns well with the requirements of HIPs (Schneider 2015). Instead of being assigned readings, students researched their assigned topics independently via the university's journal subscription database to facilitate self-regulated learning, a skill that both academics and practitioners regard as vital in the workforce (Boekaerts 1997;

Shine and Heath 2020). It is worth noting that the number of completed internship hours at the time of the conversion for all students enrolled in the course were fairly similar, so the requirements for the papers were the same for all students.

Given the pass/fail grading scheme of the course, position papers were graded liberally. A grade of C– or better demonstrated competency in and/or understanding of course material. In addition to competent writing, minimum expectations regarding achievement of learning outcomes on the assignments included demonstration of basic understanding of the assigned topics and relevant scholarly research. If students failed to meet the minimum expectations, they received feedback on errors and omissions and on where improvements could be made. Students were required to resubmit their papers based on the feedback. Weekly papers were assigned on Monday morning and were due by 5:00 p.m. the following Friday. The papers were graded, and students were provided with extensive feedback by Tuesday of the following week. In this way, students could access the feedback while the topic was still fresh in their minds and make revisions as needed. The course met once a week for the first five weeks of the semester, covering professionalism, how to write a resume and cover letter, ethics in criminal justice, interviewing skills, and careers in the private sector. Because the five meetings concluded before the pandemic was declared, there was no need to meet as a class once courses were moved online.

To successfully complete an internship, each student was required to submit a resume and cover letter to the career center on campus and to meet with a career center counselor to review these documents. Students who had not completed this requirement before the campus was closed because of COVID-19 were still required to submit their materials online for review, make any revisions suggested by the reviewer, and resubmit the updated versions for final approval. Once a career center staff member replied with final approval, the student forwarded that email to the instructor and submitted the final version of the resume and cover letter via Canvas (our university's learning management system). Students submitted their research papers (a separate and lengthier assignment than the weekly papers) online as well. Each student participated in an exit interview at the end of the course. These interviews are standard for the internship course and are intended to give students the opportunity to share and reflect on their internship experiences and to provide valuable insight and perspective to internship coordinators. As part of the transition to online, the exit interviews were conducted virtually.

EFFECTIVENESS OF COURSE TRANSFORMATION FOR SPRING 2020

Our main concern in converting the internship course to an online capstone course mid-semester was to ensure that students successfully learned the course objectives despite the dramatic format change. Although limited, the data that we have demonstrates that students successfully met the course objectives in spring 2020. These data, based on the case study model, include student course evaluations, assessments of student learning, and exit interviews with students.

A mean of eight students completes the internship each semester (fall and spring). Each student completing the internship course is given the opportunity to provide a

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course evaluation. Unfortunately, the percentage of students completing the course evaluation is small. Despite the low response rates, the course evaluations for the internship course from spring 2019 to spring 2021 are very positive. Table 1 shows the mean scores of the course evaluation questions most relevant to student learning for spring 2019 to spring 2021.

Table 1. Select Student Course Evaluation Results

	Spring 2019	Summer 2019	Fall 2019	Spring 2020	Summer 2020	Fall 2020	Spring 2021	Spring 2021
	<i>J380</i>	<i>J380</i>	<i>J380</i>	<i>J380</i>	<i>J370</i>	<i>J380</i>	<i>J380</i>	<i>J490</i>
Statements	<i>N = 4</i> (36.36%)	<i>N = 1</i> (16.67%)	<i>N = 3</i> (50.00%)	<i>N = 4</i> (30.77%)	<i>N = 5</i> (62.50%)	<i>N = 1</i> (25.00%)	<i>N = 2</i> (40.00%)	<i>N = 4</i> (40.00%)
Overall, I would rate the quality of this course as outstanding.	3.75	4.00	4.00	4.00	3.80	4.00	4.00	3.50
Announced course objectives agree with what is taught.	3.75	4.00	4.00	4.00	3.80	4.00	4.00	4.00
The course improved my understanding of concepts in this field.	4.00	4.00	3.67	4.00	3.60	4.00	4.00	4.00
This course increased my interest in the subject matter.	4.00	4.00	3.67	4.00	4.00	4.00	4.00	3.50
Course assignments helped in learning the subject matter.	3.75	4.00	4.00	4.00	3.80	4.00	4.00	3.75
My instructor uses teaching methods well suited to the course.	4.00	4.00	4.00	4.00	3.80	4.00	4.00	3.00

The course evaluations for the internship course are provided for the three semesters leading up to the “COVID semester” (spring 2020), when we converted the

internship into an online capstone course halfway through the semester, as are the mean course evaluation scores for both the internship and online capstone courses for the three semesters following the COVID semester. As can be seen in the table, there are no significant differences in mean scores across the seven semesters.

Students were asked to indicate, on a scale of 1 (*strongly disagree*) to 4 (*strongly agree*), their level of agreement with the statements. High scores indicate positive course evaluations, with scores above 3.0 indicating agreement with the statements and demonstrating positive student evaluations of the course. Students in the internship courses before spring 2020, in the internship course during spring 2020, and in both the internship and capstone courses during spring 2020, fall 2020, and spring 2021 agreed or strongly agreed that (1) the announced course objectives aligned with what was taught in the course, (2) the course improved their understanding of concepts in the field, (3) the course increased their interest in the subject matter, and (4) the teaching methods used by the instructor were well suited to the course.

Very few responses were received to the qualitative questions (*Which aspects of the class were most valuable? Which aspects of the class were least valuable? What could the instructor do to improve the course or his/her teaching effectiveness?*) on the student course evaluation. Furthermore, limitations to the responses were present. For example, it was not possible to determine if the students who responded to the open-ended questions at the end of the spring 2020 semester were students who had completed their internship hours or those who had completed the course as a capstone course. Thus, the responses from one student who wanted more meeting dates throughout the semester and from another who thought “the class was well taught” are not helpful in determining the effectiveness of the transition to online learning. Despite these limitations, it is important to note that no students mentioned the transformation of the course from field placements to online instruction as positive or negative; they did not mention the change at all in the course evaluations.

Assessment of student learning is another measure of a successful transition from internship placements to the online capstone experience. Of the course learning objectives, the objective “apply concepts learned in the criminal justice program at IUK to the work environment” best measures the effectiveness of our strategy for transforming the course into an online capstone experience.¹ Assessments of student learning through the position papers and the final research paper demonstrates that students were able to successfully meet the internship course goal even though they completed the class as a capstone. For example, seven students completed the position papers that were required as part of the capstone. As part of the paper requirements, students were required to apply theoretical concepts and empirical evidence to a contemporary problem in the criminal justice system. All seven students successfully demonstrated achievement of these learning goals in each of the four position papers. The students also completed a final research paper whether they had completed the internship hours or the capstone. All thirteen of the students completing the paper met or exceeded expectations on the assessment by demonstrating knowledge of criminal justice concepts and their relevance to the field. These assessments show that students achieved course goals despite the move from field placements to a capstone experience.

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A final measure of the success of the transformation from internship to capstone experience comprises student responses and comments during the exit interview for the course. Each student completing the course was required to meet with the instructor for an exit interview. The purpose of the exit interviews is to gain a better understanding of students' activities and experiences with their internship providers. For students who didn't get the opportunity to complete their internships traditionally, questions about the pivot to a capstone model were also asked, and although there was naturally a bit of disappointment about not getting to complete their internships as planned, students voiced support for the conversion, as well as appreciation for weekly paper topics related to what they had been doing in their individual internships.

Although limited direct data exist to help us assess the effectiveness of our approach in transitioning from in-person internships to an online equivalent experience, the available evidence indicates that the revision of the course was successful. Assessments of student learning, course evaluations, and informal exit interviews with students all indicate that students successfully met the learning objectives of the course. The evidence that our approach was successful encouraged us to continue with the online capstone course for the summer and the following academic year as some students were still unable to complete internships through spring 2021 because of COVID restrictions.

PREPARING FOR SUMMER AND BEYOND

In addition to making mid-semester changes to the internship course, criminal justice faculty needed to determine how to manage summer internships. Students (including those who were graduating in the summer) had already been enrolled in the full-semester summer internship course when the national emergency was declared in the United States. The university made the decision to continue with online rather than face-to-face courses in the summer to comply with state mandates and to ensure the safety and well-being of faculty, staff, and students. The criminal justice faculty decided that any changes to the summer internship course should be easily and readily applicable to the following academic year in case internships were not available to students because of continued COVID-19-related restrictions. In fact, the capstone was not needed for fall semester, as the only four students who needed to complete the capstone experience requirement for the degree enrolled in the internship course rather than the capstone course. These students were able to be placed in an agency to complete the internship. In spring 2021, two students were able to find internship placements and four students enrolled in the online capstone course.

Through collaboration between the instructor, the department head, and the dean of the school, it was decided that the summer internship course should be replaced with a capstone course. Several possible ways to offer this alternative experience to students were considered. One possibility was to keep the internship course on the schedule, allow students to register for the internship course, and then teach it as an online capstone. This option was similar to what occurred in the spring but would apply to the full semester rather than to only the last half of the semester. Another alternative was to offer a capstone course, distinct from the internship course, and temporarily allow it to be

substituted for the internship degree requirement.² The former option was problematic because the capstone course is not an actual internship. The department and school administrators determined that it was not appropriate to have an internship listed on an academic transcript when, in fact, the experience was not an internship. The latter option was problematic because it required the full design (albeit built upon the work done in the spring) of a course in less than two months. Ultimately, it was decided that the second option, although clearly challenging, was the best option for the students, the program, the university, and potential future employers; thus, the instructor of the internship course designed a capstone course to be offered in the summer, and potentially in the fall, to temporarily replace the internship requirement.

Once the summer capstone course was designed, only minor adjustments were needed to account for the two-week difference in length between the summer and regular academic semesters. The second iteration of the capstone course was developed and eventually approved as a new course (J490) through remonstrance. There was not enough time to gain approval for a new course through remonstrance in time for the summer semester, however. As such, the summer capstone course was listed as a special topics course for the summer semester using the upper-level special topics course number (J370). Two criminal justice students were approved for in-agency internships in the summer; thus, the instructor taught both the capstone course (as a topics course) and the traditional internship course (J380) in the summer.

Decisions regarding the curriculum of the capstone course were also pressing. For the course to be offered in the summer, the syllabus needed to be submitted for review in April. Similar to the internship course, the capstone course required students to complete resumes and cover letters reviewed by the career center. In addition, a 3000-word research paper was assigned (a longer version of the 1500-word research paper required for the internship course). Also consistent with the internship course, students were required to attend five virtual classes. In addition to attending the required classes, students completed an assignment related to the topics covered during each class. Finally, students were assigned weekly position papers and were required to participate in weekly online discussions.

The topics covered during the classes mirrored those covered in the internship course classes, including how to dress and behave in the workplace, how to write a resume and cover letter, ethics in criminal justice, the interview process and interviewing tips, and careers in the private sector. To assist students with the unique and individual time constraints posed by COVID-19, classes were held asynchronously, with lessons posted on Monday mornings. Assignments associated with each topic were created to ensure that students were completing and understanding the virtual lessons. The assignments were due by 5:00 p.m. Friday of the week that each related lesson was posted.

Weekly position papers were assigned to examine critical issues in criminal justice. The requirements and grading scheme for the position papers were identical to those listed for the spring semester conversion. Because the course was a traditional criminal justice capstone course, however, topics covering every stage of the criminal justice system were assigned, not just those associated with a student's preferred career.

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That said, many of the paper topics used in the spring semester conversion were utilized for the capstone course as well.

Lastly, students were required to participate in weekly online discussions covering key issues and current events in criminal justice. Examples of these issues include Miranda rights and warnings, America's response to the COVID-19 pandemic, and crime and the media. Students were provided links to supplemental readings and videos and were instructed to answer the discussion questions and to reply to at least one other student's post per discussion. This gave students the opportunity to learn with and from their peers while facilitating interpersonal communication and engagement.

EFFECTIVENESS OF SUMMER AND FALL TRANSITION TO CAPSTONE COURSES

As discussed earlier, the results from Table 1 demonstrate that, based on student course evaluations, the transition from internship courses to capstone courses was effective for the summer, fall, and spring semesters. Students in both the capstone and internship courses agreed or strongly agreed that the course improved their understanding of concepts in the field and increased their interest in the subject matter, and that the instructor asked questions that challenged them to think and used teaching methods well suited to the class. Although the mean response scores to the questions in the capstone course were slightly lower than those in the internship (e.g., 3.75 and 4.0), the difference is marginal. The responses were *agree* and *strongly agree*, and it is not possible to determine how much more agreement *strongly agree* has than does *agree* or to determine how students interpreted the distinction between the two. Agreement and strong agreement are both indicators of a positive course experience; thus, the course evaluations demonstrate similar student perceptions of both the internships and the online capstone courses. Further, assessments of student learning in summer, fall, and spring revealed that students effectively learned the stated course objectives in both the internship and capstone courses.

CONCLUSION

The COVID-19 crisis created several challenges within academia as faculty were required to abruptly move from face-to-face to online learning. Within this context, internships presented even greater challenges as faculty struggled to provide students removed from internships with online learning experiences that matched internships in learning objectives and HIPs. The strategies we used to transform internships into online capstone courses were successful. We hope that the presentation of our experience in developing and revising curriculum during the COVID-19 pandemic and of the strategies and lessons we've learned through this experience will enable others who are grappling with the same issues to use our experiences to think through and develop improved learning experiences for their criminal justice students. Further, we expect this case study to engender discussion and encourage others to share their experiences to increase the

discipline's overall understanding of effective teaching practices and to improve teaching practices if future crises were to occur.

ENDNOTES

1. There were other course objectives; however, the other objectives were assessed prior to the transition to online or as part of assignments that did not change (e.g., the research paper) during the transformation of the mode of instruction. As such, the learning objective noted above is the best assessment of student learning through the transition to online.
2. The research practicum course was not offered during the summer for reasons unrelated to COVID-19, and faculty and administrators agreed that criminal justice students who wished to pursue careers, rather than graduate studies, upon graduation should not be required to take a research practicum course that did not align with their academic or career goals.

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Profitable Retail Customer Identification Based on a Combined Prediction Strategy of Customer Lifetime Value*

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ABSTRACT

As a fundamental concept of customer relationship management, customer lifetime value (CLV) serves as a crucial metric to identify profitable retail customers. Various methods are available to predict CLV in different contexts. With the development of consumer big data, modern statistics and machine learning algorithms have been gradually adopted in CLV modeling. We introduce two machine learning algorithms—the gradient boosting decision tree (GBDT) and the random forest (RF)—in retail customer CLV modeling and compare their predictive performance with two classical models—the Pareto/NBD (HB) and the Pareto/GGG. To ensure CLV prediction and customer identification robustness, we combined the predictions of the four models to determine which customers are the most—or least—profitable. Using 43 weeks of customer transaction data from a large retailer in China, we predicted customer value in the future 20 weeks. The results show that the predictive performance of GBDT and

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This study is supported by funds for building world-class universities (disciplines) of Renmin University of China. The third author is financially supported by the Byron Root Foundation Grant.

The authors express sincere thanks for the support of Dr. Dehong Yang, chairman of Miya Information Technology Inc.

RF is generally better than that of the Pareto/NBD (HB) and Pareto/GGG models. Because the predictions are not entirely consistent, we combine them to identify profitable and unprofitable customers.

KEY WORDS Customer Lifetime Value (CLV); Pareto/NBD (HB); Pareto/GGG; Gradient Boosting Decision Tree (GBDT); Random Forest (RF)

With the development of relationship marketing, customer relationship management (CRM) has been widely studied by academics and industry insiders. Many believe that the primary task of CRM is to identify, satisfy, and retain the most profitable customers to reduce costs and increase revenues. Customer profitability should not be judged by a customer's single transaction with the firm but rather by a series of transactions or potential transactions (i.e., a customer's lifetime income stream; Buttle 2004). As a result, customer lifetime value (CLV) becomes a fundamental CRM concept and a crucial metric in relationship marketing (Rust, Zeithaml, and Lemon 2000). CLV is defined as the net present value of all streams of contributions to profit resulting from a customer over his or her entire life of transactions with the firm (Jain and Singh 2002). Because not all customers are profitable and financially attractive to firms, CLV works as a metric to segment customers, allocate resources, and formulate related strategies (Zeithaml, Rust, and Lemon 2001). In the early 1990s, companies emphasized the importance of measuring and managing customer satisfaction and customer loyalty, but researchers found that customer satisfaction, customer profit, and the relationship between customer loyalty and customer profit are not as strong as anticipated (Reinartz and Kumar 2000, 2002). Satisfied customers and loyal customers are not always the most profitable customers (Kumar 2008). Many companies have seriously misallocated resources by taking customer satisfaction or customer loyalty as a simple proxy measure for customer profit. It is therefore essential to measure customer-level profitability, and CLV is ultimately required for making good marketing decisions. According to CLV, firms can allocate resources and establish long-term relationships with the "right" customers.

CLV works as a foundation for companies to make marketing strategies concerning customer acquisition, customer retention, and customer win-back. It is essential to accurately predict CLV and identify the most profitable customers. The misestimate of CLV may lead to the wasting of limited marketing resources and the mismanagement of customers. Marketing researchers have proposed various methods to predict CLV in different contexts, including the Pareto/NBD (negative binomial distribution) model (Schmittlein, Morrison, and Colombo 1987), the logit/probit model (Thomas 2001), the hazard rate model (Meyer-Waarden 2007), and the Markov chain model (Bandyopadhyay 2009; Pfeifer and Carraway 2000). Although improving prediction accuracy can never be overemphasized, it's still the main task for researchers in this field. Besides, with advanced data-analysis techniques, machine learning algorithms have been gradually adopted by researchers in customer behavior analytics. The prediction performance of these new algorithms deserves further exploration and study. In our study, we introduce two machine learning algorithms—the gradient boosting decision tree (GBDT) and the random forest

(RF)—in retail customer CLV modeling and compare their predictive performance with that of two classical probability models—the Pareto/NBD (HB) (Abe 2009; Ma and Liu 2007) and the Pareto/GGG (gamma-gamma-gamma; Platzer and Reutterer 2016). Each of the four algorithms has its pros and cons in CLV prediction (Table 1). Pareto/NBD (HB) is a hierarchical Bayes extension to the Pareto/NBD model that is well known for describing customer purchasing behavior in a noncontractual context. Pareto/GGG is another generalization of the Pareto/NBD model by considering the regularity of customer interpurchase timing. GBDT and RF have integrated learning models. They are representative prediction methods in machine learning, and both of them can effectively improve prediction accuracy. The purpose of our study is to establish a framework to identify profitable retail customers based on their CLV. To ensure the robustness of customer identification, we predict CLV by the four aforementioned models and combine their predictions to determine which customers are the most profitable for the firm.

The next section presents a literature review of CLV modeling approaches. Section 3 explains the basic logic of Pareto/NBD (HB), Pareto/GGG, GBDT, and RF. Section 4 outlines the empirical application based on customer transaction data of a retailer, and Section 5 presents our summary and conclusion.

MODELING CLV

CLV is a forward-looking metric that considers a customer's future behaviors and enables firms to treat individual customers differently according to their contributions (Kumar and Reinartz 2016). Researchers have developed various CLV models that, in general, can be divided into two different types: deterministic and stochastic. Deterministic CLV analysis adopts simplified calculations and uses formulas without any stochastic components, ignoring individual customers' heterogeneity (Estrella-Ramón et al. 2013). Jain and Singh (2002) described the basic CLV deterministic model as

$$CLV = \sum_{i=1}^n \frac{(R_i - C_i)}{(1+d)^{i-0.5}},$$

where i represents the period of cash flow from a customer transaction, R_i is the revenue from the customer in period i , C_i is the total cost of generating the revenue in period i , n is the total number of periods of projected life of the customer under consideration, and d is the discount rate. Deterministic CLV analysis is more basic and general and has fewer variations. It is often adopted in contractual settings, such as telecommunications or magazine subscriptions. Stochastic CLV modeling approaches view the observed customer behavior as realizing an underlying stochastic process, thus emphasizing customer heterogeneity. As a result, this type of model brings more precision to CLV estimation (Estrella-Ramón et al. 2013). Stochastic CLV analysis is usually adopted in noncontractual settings such as retailing. Generally, two types of stochastic CLV modeling methods are based on deductive reasoning and the other based on inductive reasoning.

Table 1. Advantages and Disadvantages of the Pareto/NBD (HB), Pareto/GGG, GBDT, and RF Algorithms

Algorithm	Similarity	Characteristic	Advantage	Disadvantage
Pareto/NBD (HB)	Probability models	Combines Pareto and NBD (HB) models to predict customer churn and purchase behavior	Very stable prediction performance	Not sensitive to extreme data
Pareto/GGG		Considers regularity of customer interpurchase timing and uses gamma distribution to describe this regularity	Very stable prediction performance; considering regularity of customer interpurchase timing can effectively improve prediction accuracy	Not sensitive to extreme data
GBDT	Combination forecasting model, also known as integrated learning model	For the loss function, finds the current optimal tree through continuous iteration	Can effectively improve prediction accuracy and has fast convergence speed	May lead to overfitting model
RF		For the loss function, the diversity enhancement strategy is used to build multiple unrelated trees	Can effectively improve prediction accuracy and reduce prediction variance	Convergence speed is relatively slow

Stochastic CLV Models Based on Deduction

Deduction and induction, which can be traced to Greek antiquity, are two reasoning patterns for scientific inquiry. In the research field of marketing and customer behavior, deductive reasoning techniques have been dominant, with researchers building and testing hypotheses to find answers (Lawson 2005). The study of CLV is no exception, as many stochastic CLV modeling methods were built on existing knowledge and theories. These methods include probability, econometric, and persistence models (Estrella-Ramón et al. 2013; Gupta et al. 2006). Probability models adopt probability distributions to model observed customer behaviors such as purchase frequency and contribution margin. Two widely recognized probability models are Pareto/NBD (Schmittlein, Morrison, and

Colombo 1987) and BG/NBD (beta geometric/negative binomial distribution; Fader, Hardie, and Lee 2005a). Many econometric models share the same underlying logic as probability models (Gupta et al. 2006). Unlike probability models using a probability distribution to describe customer behaviors, econometric models focus on explaining different customer responses as a function of covariates. Typical econometric models include a simple regression model (Venkatesan and Kumar 2004), a logit/probit model (Thomas 2001), and survival analysis (Meyer-Waarden 2007). When the customer data time series is long enough, persistence models are suitable for CLV estimation. Similar to the econometric models, persistence models emphasize CLV drivers; however, these covariates are considered part of a dynamic system, and their movements over time affect CLV in the long run. Persistence models are based on the development of multivariate time series analysis, such as VAR models (Bandyopadhyay 2009), unit roots, and cointegration (Gupta et al. 2006).

Stochastic CLV Models Based on Induction

Although deductive reasoning has been widely used in scientific inquiry (Lawson 2005), an increasing number of researchers believe that deductive reasoning techniques have limitations in analyzing big data (Erevelles, Fukawa, and Swayne 2016; Lycett 2013). According to Erevelles, Fukawa, and Swayne (2016:900), knowledge-based deductive reasoning “result[s] in considerable linear growth in understanding marketing phenomena about which much is already known, at the expense of nonlinear advances in understanding marketing phenomena about which little or nothing is known,” thus hindering the search for new information and insight. On the contrary, ignorance-based inductive reasoning enables researchers to observe a phenomenon before forming any hypotheses and to mathematically identify the hidden patterns in customer big data (Lycett 2013). Inductive CLV modeling approaches are usually based on computer science development, especially data mining, machine learning, and nonparametric statistics. These models include the GBDT, the generalized additive model (GAM), the RF, the support vector machine (SVM), and the neural network model, among others. Compared with deductive models based on theory and easy to interpret, inductive models based on computer science often have better predictive abilities (Gupta et al. 2006). Studies show that SVM, GAM, and a multivariate decision tree all provide more accurate predictions than a logit model (Coussement, Benoit, and Van den Poel 2010; Cui and Curry 2005). According to Gupta and colleagues (2006), these inductive machine learning models need further exploration in the field of CLV prediction, especially in the age of consumer big data.

Although various CLV models have been developed, no well-accepted prediction model suits all situations, despite many researchers’ comparisons. For example, Vafeiadis et al. (2015) compared an artificial neural network, a support vector machine, a decision tree, a naïve Bayes, and a logistic regression for customer churn prediction and found that SVM performed best. Martínez and colleagues (2018) used machine learning algorithms including logistic lasso regression, extreme learning machine, and gradient tree boosting to predict customer purchases, and gradient tree boosting performed best. Current research suggests that the prediction performance of different models depends on different situations

and datasets and that no well-recognized CLV model performs best under all circumstances. Customer identification based on one CLV prediction model may therefore be biased. In this paper, we combine the prediction results of four CLV models, two probability models—Pareto/NBD (HB) and Pareto/GGG—and two machine learning models—GBDT and RF—to ensure the robustness of profitable customer identification.

MODEL SPECIFICATION

Retailing is a typical noncontractual context, and the relationship between retail customers and the firm is uncertain. Modeling retail customer CLV can be very challenging because customer defection is not observable; therefore, the key point of retail customer CLV estimation is to predict customers' future purchase behaviors. It is strongly suggested that the three variables of the RFM model—recency, frequency, and monetary—are sufficient to describe an individual customer's purchase history and that customers' past purchases act as good predictors of their future purchases (Bandyopadhyay and Martell 2007; Estrella-Ramón et al. 2013; Fader, Hardie, and Lee 2005b). RFM can therefore provide a solid foundation for CLV modeling.

This paper emphasizes the prediction of a customer's future purchase frequency based on Pareto/NBD (HB), Pareto/GGG, GBDT, and RF. We compare their predictive performance and recommend combining the four models to predict purchase frequency and further identify the most profitable customers to ensure the robustness of the results. The monetary value of a customer's future purchases was estimated based on a normal distribution (Schmittlein and Peterson 1994). We assume that all the retail customers have the same acquisition cost and direct cost. Without considering the discount rate, the calculation of CLV can be simplified as the product of a customer's future purchase frequency and monetary value. We believe that a retail customer CLV prediction strategy combining classical probability models with machine learning approaches will be a future research direction for CLV and CLV-based customer identification. Below, we briefly introduce Pareto/NBD (HB), Pareto/GGG, GBDT, and RF before describing our empirical study.

Pareto/NBD (HB)

Pareto/NBD (HB) is a hierarchical Bayes extension to the Pareto/NBD model (Abe 2009; Ma and Liu 2007). Developed by Schmittlein, Morrison, and Colombo (1987), the Pareto/NBD is a well-recognized model that describes customer purchasing behavior in a noncontractual context. Pareto/NBD (HB) extends the Pareto/NBD model using a hierarchical Bayesian (HB) framework. The Pareto/NBD (HB) model obtains the posterior value based on the prior parameters and data likelihood. A hierarchical Bayesian version of the NBD model of transactions x is

$$\pi(r, \alpha, \{\lambda_i\} | \{x_i\}) \propto \prod_i p(x_i | \lambda_i) g(\lambda_i | r, \alpha) \pi(r) \pi(\alpha),$$

where λ_i is the purchase rate of customer i and $\pi(r)$ and $\pi(\alpha)$ are prior distributions on the parameters of the gamma distribution of λ_i (Jen, Chou, and Allenby 2003). The left side is posterior, the last three factors on the right side form the prior distribution, and $p(x_i | \lambda_i)$ is the data likelihood. Thus can we estimate not only the parameters of the purchase rate of the customer cohorts but also the individual purchase rate by integrating the joint posterior density:

$$\pi(\lambda_j | \{x_i\}) = \int \dots \int \pi(r, \alpha, \{\lambda_i\} | \{x_i\}) dr d\alpha d\lambda_{-j},$$

where $-j$ denotes all customers except customer j . Pareto/NBD (HB) can be estimated by the Markov chain Monte Carlo (MCMC) method.

Pareto/GGG

Pareto/GGG (Platzer and Reutterer 2016) is another generalization of the Pareto/NBD model. It notes that the regularity of customer interpurchase timing can effectively improve prediction accuracy. Pareto/GGG assumes that the intertransaction timing $\nabla t_j = t_j - t_{j-1}$ follows the gamma distribution with shape parameter k and rate parameter $k\lambda$ —that is, $\nabla t_j \sim \text{Gamma}(k, k\lambda)$ —when the customer remains alive. Here, λ determines the frequency and k determines the regularity of intertransaction timings. There are also differences in individual intertransaction timing, which follows the gamma distribution. This model is called the Pareto/GGG because the individual-level parameters of the purchase process follow three gamma distributions: $k \sim \text{Gamma}(t, \gamma)$; $\lambda \sim \text{Gamma}(r, \alpha)$; $\mu \sim \text{Gamma}(s, \beta)$. Pareto/GGG parameters can also be estimated by the MCMC method.

Gradient Boosting Decision Tree

A GBDT is one of the representative prediction methods in machine learning and has an outstanding performance in combination forecasting. The basic learner of GBDT is usually the classification and regression tree (CART; Breiman et al. 1984). CART avoids the linear assumption in traditional statistical models and can find the nonlinear relationship between the dependent and independent variables, thus effectively improving prediction accuracy. The CART (including a classification tree and regression tree used later in this paper) algorithm includes two processes: tree growth and tree pruning. Tree growth is a multi-iteration grouping process for training datasets. The “excessive” growth of trees can be limited by pre-pruning strategies that specify the maximum depth of trees and the sample size of tree nodes or by minimal cost-complexity pruning strategies after the tree grows. The principle of minimum test error determines the optimal tree. Generally, the test errors (out-of-bag errors) can be estimated by an N-folds cross-validation method.

Random Forest

RF is also a combination forecasting strategy consisting of several CARTs with high accuracy and weak correlation or even irrelevance. Forecasting is achieved by a tree's voting or averaging. The randomness of RFs is reflected in the two aspects (sample randomness and variable randomness). Using the strategy of bagging (bootstrap aggregating), multiple trees are built based on independent random samples. Independent samples are obtained by a resampling bootstrap method. A random sample (called a bootstrapping sample) with a sample size of n is obtained by repeated sampling B times with playback from the train dataset with an n of the same size. In the process of tree building, a few input variables are selected randomly to form a subset of variables Θ . Only the explanatory variables entering the subset Θ have the chance to become bin-variables to prevent multiple CARTS from being highly correlated.

We can see that the basic starting point of the classic customer behavior prediction model represented by Pareto/NBD (HB) and Pareto/GGG is that the distribution of customers' historical purchase behavior will remain unchanged in the future; therefore, the assumptions of customer purchase behavior and its distribution form are crucial for establishing the deductive models. As long as the distribution parameters of customers' previous purchases are obtained, the future behavior can be predicted based on the distribution function. Only a few variables—including the historical number of purchases (F), recent purchases (R), monetary value of purchases (M), and observation period (T)—are needed to identify distribution parameters and develop distribution function. Although many scholars (Abe 2009; Fader, Hardie, and Shang 2010; Ma and Büschken 2011) have proposed a variety of improved models based on the revision of the assumptions, there is no significant change in the basic modeling framework. These models belong to unsupervised learning in terms of modern statistics (i.e., the parameters of the prediction model are estimated without supervision of the customers' future purchase behavior). Pareto/NBD (HB) and Pareto/GGG are therefore suitable to describe stable purchase behavior without much consideration of purchase fluctuations.

Machine learning methods bring us new thoughts and ideas regarding customer behavior prediction, however, and they can work as an important supplement to the classic deduction-based customer behavior prediction models. Machine learning algorithms such as GBDT and RF are supervised methods, meaning that parameter estimation is carried out based on customers' historical behavior. These models directly reflect the nonlinear relationship between customers' purchase histories and future purchases with no need for the assumptions of customer purchase behavior, which is suitable to capture unstable and unconventional purchases. Besides, we can introduce more related variables into the explanatory variable set; therefore, modeling customer behavior is no longer limited to a few variables such as R, F, T, and M. More variables describing the characteristics of customer behavior can be introduced into the model, but it is critical to decide which

variables should be contained in the model's explanatory variable set. In our study, we used four groups of explanatory variables in GBDT and RF.

First, we gained insights from Pareto/NBD (HB) and Pareto/GGG that customers' historical purchase behavior would determine the number of their future purchases. We therefore kept the classic variables that describe customers' historical purchases—including F, R, M, and T—in the GBDT and RF models.

Second, we added variables that described customers' recent historical purchases. Because remote purchase history is less useful for predicting the future, we introduced the more recent purchases—including monetary value and purchase intervals—into the models. These variables can reflect whether the customer has frequently purchased or has stocked up recently because of a sales promotion. If so, the possibility of frequent purchases in the near future will be reduced.

The level of historical purchasing power was also an important factor in determining future purchases; therefore, we next introduced variables that reflected customers' purchasing power during a certain time. One of the most important variables was the accumulated monetary value of purchases in a given time. If two customers had the same F and R for a period, the customer with the higher accumulated monetary value of purchases should have a higher purchasing power.

Finally, we believe that the number of future purchases is closely related to intertransaction timing (i.e., purchase intervals), which can depict customers' regularity and effectively improve prediction accuracy. Customers with shorter time intervals between purchases must have a different number of purchases from customers with longer time intervals between purchases in the same future period. We thus introduced variables into the model that described the purchase intervals.

All of the explanatory variables of the GBDT and RF algorithms are shown in Table 2.

EMPIRICAL APPLICATION

Dataset

The data we used in this empirical study came from a large retailer in China. We used 114,973 pieces of transactional data from 25,800 customers in a 43-week period from July 25, 2017, to May 20, 2018. The preliminary data processing was done in the following steps.

Step 1: We reorganized the data by combining all of a customer's transactions in the same week and then calculating the variables in Table 2.

Step 2: We divided the dataset into two time periods. The first period was July 25, 2017, through January 1, 2018 (23 weeks), and the second was January 2, 2018, through May 20, 2018 (20 weeks). For Pareto/NBD (HB) and Pareto/GGG, we used the data from the first period to estimate model parameters and the monetary value of an individual customer's future purchases. Furthermore, based on the estimated model parameters and monetary value of the first period, we predicted a customer's number of purchases and then calculated the CLV of the second period. For GBDT and RF, we used variables listed in Table 2 from the first-period dataset as explanatory variables and the number of purchases

from the second-period dataset as the explained variable to build the models and estimate the parameters. Then we predicted a customer's number of purchases and calculated CLV for the second period.

Step 3: After data cleaning, we randomly selected a portion of the customers who survived to the 43rd week and observed the variable distribution.

Table 2. Explanatory Variables of the GBDT and RF Algorithms

Variables	Variable Description	Classification
F	Number of purchases that describes customers' historical purchase frequency	Classical variables
R	Latest purchase that describes the time period since customers' last purchases	
M	Monetary value of purchases that describes customers' purchasing power	
T	Observation period that describes customers' survival time	
R.1	Interval (weeks) between customers' last and third-to-last purchases	Variables describing the purchase intervals of recent historical purchases
R.2	Interval (weeks) between customers' last and second-to-last purchases	
sale.1	Monetary value of customers' third-to-last purchases	Variables describing the monetary value of recent historical purchases
sale.2	Monetary value of customers' second-to-last purchases	
sale.3	Monetary value of customers' last purchases	
sale.sum.1	Accumulated monetary value of customers' last three purchases	Variables describing the purchasing power of customers during a certain time
sale.sum.2	Accumulated monetary value of customers' last two purchases	
timespace.mean	Mean of the intertransaction timing that reflects the average level of customer purchase intervals	Variables describing customers' purchase time intervals
timespace.sd	Standard deviation of the intertransaction timing that reflects the fluctuation of customer purchase intervals	
timespace.max	Maximum value of the intertransaction timing that reflects the extreme case	
litt	Sum of logarithmic intertransaction timing that reflects the overall level of customer purchase intervals	

The line chart in Figure 1 shows changes in the number of customer purchases during the 43 weeks; the solid black line is the total number of purchases, and the red dashed line is the number of repeat purchases. The number of purchases reached its peak in weeks 22 to 25, when the retailer frequently promoted at the end of the year, and dropped to the lowest point in May 2018. The boxplot in Figure 2 shows customer intertransaction timing for the first period. The median for the third-to-last time interval—the time between the third-to-last purchase and the last purchase—was about four weeks. The median for the second-to-last time interval—the time between the second-to-last purchase and the previous purchase—was about two weeks. The variance for the third-to-last time interval was relatively larger than that of the second-to-last time interval. The distributions of both time intervals were right-skewed, with fewer customers having longer purchase-time intervals. The last time interval shows the time interval since the last purchase. The median was about three weeks, with relatively large variance, and the number of customers who had not purchased for a long time was relatively small.

Figure 3 shows the distribution of T and F. As shown in Figure 3A, during the 23 weeks of the first period, only 6 percent of customers bought for the first time in the latest four weeks (i.e., survival time less than four weeks) and only 5 percent of customers survived more than 23 weeks. Most of the customers had a survival time of about 10–20 weeks. Figure 3B shows that during the first period, 40 percent of customers purchased in this retail store fewer than five times, 38 percent purchased six to ten times, and only 3 percent purchased more than fifteen times.

Figure 1. Customer Purchase Frequency

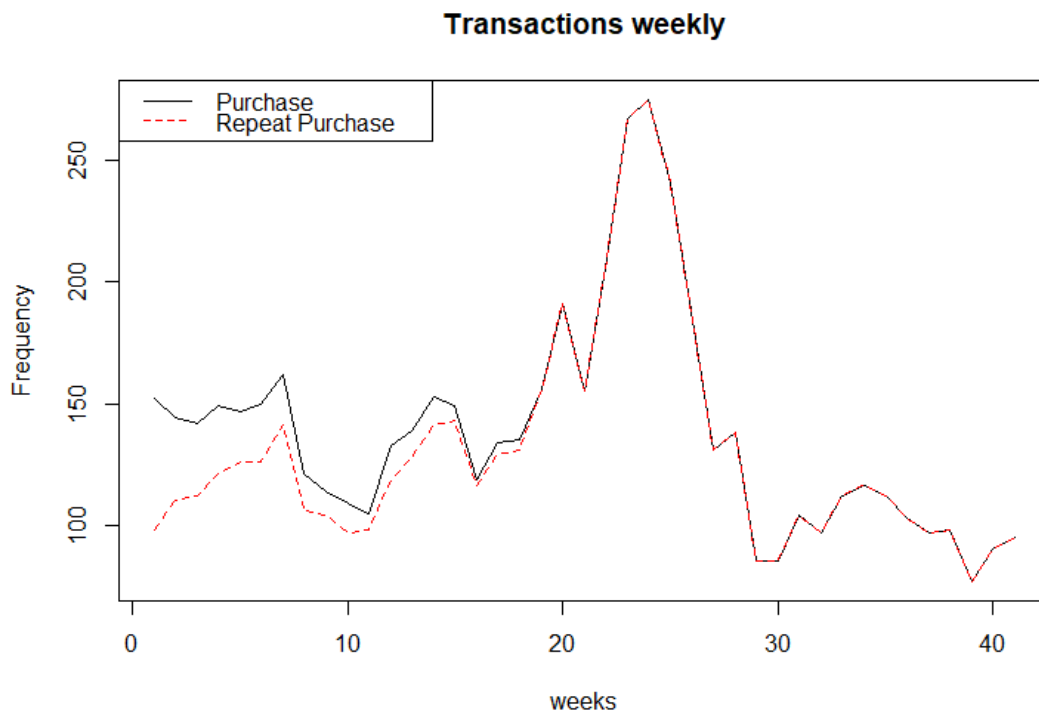


Figure 2. Intertransaction Timing of the First Period

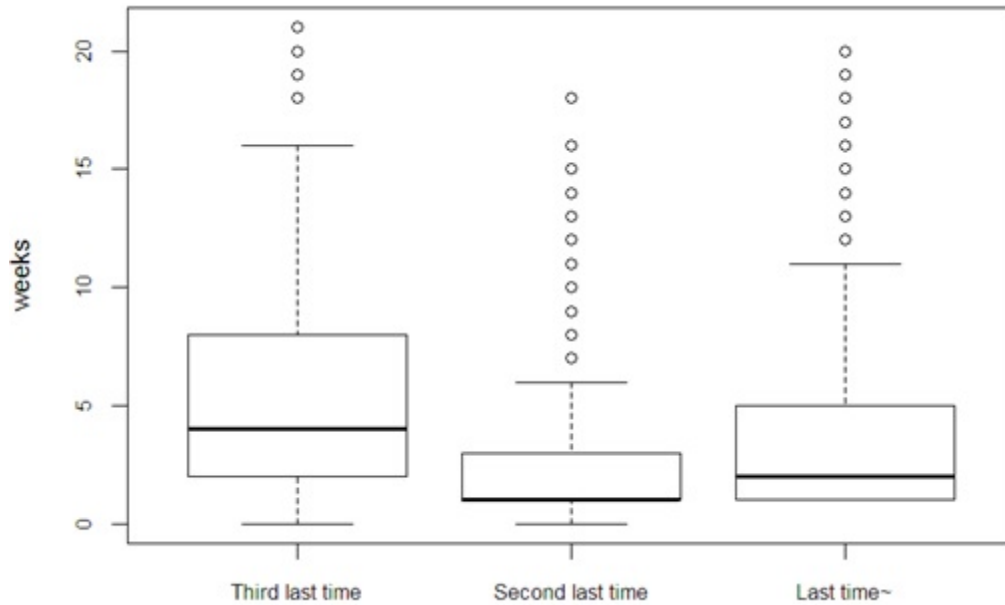
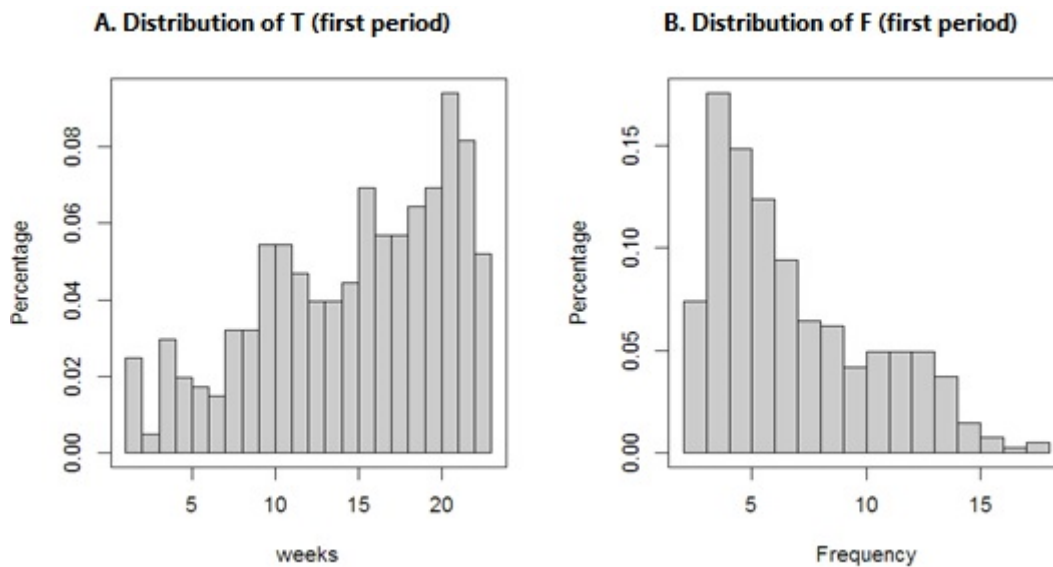


Figure 3. Distribution for the first period. (A) Time. (B) Frequency.



Estimating Frequency of Future Purchase Using Pareto/NBD (HB) and Pareto/GGG

We adopted the MCMC method to estimate the parameters of Pareto/NBD (HB) and Pareto/GGG based on the first-period dataset. MCMC estimation is a simulation-based estimation procedure in which random draws are recursively simulated from the model's full conditional distributions and are used as conditioning arguments in subsequent draws. Upon convergence, these draws form the true posterior. We estimated the model using 3,000 iterations of the Markov chain. The first 2,500 iterations were discarded, and the last 500 iterations were used to form estimates of the posterior distribution of model parameters. A time series plot of the draws indicated the convergence of two chains from multiple initial values.

We calculated the average of the draws as the estimated values of the parameters. The estimated parameter values of Pareto/NBD (HB) on an aggregated level were $\hat{\alpha} = 15.44$; $\hat{\tau} = 7.01$; $\hat{\delta} = 0.36$; $\hat{\beta} = 41.23$, which means the number of purchases per week was 0.45 and the dropout rate was 0.008. Meanwhile, the parameter estimation results of Pareto/GGG were $\hat{\tau} = 116.82$; $\hat{\gamma} = 131.56$; $\hat{\alpha} = 20.64$; $\hat{\tau} = 9.09$; $\hat{\delta} = 0.50$; $\hat{\beta} = 69.83$, meaning that the average number of purchases per week was 0.44, the dropout rate was 0.007, and the intertransaction timing was 0.89 weeks when the customer remained alive.

To evaluate the two models' prediction performance, we first grouped customers based on their number of purchases in the first period. The lowest category was two or fewer times, and the highest category was fifteen or more times. We then predicted the average number of purchases (i.e., the conditional expectation) of the corresponding groups in the second period according to Pareto/NBD (HB) and Pareto/GGG. We then compared the prediction results of the two models with the second period's actual values, as shown in Figure 4A. This figure also shows an overall positive correlation between the numbers of purchases in the first and second periods; however, the number of purchases in the second period decreased for the customers who purchased 10 times or 13 or more times, meaning that purchasing was unstable. The high purchase frequency in the first period may have been caused by factors such as seasonal fluctuation, holidays and festivals, sales and promotions, and similar. Figure 4A illustrates that neither the Pareto/NBD (HB) nor the Pareto/GGG method captured these fluctuations. The predictions of these two models were relatively stable. Figure 4B shows the cumulative number of purchases. The prediction values of Pareto/NBD (HB) and Pareto/GGG were very close, while both of them were overestimated with mean square error (MSE) terms of 3.05 and 3.23, respectively.

Furthermore, we grouped customers with a different observation time T , including one or fewer months—up to six months or more—in the first period and predicted the average number of purchases (i.e., the conditional expectation) of the corresponding groups in the second period, according to Pareto/NBD (HB) and Pareto/GGG. We then compared the two models' prediction results with the actual number of purchases of the second period, as shown in Figure 5. This figure shows that the average customer purchases' actual values did not increase monotonically with the duration of the observation time. The prediction values made by Pareto/NBD (HB) and Pareto/GGG were very close. Both models predicted well for groups 1 and 2, overvalued

for groups 3–5, and slightly undervalued for group 6. The MSE terms of the two models were 6.21 and 6.37, respectively.

Figure 4. Model Evaluation of Pareto/NBD (HB) and Pareto/GGG Based on Bins for F

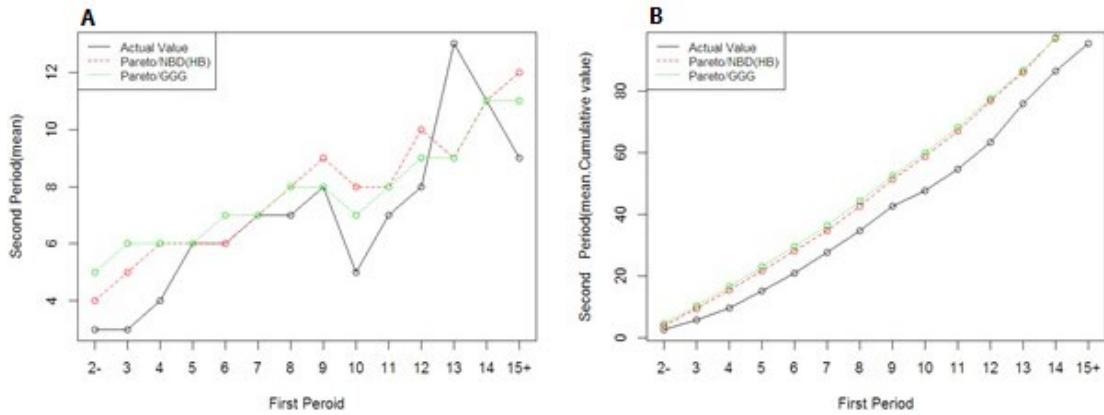
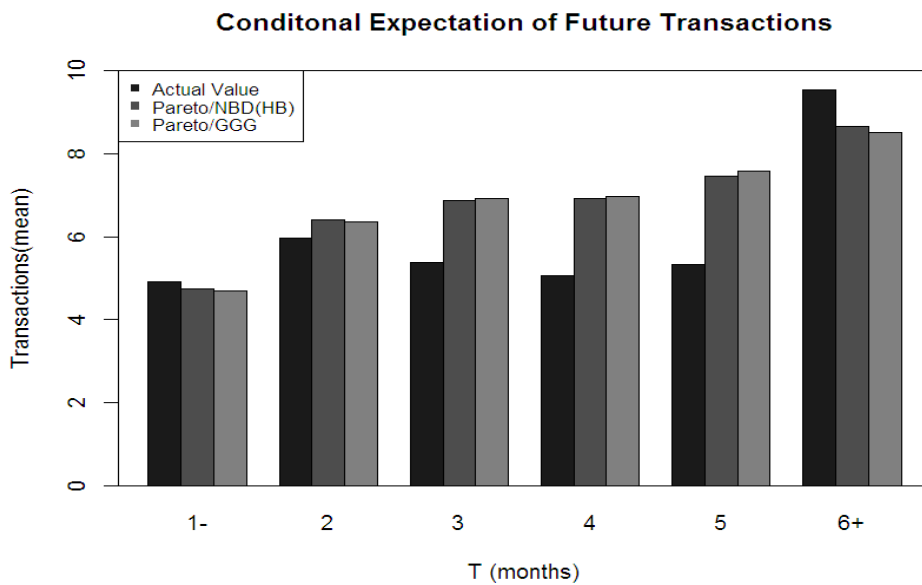


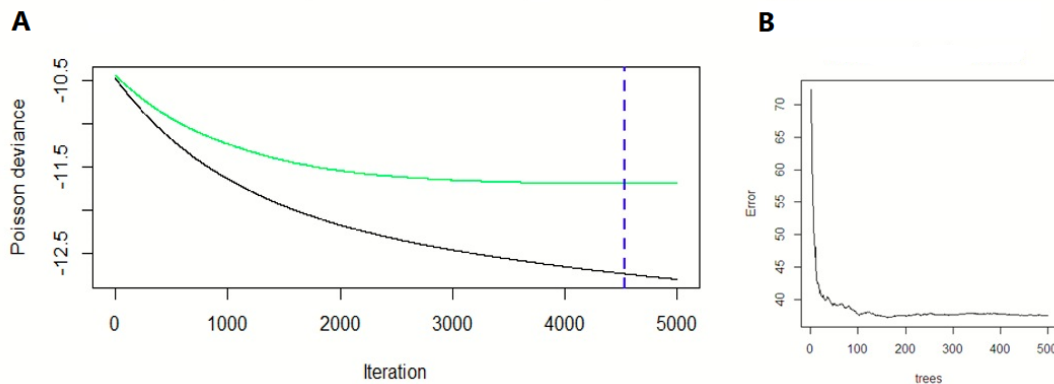
Figure 5. Model Evaluation of Pareto/NBD (HB) and Pareto/GGG Based on Bins for T



Estimating Frequency of Future Purchase Using GBDT and RF

For GBDT, we set the shrinkage parameter as 0.001, and it grew 5,000 trees. A 10-fold cross-validation method was used to prevent model overfitting. We investigated the influence of tree numbers on the training error and the test error as shown in Figure 6A. The green (upper) curve in Figure 6A represents the test error, and the black (lower) curve represents the training error. With the increase in the number of trees, the training error decreased monotonically, while the test error began to increase after reaching the minimum when the tree number was 4,532. This indicates that the model started to overfit when the tree number exceeded 4,532. We therefore chose the GBDT model when the number of trees equaled 4,532.

Figure 6. Influence of Tree Numbers of Training and Test Errors. (A) Training error (black) and test error (green) of GBDT. (B) Test error of RF.

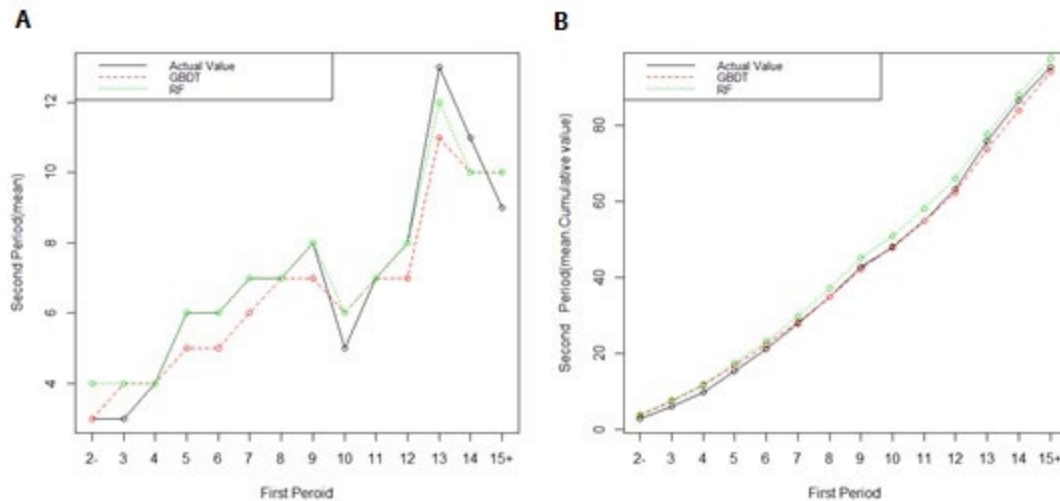


For RF, we set the variable subsets for each tree to include $p/3$ explanatory variables (p was the number of explanatory variables) to grow 500 trees. To prevent model overfitting, the test error curve (i.e. the OOB curve) was drawn as shown in Figure 6B. With the increase in the number of trees, the curve declined sharply at the beginning and then fluctuated up and down, which indicated model overfitting. The minimum test error was attained when the tree number reached 165. We therefore chose the RF model when the tree number equaled 165.

To evaluate the two models' prediction performance, we grouped customers according to the number of purchases—from two or fewer times to fifteen or more times—in the first period. We then predicted the average number of purchases (i.e., the conditional expectation) of the corresponding groups in the second period according to GBDT and RF. We then compared the two models' prediction results with the second period's actual value, as shown in Figure 7A. Compared with the prediction performance of the Pareto/NBD (HB) model and Pareto/GGG model as shown in Figure 4A, GBDT and RF had an excellent ability to track the sharp fluctuations in the dataset. The predictions for customers who purchased 10–13 times in the first period were significantly better than those of the Pareto/NBD (HB) and the Pareto/GGG models. We also compared the models' fitting effect based on the cumulative number of purchases, as shown in Figure 7B. The predicted

value curves of the GBDT and RF models coincided with the actual value curve, and the prediction results of the GBDT were slightly lower than those of the RF. Both GBDT and RF displayed excellent prediction ability, with MSE terms of 0.65 and 0.34, respectively.

Figure 7. Model Evaluation of GBDT and RF Based on Bins for F



Furthermore, similar to Figure 5, we grouped customers with different observation time T in the first period and predicted the average number of purchases (i.e., the conditional expectation) of the corresponding groups in the second-period GBDT and RF. We then compared the two models' prediction results with the actual number of purchases of the second period, as shown in Figure 8. Compared with the Pareto/NBD (HB) prediction performance and the Pareto/GGG models (Figure 5), the prediction values given by GBDT and RF were closer to the actual values. The prediction values of GBDT were slightly lower than those of RF. The MSE was 1.90 for GBDT and 0.64 for RF.

Both GBDT and RF can sort the importance of the explanatory variables. For example, as shown in Figure 9A, the RF model illustrates each explanatory variable's contribution to the reduction of the test error. Figure 9B shows each explanatory variable's contribution to the decrease in value heterogeneity of the tree nodes' explained variable. The greater the contribution value, the more important the explanatory variable. According to Figure 9A, T was the most important explanatory variable, followed by R , $R.1$, etc., while according to Figure 9B, $R.1$ was most important, followed by T , F , etc. The seven most important explanatory variables based on their contribution to reducing the test error are listed in Table 3.

Among the top seven variables, six were important for both GBDT and RF. Furthermore, the remaining variables (in **bold** in Table 3) for GBDT (average purchase interval) and RF (sum of logarithmic purchase intervals) were both functions of the purchase-time intervals. Number of purchases, purchase intervals, observation period, and

monetary value of the purchases were decisive factors for the number of purchases in the future (20 weeks in our study). This indicates that the number of purchases and the monetary value of purchases were not always independent of each other as the Pareto/NBD (HB) model assumed. It also shows the necessity of introducing variables that describe purchase-time intervals into the Pareto/GGG model.

Figure 8. Model Evaluation of GBDT and RF Based on Bins for T

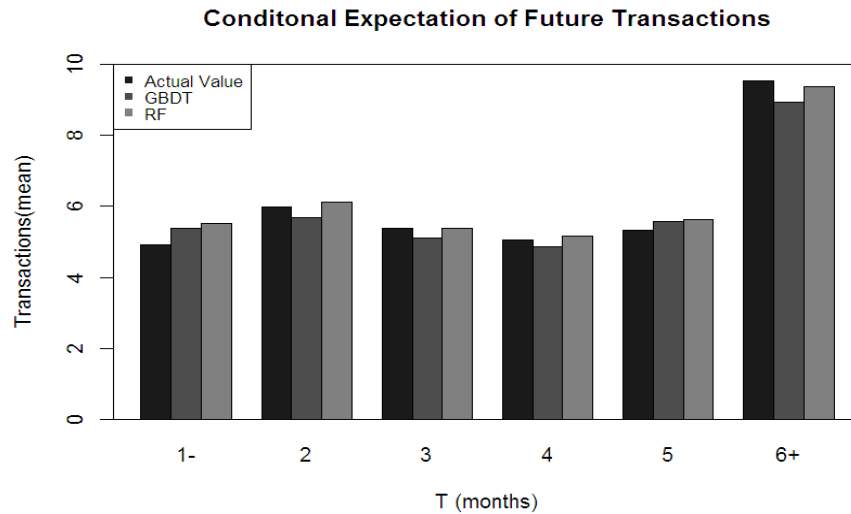


Figure 9. Variable Importance of RF to Reduction of Test Error (A) and Decrease in Value Heterogeneity (B)

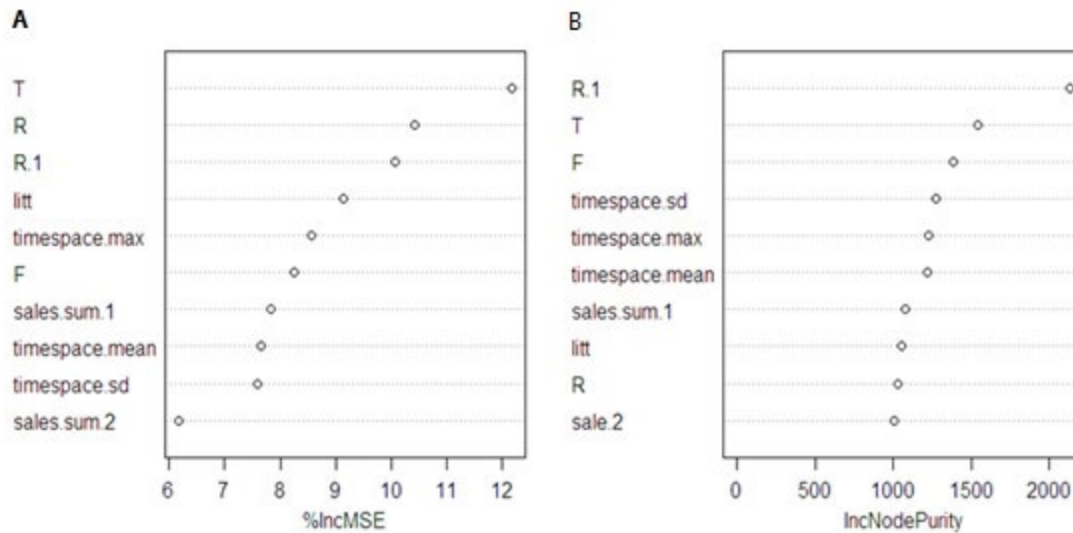
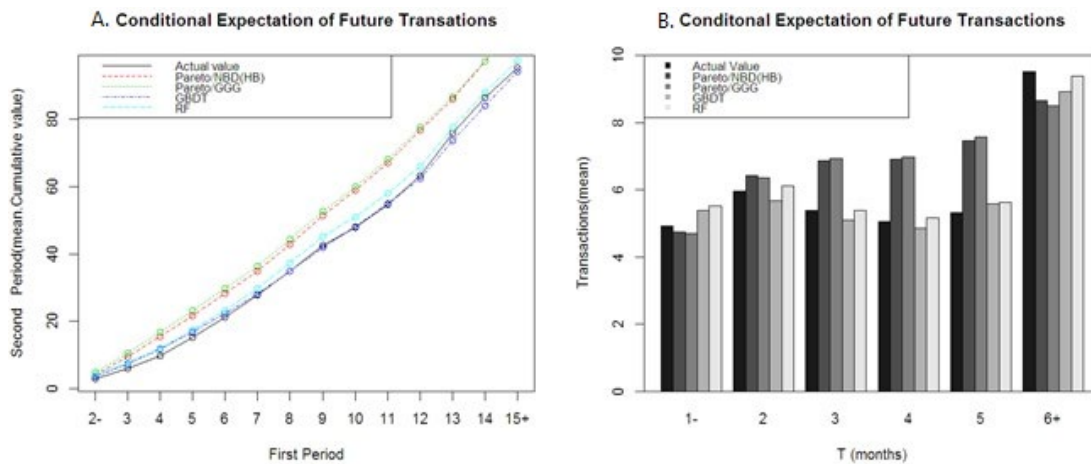


Table 3. Variables Ranked by Importance

GBDT		RF	
Variable	Importance score	Variable	Importance score
Interval between last purchase and third-to-last purchase (R.1)	28.72	Observation period (T)	12.17
Observation period (T)	14.44	Recency (R)	10.41
Maximum purchase interval (timespace.max)	9.59	Interval between last purchase and third-to-last purchase (R.1)	10.06
Number of purchases (F)	9.35	Sum of logarithmic purchase intervals (litt)	9.13
Average purchase interval (timespace.mean)	7.97	Maximum purchase interval (timespace.max)	8.56
Recency (R)	7.17	Number of purchases (F)	8.25
Accumulated monetary value of last three purchases (sale.sum.1)	5.75	Accumulated monetary value of last three purchases (sale.sum.1)	7.82

Figure 10. Comparison of Model Performance



Comparing the Prediction Performance of the Four Models

We compared prediction results of Pareto/NBD (HB), Pareto/GGG, GBDT, and RF. As shown in Figure 10, the prediction values of the two probability models, Pareto/NBD (HB) and Pareto/GGG, were similar. The prediction values of the two machine learning models, GBDT and RF, were also quite similar. Table 4 compares the MSE of the four models. The MSE terms of GBDT and RF were significantly lower than those of the Pareto/NBD (HB) and Pareto/GGG models, suggesting that machine learning algorithms had better predictive abilities.

Table 4. Comparison of Conditional Expectation MSE

Prediction Models	Conditional Expectation MSE (1)	Conditional Expectation MSE (2)
Pareto/NBD (HB)	3.05	6.21
Pareto/GGG	3.23	6.37
GBDT	0.65	1.90
RF	0.34	0.64

Estimating the Monetary Value of Future Purchases

Schmittlein and Peterson (1994) noted that the monetary value of a customer's future single purchase can be estimated based on a normal distribution. In our study, θ denoted the mean and σ_A^2 denoted the variance of purchase value per transaction for all customers, θ_i denoted the expectation, and σ_{wi}^2 denoted the variance of the future purchase value per transaction for the i th customer. Under large sample \bar{Z}_i , the average purchase value for X_i times (sample mean) was normally distributed with mean θ_i and variance σ_{wi}^2/X_i . The expected future purchase value per transaction was therefore

$$\theta_i = \left(\frac{X_i \sigma_A^2}{X_i \sigma_A^2 + \sigma_{wi}^2} \right) \bar{Z}_i + \left(\frac{\sigma_{wi}^2}{X_i \sigma_A^2 + \sigma_{wi}^2} \right) \theta.$$

According to the equation, we can estimate each customer's future purchase value per transaction, denoted by \hat{M} .

Identifying Profitable Customers Based on CLV

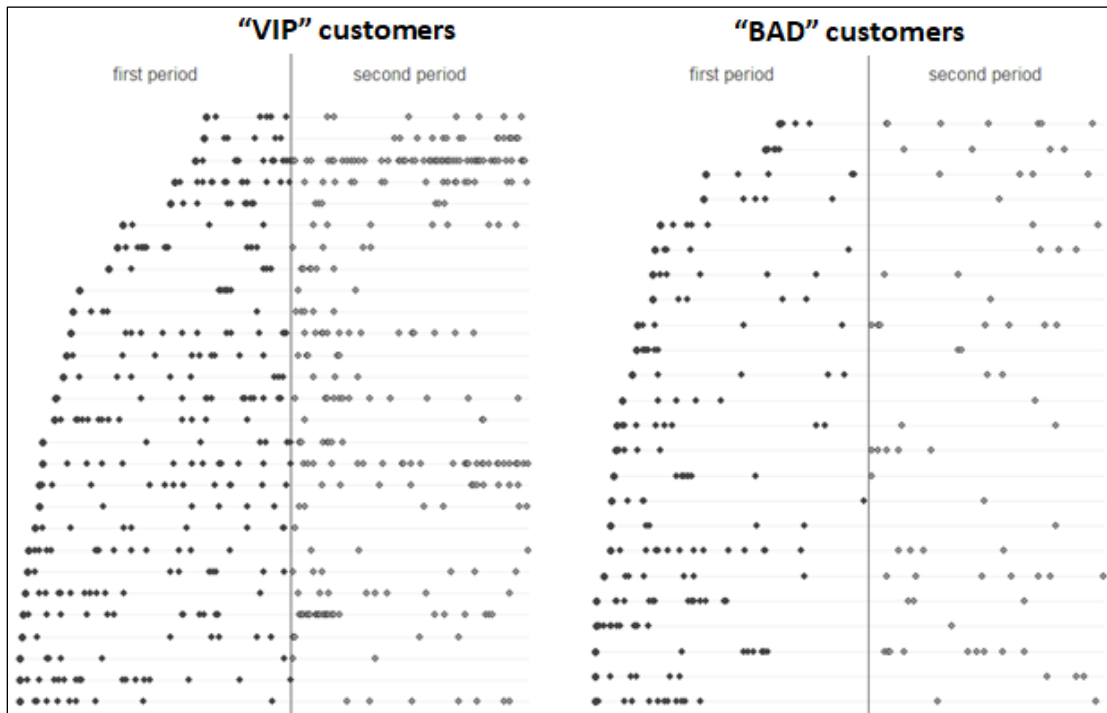
After predicting the frequency and monetary value of each customer's future purchase, we combined the two to calculate CLV ($CLV = \hat{M} \times \hat{F}$). Here, \hat{F} was the predicted purchase frequency and \hat{M} was the predicted purchase value for the future 20 weeks.

We identified the most- and least-profitable customers based on the combined CLV prediction model. First, we listed the 15 percent of customers with the highest

CLV as “VIP” customers (N total customers) and the 15 percent with the lowest CLV as “BAD” customers (N total customers), resulting in four VIP customer lists and four BAD customer lists. Next, we used the four prediction models to count the number of times each customer appeared on the VIP customer lists or the BAD customer lists. Finally, we identified a customer as profitable or unprofitable based on his or her scores. When a customer received a score of at least 3 for VIP, he or she was identified as a profitable customer; similarly, a score of at least 3 for BAD caused a customer to be identified as unprofitable.

After customer identification, we randomly selected 25 profitable and 25 unprofitable customers to further investigate with regard to purchasing behaviors. Figure 11 reflects the purchasing behaviors of both types of customers, where the horizontal axis is the week, the vertical axis is the customer ID, and the dots indicate that the customer made purchases in that week. A profitable customer could be an old customer with a longer history of purchases, an old customer with a larger number of purchases and relatively regular purchase cycles, or a new customer with shorter purchase-time intervals but a larger number of purchases within a rather short time. It should be noted that the value of purchases also has a great influence on the calculation of CLV but Figure 11 depicts only number of purchases, time intervals, and survival time of customers without considering the value of customer purchases. This might be an important reason why customers with fewer purchases were still identified as profitable customers. Compared with profitable customers, unprofitable customers usually have no regular purchase cycle and have increasingly longer purchase-time intervals despite the possibility of frequent purchases earlier in the observation period.

Based on the customer-identification results, we believe that it is necessary to identify customers based on a combined prediction strategy of CLV. Because only customers who received scores of at least 3 were identified as profitable or unprofitable, we can say that there should be approximately N customers identified as profitable and N as unprofitable when the four models give relatively consistent CLV values. Otherwise, the number of profitable or unprofitable customers should be lower than N . The prediction results for the four models were not completely consistent because of different method design and modeling approaches. This was reflected in that only 74 percent of the customers on the VIP customer list were identified as profitable and only 72 percent of customers on the BAD customer list were identified as unprofitable; that is, the overall agreement rates of the four models were 74 percent and 72 percent, respectively, for the identification of profitable and unprofitable customers. Moreover, the agreement rates of the Pareto/NBD (HB) and Pareto/GGG models were 92 percent and 88 percent, respectively, which were significantly higher than the overall agreement rate. The agreement rates of GBDT and RF were 78 percent and 76 percent, which was also slightly higher. These indicate that different models might get different prediction results. The customer identification based on a certain model might thus be biased. We therefore believe that a combined CLV prediction strategy is an effective way to improve the robustness of customer identification.

Figure 11. Customer Purchasing Behavior

MANAGERIAL CONTRIBUTION

Our study findings offer several managerial benefits. First, we have developed a new metric to measure CLV. Given the distinct benefits provided by CLV, a marketer should closely monitor this metric in the pursuit of growing its business. Buoyed by the technological advancements of analytics and a customer data platform, it delivers all the information a company needs to predict CLV. Second, CLV gives a company a closer look at the health of a business by taking a longer timeframe into account. CLV can help a company identify its best customers. Data about customers let a company spot those who spend the most. Taking advantage of this information enables a company to promote certain products. Third, a company can invite its customers to special events and can offer deals specially tailored for high-value customers. Finally, the company can take better care of its most valuable customers by providing them with individual assistants or advisers (Jain and Singh 2002; Kumar and Reinartz 2016).

SUMMARY AND CONCLUSION

Researchers have explored different CLV modeling methods, but most of the studies have focused on deductive approaches, such as probability and econometric and persistence models, because of their emphasis on parametric setup and easy interpretability in the

marketing literature. Compared with deductive approaches, inductive approaches based on modern statistics and machine learning algorithms have not received as much attention. With the development of data analysis technology, inductive methods are playing a more and more important role in marketing research. In our study, we introduced two inductive models, GBDT and RF, to predict CLV. Based on the empirical analysis of a Chinese retailer, we found that the predictive performance of modern statistics and machine learning algorithms was generally better than that of the methods based on probability distribution (i.e., Pareto/NBD (HB) and Pareto/GGG). To identify the most- and least-profitable customers for the firm, we first used the four aforementioned models separately to predict CLV and then combined the prediction results to ensure the robustness of customer identification.

Because the inductive methods have excellent predictive ability, we believe that CLV models based on modern statistics and machine learning should be further explored. Future research can introduce more modern statistics and machine learning algorithms in CLV modeling and can focus on the comparison of their predictive ability. With the continuous enrichment of CLV modeling approaches, we propose combining more different CLV methods as a way to ensure robustness in customer identification.

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*Status, Maintenance of Security, and Militarized Foreign Policy**

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ABSTRACT

How does status affect foreign policy outcomes? Scholars have long argued that status is a salient foreign policy driver and that states fight for status, but there is no consensus on how to think about this relationship. I propose that unpacking the link between status and role in international relations can help scholars analyze how status shapes national security outcomes. I illustrate the usefulness of this framework on the processes leading to Australia's intervention in the Solomon Islands. An analysis of speeches by Australia's leaders reveals that concern for maintaining Australia's status as the leader of the Pacific and the role of maintainer of regional order and security affected the decision to dispatch an intervention.

KEY WORDS Status; Role; Foreign Policy; Australia; South Pacific

Political scientists have long regarded pursuit of status as a salient foreign policy motive (Paul, Larson, and Wohlforth 2014). Several books exploring status in international relations from various theoretical perspectives have been published in recent years (Larson and Shevchenko 2019; Murray 2019; Renshon 2017). One of the central claims in the literature has been that countries value status so much that they are even willing to fight for it (Dafoe, Renshon, and Huth 2014). Evidence exists that concerns about status have played a significant role in the lead-up to conflicts such as World War I (Murray 2019) and, more recently, the U.S. invasion of Iraq (Butt 2019). According to one study, more than half of all wars were fought over status (Lebow 2010). Nevertheless, beyond a consensus that status *matters*, little agreement exists on how status affects foreign policy outcomes. As one frequently cited review article noted, the importance of status is often merely asserted and the theoretical mechanisms linking status to national security decisions remain underdeveloped or vague (Dafoe et al. 2014:388). The lack of elaboration has led skeptics to conclude that status in international relations is merely an *illusion* (Mercer 2017). How should scholars think about the effect of status on foreign policy outcomes, particularly on the use of force?

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I propose that we can gain a more complete understanding of how status affects national security outcomes by exploring the link between status and role. In international relations, *role* refers to a set of behaviors that other states expect a country to follow. A country on the top of the status hierarchy is expected to take on the role of maintainer of security and order outside of its borders. When a domestic crisis in another country begins to disrupt international security, it is the responsibility of the high-status country to resolve it. I illustrate the implications of this argument on the case of Australia's 2003 intervention in the Solomon Islands. Existing scholarship on status in international relations has focused predominantly on a few historical cases involving European great powers. Consequently, less is known about the effect of status on countries located outside of Europe or not at the top of the global status hierarchy. Australia holds the status as leader of the South Pacific; nevertheless, the impact of status on Australia's foreign policy has been understudied. An examination of speeches by Australia's leaders reveals that the concern to protect Australia's status as leader of the South Pacific motivated the decision to dispatch a military intervention in the Solomon Islands.

The discussion that follows has three parts. It begins by reviewing the extant literature on status in international relations and proposing that scholars can gain a more complete understanding of how status translates into foreign policy outcomes by incorporating role as analytical category. It then explores the link between status and the role of maintainer of order and security. Finally, it shows that concerns about Australia's status and role led to the decision to dispatch an intervention in the Solomon Islands.

STATUS IN WORLD POLITICS

Conceptualizing Status

Status is a difficult concept to define, but analysts agree that it refers to rank or position occupied by a country in the international system relative to other states (Dafoe et al. 2014; Lake 2011; Renshon 2017). According to a frequently cited book chapter, status refers to "collective beliefs about a given state's ranking on valued attributes (wealth, coercive capabilities, culture, demographic position, sociopolitical organization, and diplomatic clout)" (Larson, Paul, and Wohlforth 2014:7). Recently, status has been defined very similarly as "a state's position in a social hierarchy. More concretely, a state's status is equivalent to the sum of the beliefs of relevant others about how important it is relative to other states" (Ward 2020:275). Status manifests in international relations in two ways: membership in a club of states, such as the European Union (EU) or the G20, and relative standing within such a club. For example, all member states gain status from being part of the EU; nevertheless, Germany and France hold greater status than other EU members do.

Three attributes are central to conceptualizing status in international relations: status is positional, social, and subjective (Dafoe et al. 2014; Paul et al. 2014; Renshon 2017). First, status is positional—it delineates a country's standing relative to other states. To say that a country has high status therefore implies the existence of states with low status. If everyone had the same status, it would make little sense to speak of high or

low status. The positional nature of status makes holding high status desirable, which can help account for the frequency and severity of status conflicts between states. For example, Iran and Saudi Arabia have been engaged in a fierce competition to become the leader of the Middle East.

Second, status is social—it cannot be declared by a single country but can only be conferred by other states. Although all members of the international community are involved in status attribution, the states that sit on the top of the global status hierarchy have a greater say. For this reason, countries seek to gain favor with high-status states, such as the United States, in order to advance their own status (Jakobsen, Ringsmose, and LundeSaxi 2018). The collective nature of status attribution in international relations—the fact that status cannot be simply declared but has to be conferred—can make the quest for status difficult. For example, observers noted that China did not succeed in gaining the global status it sought because the United States and its allies refused to recognize China’s status claims.

Third, status is subjective—a country’s status is assigned based on how that country and its attributes are perceived by other states (Larson et al. 2014). Although the impact of certain attributes on status is relatively straightforward, the effect of others is less clear. For example, military power is considered a salient attribute of status. According to one estimate, the correlation between military power and status is between 0.5 and 0.75 (Renshon 2017). It is no coincidence that countries at the top of regional and global status hierarchies are usually the ones with greatest military power. Despite the strong correlation, some countries, such as Canada, New Zealand, and Vatican City, managed to obtain higher status compared to their military or economic power. In contrast, 18th-century Russia, despite its material power, was unable to obtain the status of a great power because it did not meet the moral and civilizational standards of that time (Neumann 2008). Overall, status refers to a country’s rank relative to others, and political scientists agree that it is positional, social, and subjective.

In international relations literature, status is frequently discussed with reputation, which refers to “belief about a trait or behavioral tendency of an actor, which is based on that agent’s past behavior” (Dafoe et al. 2014:375). Others have defined reputation similarly, as “having a good name in the world of nations” (Wang 2006:91). In international relations, countries can hold reputations for expressing resolve during international crises (Huth 1997), complying with international treaties (Simmons 2010), and behaving like good allies (Miller 2012). It is not unusual for countries to hold multiple reputations simultaneously. Developing a positive reputation might help a country gain status, whereas losing reputation can undermine a country’s standing in the eyes of others (Wylie 2009). Despite the two having a close relationship, scholars have observed significant differences between status and reputation (Dafoe et al. 2014; Mercer 2017). For example, status attribution requires consensus among group members regarding everyone’s rank, whereas a reputation does not require consensus. For this reason, it is more difficult for a country to obtain a new status compared to a new reputation. Despite similarities, status and reputation are different concepts and should not be used interchangeably.

Status and Foreign Policy Outcomes

While a small research program examining the role of status in international relations has existed, the past two decades have seen a sharp growth of the scholarship. Several book-long manuscripts exploring status from various theoretical perspectives have been published in recent years (Larson and Shevchenko 2019; Murray 2019; Renshon 2017). Empirical studies have provided evidence of the impact of status on Russian and Chinese foreign policies (Larson and Shevchenko 2010). Concerns about the decline of America's standing in the world were the central driver of a confrontational American foreign policy during the Trump administration (Wolf 2017). Analysts agree that conflicts over status are frequent; according to one study, more than half of all wars were fought over status (Lebow 2010). Political scientists have provided evidence that status is a salient aspect of international relations and driver of international conflict.

Despite an agreement that status *matters* in international relations, less consensus exists on how, exactly, status translates into foreign policy outcomes. Lack of clarity persists despite the growth of scholarship in recent years. For example, no consensus exists on the importance of status as a foreign policy motive. Some scholars maintain that states seek status as an end in itself, while others believed that states pursue status to obtain further material benefits (Barnhart 2016; Renshon 2017). According to a frequently cited review article, theoretical mechanisms linking status to foreign policy outcomes remain underdeveloped (Dafoe et al. 2014:388; Wolf 2020). Without a clearly articulated relationship, it is challenging to evaluate the extent to which status affects foreign policy outcomes. For skeptics, the presence of lingering questions constitutes proof that status in international relations is no more than illusion (Mercer 2017). While scholars believe that status affects how countries relate to each other, how should this relationship be conceptualized? I discuss two existing approaches and then suggest an alternative conceptualization of the link between status and foreign policy outcomes.

First, political scientists have often thought of status as closely linked to national identity, and of identity narratives as central to understanding how status translates into foreign policy outcomes (Murray 2019). Each country strives to create a national identity, which refers to a narrative capturing the country's self-image (Berenskoetter 2011). Domestically constructed identities provide foundations for how countries see themselves as well as for how other states should treat them (Subotic 2016). National identity narratives therefore generate expectations about the country's appropriate international status. The quest to obtain international recognition for status ambitions is a central part of national identity formation and of nation-building (Sambanis, Skaperdas, and Wohlforth 2015).

While countries seek status to obtain recognition of their identities, the process involves uncertainty and often tension (Gustafsson 2016). Other states might be unwilling to cooperate, which explains why countries sometimes engage in status-seeking policies even at high cost. For example, Sweden entered the Thirty Years War in defense of its identity and status (Ringmar 1996). Observers note that Russia's status disputes with Europe and the United States did little to boost the country's international standing (Larson and Shevchenko 2010; Wolf 2020). Because status is intrinsically connected to

national identity, scholars argued that identity narratives are key to understanding a country's status aspirations and why countries fight for status.

Second, political science scholarship has frequently emphasized the close connection between status and military power. Definitions maintain that status is based on multiple attributes, but military power is considered the most salient one. Empirical measures of status have drawn heavily on military capability, which has even been used as a proxy measure (Røren and Beaumont 2019; Volgy and Mayhall 1995). Various measures of military power, such as military expenditure compared to gross domestic product, five-year change in military capabilities, and aggregate military spending per year, have been utilized in large-N studies to clarify the relationship between military power and status (Duque 2018; Miller et al. 2015; Renshon 2017).

Scholars considered military power—particularly shifts in military balance in the international system—as key to understanding why countries compete, or even fight, for status (Organski and Kugler 1980; Volgy et al. 2011; Wohlforth 2009). As another country's material capabilities begin to match their own, states become more concerned about their status, and international conflict becomes more likely. For example, Great Britain and France initiated rivalries against countries whose economic and military capabilities began to match their own in order to protect their status (Onea 2014). Rising tensions between the United States and China, analysts argue, have been driven by the shrinking gap in military and economic power between the two countries (Chan 2005). Overall, scholars frequently emphasize military power as central to understanding the impact of status on foreign policy decisions, particularly the use of force.

STATUS, ROLE, AND FOREIGN POLICY OUTCOMES

Existing scholarship has proposed several ways of thinking about status and national security decisions. I do not argue that scholars have failed to explore this relationship; rather, my point is that the existing conceptualizations cannot capture the full extent to which status shapes foreign policy outcomes. I suggest that we can obtain a more complete understanding of this relationship by exploring the link between status and role in international relations. My approach builds upon the existing literature in anthropology, sociology, and social psychology, which has established a close connection between status and role (Jacobs 2018; Koenig and Eagly 2019; Linton 1936; Sarangi 2010). In international relations, *role* refers to a set of collectively constituted expectations of behavior that a country should follow, such as responsibilities, duties, and privileges (Holsti 1970). Roles prescribe appropriate conduct, extent of involvement in the international system, and foreign policy commitments. Although role does not provide a precise script of behavior to follow, it imposes constraints on how a country should behave.

Status provides the foundation for the roles a country takes on in international relations. Countries with lower status are expected to be followers and to conform to policies of high-status states. They frequently use this strategy as a way to bolster their standing (Larson and Shevchenko 2010). For example, Central and Eastern European countries as well as Scandinavian countries supported military operations by the United

States in North Africa and the Middle East in order to advance their own status (Jakobsen et al. 2018). Cyprus presented itself as a useful partner to both the United States and Russia in order to gain status (Pedi and Kouskouvelis 2019).

In contrast, states on the top of status hierarchies carry greater responsibilities and are expected to play leadership roles. These states are “thought by others to have the duty of modifying their policies in the light of the managerial responsibilities they bear” (Bull 1977:196). Members of the United Nations Security Council, in particular the five permanent members, have greater status than other countries but at the same time hold the greatest responsibility to maintain peace in the international system. The nuclear nonproliferation treaty and the Kyoto Protocol clarify the roles and responsibilities of high-status states in areas of nuclear nonproliferation and greenhouse gas-emission reductions, respectively. Even outside of the highly institutional setting of international organizations, countries with high status are expected to carry additional responsibilities, such as providing collective goods in international relations, maintaining order and security, helping allies, and giving assistance to less developed countries (Bernstein 2020; Bukovansky et al. 2012; Suzuki 2008). For example, because of its global standing, the United States has been expected by other states to take on roles as provider of global leadership, protector of human rights, and guardian of the liberal international order (Claude 1986).

Evidence exists that states with high status are aware of their roles and responsibilities. For example, commitment to allies and maintenance of peace and order in the international system have long occupied a central place in the United States’ national security discourse. Former U.S. Secretary of State Schultz stated that “as the most powerful country in the world, we have recognized our responsibility for helping to ensure international peace and stability” (quoted in Claude 1986:723). Overall, high-status states are expected by the international community to fulfill the obligations that come from their position in the international system.

While states on top of status hierarchies hold multiple roles and responsibilities, maintenance of order and security beyond their orders has been considered one of the central tasks (Bellamy 2016; Bukovansky et al. 2012; Buzan 2014; Claude 1986). When a crisis breaks out that threatens international security, other countries in the region as well as in the international community expect the high-status state to resolve that crisis. In particular, the high-status state is expected to get involved in the situation when that crisis poses harm to the security of the citizens of that country and when a country is unable to protect its citizens from harm. Documents such as the Universal Declaration of Human Rights, the Covenant on Civil and Political Rights, and the Covenant on Economic, Social and Cultural Rights provide the foundation for the understanding that high-status states have a particular responsibility to help states suffering from governance crises and to protect populations from human rights violations. Although helping countries that are plagued by internal instability and conflict is the responsibility of the entire international community, states on the tops of status hierarchies are expected by the international community to play a leading role in such efforts.

Overall, political scientists have long agreed that status is a critical element of international relations that affects how countries relate to each other. Despite this

agreement, less consensus exists on how to conceptualize the relationship between status and foreign policy outcomes, particularly decisions regarding the use of force. I proposed that one way to gain traction in this debate is to unpack the relationship between status and role. Countries at the top of status hierarchies hold multiple roles, such as providing order and security outside of their borders. In case a crisis breaks out in one of the countries that is disrupting international security, other states expect that the country with highest status will lead efforts in addressing the crisis and restoring security. I illustrate the implications of this argument on the processes leading to Australia's intervention in the Solomon Islands.

AUSTRALIA'S INTERVENTION IN THE SOLOMON ISLANDS

Despite an increase in the scholarship, analysts have focused primarily on a handful of countries with high status, such as the United Kingdom (Barnhart 2016), Russia (Forsberg 2014; Larson and Shevchenko 2010), and China (Deng 2008). Empirical studies have frequently centered on a few historical cases, such as the outbreak of World War I (Murray 2019; Wolf 2014) and relations among European powers during the 18th and 19th centuries (Onea 2014); nevertheless, the effect of status on countries located outside of Europe and on the countries that are not global great powers has been understudied.¹ For this reason, I focus on the impact of status on Australia's foreign policy, particularly on the decision to dispatch an intervention in the Solomon Islands. I first provide background on the intervention and discuss two potential explanations of Australia's decision to dispatch an intervention in the Solomon Islands. The limiting nature of these explanations provides an opening for a status-based interpretation of Australia's decision. I show that Australia's status as the leader of the South Pacific region and its role of guarantor of security motivated the intervention.

Historical Background

The Solomon Islands are an archipelago of more than 900 islands in the South Pacific and are located east of Papua New Guinea and approximately 1,000 miles from Australia's northeast coast. Most of the inhabitants live on the two biggest islands, Guadalcanal and Malaita. After gaining independence in 1978, the Solomon Islands struggled with issues such as corruption, limited economic opportunities, and unreliable government services (Dinnen 2008; Dinnen and Allen 2013). In 1998, disputes over land use and long-standing ethnic tensions between the inhabitants of Guadalcanal and Malaita ignited a political and security crisis (Hameiri 2007). The outbreak of violence put further strain on the struggling government, effectively leaving the country in a state of paralysis. Approximately one tenth of the Solomon Islands population was displaced because of the lawlessness, and the economy was shrinking at the margin of 10 percent per year (Hameiri 2007:410). The government was unable to contain the crisis, and Prime Minister Bartholomew Ulufa'alu was removed from office. Attempts to resolve the crisis, such as the 2000 Townsville Peace Agreement and the 1999 Marau Peace Agreement, were not successful. The new government, headed by Allan Kemakeza, was unable to

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stop the violence and restore order, and by 2003, the Solomon Islands were on the verge of becoming a failed state. In April 2003, the Solomon Islands government made a request to Australia to provide a military, police, and humanitarian intervention (Dinnen 2008; Wainwright 2003b).

In June of 2003, Australia responded to the request by leading an international mission to stop violence and restore order known as the Regional Assistance Mission to the Solomon Islands (RAMSI). The goal of the mission was to bring long-term security as well as political and economic stability to the Solomon Islands. Australia dispatched 1,500 military, police, and civilian officials, which constituted the mission's backbone. The first phase of RAMSI focused on the imposition of law and order, and by the end of 2003, Australian forces collected thousands of guns and made hundreds of arrests (Fraenkel 2006). Military forces remained stationed on the Solomon Islands for 10 years, and a police contingent stayed until 2017 to train the local police force. The long-term goals of the mission focused on state-building, stabilizing the economy, and fostering good governance (Dinnen and Firth 2008). Australian forces rebuilt government ministries and reformed local political and security institutions. The total cost of the intervention has been estimated at more than 2.8 billion Australian dollars, and two Australian soldiers died while deployed (Hayward-Jones 2014). Overall, the intervention was a costly foreign policy commitment that defined Australia's foreign policy for more than a decade (Allen and Dinnen 2010).

Alternative Explanations of the Intervention

What processes could explain Australia's intervention? Did Australia dispatch an intervention because the crisis in the Solomon Islands presented a threat to Australia's physical security? Analysts agree that at the time of the intervention, the situation in the Solomon Islands did not pose a direct threat to Australia's security (Clapton 2009). There was also no credible evidence to suggest the presence of terrorists or transnational criminal groups within the Solomon Islands (Greener-Barcham and Barcham 2006). The security situation in the Solomon Islands was not markedly worse at the time when Australia intervened. In fact, the severity of violence in the Solomon Islands had been greater when the crisis first emerged than when Australia intervened. For example, the number of tension-related deaths, abductions, illegal detentions, sexual assaults, and torture and ill-treatment cases had peaked around 2000 and declined by 2003 (Solomon Islands Truth and Reconciliation Commission 2012). Overall, little evidence suggests that the decision to dispatch an intervention was driven by a threat to Australia's physical security.

Alternatively, was Australia's decision to intervene in the Solomon Islands driven by a changing domestic political environment? For example, a shift in the ruling coalition or public opinion could put pressure on the government to dispatch an intervention. During the period of crisis in the Solomon Islands, however, the Liberal/National coalition led by Prime Minister Howard kept majority. In fact, in the 2001 election, the ruling coalition gained two extra seats in the parliament. Given the size and distance from Australia, the crisis in the Solomon Islands was always a peripheral issue in Australia that

was hardly on the radar of the average citizen. Little evidence exists of a major shift in the popular perception of the crisis in Australia or in domestic preference for a military intervention. Overall, there is little to suggest that Australia's decision to intervene in the Solomon Islands was due to domestic political processes or the threat that the crisis in the Solomon Islands posed to Australia's security. The limiting nature of these explanations provides an opening for a status-based interpretation of Australia's decision to dispatch an intervention.

A STATUS-BASED INTERPRETATION OF AUSTRALIA'S INTERVENTION

Australia's Status as Leader of the South Pacific

I begin the analysis by establishing Australia's status as the leader of the South Pacific region (Schultz 2014). Australia has the greatest economic and military power in the region, and it dominates regional organizations (Carr 2014). Other South Pacific nations rely on Australia for trade, security, and humanitarian aid. Australia's status as the leader of the South Pacific is based on the recognition of other South Pacific countries as well as of states outside of the region, in particular the United States (Schultz 2014; Wallis and Wesley 2015). Based on this status, Australia holds several roles and responsibilities in the region, including the role of guarantor of order and security (Dobell 2007; Fry and Kabutaulaka 2008; Halvorson 2013; Kabutaulaka 2005). This role is codified in several foreign policy documents and international treaties, such as the Canberra Pact, the Australia–New Zealand–Malaya Agreement, and the Australia, New Zealand, United States Security Treaty (Mediansky 1987; Young 1994). Australia's 2000 defense white paper stated that "Australia's interests in a stable and secure Southwest Pacific are matched by significant responsibilities as leader" (Department of Defence 2000:43). Australia's commitment to the maintenance of security and order in the South Pacific affected the decision to dispatch a military force more than one thousand strong to Bougainville in Papua New Guinea in 1994 and again in 1997 (Breen 2016). For the same reason, Australia dispatched more than five thousand military troops to address the security situation in East Timor in 1999.

Research Methodology

Did Australia dispatch an intervention in the Solomon Islands to maintain its status as leader of the South Pacific region? Status and its impact on international relations can be challenging to measure, which creates an obstacle for analysts seeking to evaluate whether a national security decision was driven by status. For this reason, scholars frequently analyze statements by political leaders and other foreign policy elites (Hart 2020; Heimann 2015; Mantilla 2018; Smith 2014; Wolf 2014). This focus is grounded in empirical findings that leaders and foreign policy elites derive self-esteem and identity from the groups that they belong to, particularly their country (Druckman 1994; Turner, Brown, and Tajfel 1979). The status that their country has compared to other states provides a strong source of self-esteem and identity (Viskopic 2020). For this reason,

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leaders and foreign policy elites often appear concerned, and even obsessed, about their country's international status (Dafoe et al. 2014). Speeches by leaders and foreign policy elites can thus serve as a valuable source of evidence regarding the effect of status on national security decisions and foreign policy outcomes.² A quote by a leader can provide smoking-gun evidence that concern over status has driven a foreign policy decision.

For this reason, the empirical analysis will focus on speeches by Australia's leaders in the legislature immediately prior to Australia's intervention in the Solomon Islands. Speeches delivered by Australia's foreign policy elites provide a window into their concern about Australia's status as leader of the South Pacific and their willingness to maintain that status. The analysis will help illustrate the presentation of and justification for dispatching an intervention in the Solomon Islands. Speeches by Australia's leaders will reveal the extent to which the intervention was justified by the concern to maintain Australia's status as leader of the South Pacific region.

Evidence

A close reading of speeches by Australia's leaders reveals a link between the country's role of stabilizer and caretaker of the South Pacific region and the decision to dispatch an intervention in the Solomon Islands. A central component of the government's narrative was an emphasis that Australia's status as the leader of the South Pacific meant that the country had a unique role in the South Pacific region. Minister of Foreign Affairs Downer acknowledged Australia's role when noting, "This country has enormous responsibilities in the South Pacific region, and we are prepared to work with our regional partners to fulfil those responsibilities" (Parliament of Australia 2003a:16263). Australia's status as leader determined that its foreign policy interests went beyond maintaining security in its own border and included the South Pacific region. For this reason, Minister Downer stated that "Australia should be in the Solomon Islands because it is in our own national interest. It is in our own national interest because national security is broader than just protecting the borders of our own country" (Parliament of Australia 2003c:18392).

A central part of the government's reasoning for dispatching an intervention was the belief that the international community expected Australia to restore order on the Solomon Islands. The government's foreign policy narrative emphasized that Australia's responsibilities were not only to other South Pacific countries but also to Western allies, particularly the United States. A report commissioned by the government in early 2003 noted this dimension of Australia's leadership in the South Pacific region:

Other countries, including major allies and friends, expect Australia to take a leading role in this part of the world, and judge us in part on how well we discharge what they tend to see as our responsibilities here. Australia's standing in the wider world—including with the United States—is therefore at stake. (Wainwright 2003a:14–15)

Prime Minister Howard underscored Australia's role as maintainer of regional security and its international obligations in a single coherent argument in declaring that "the international community understandably looks to Australia to play a leading role in the South Pacific. Our leadership of the regional assistance mission to the Solomon Islands reflects both a national interest and an international expectation" (Parliament of Australia 2003c:18198). The decision to dispatch an intervention was based on the understanding that this was not only compatible with Australia's foreign policy orientation but also something that other countries expected Australia to do. When discussing the reasoning behind Australia's intervention, Prime Minister Howard noted, "With this regional assistance mission to the Solomon Islands, Australia has signaled it is willing, in a cooperative and collegiate way, to play a supportive, stabilizing, and, if it is required, more interventionist role in the region. We will not let our friends down" (Parliament of Australia 2003a:13329). In other words, Australia had a unique responsibility to address the crisis and restore order in the Solomon Islands. The decision to dispatch an intervention was based on Australia's status and its role as guarantor of security in the South Pacific.

Australia's leaders emphasized not only the responsibility to address the crisis in the Solomon Islands but also the possibility that if Australia failed in this duty, the country's status as the leader of the South Pacific would come into question. The narrative revealed a direct link between Australia's status as leader of the South Pacific region and its role as maintainer of regional security. For this reason, not dispatching an intervention to the crisis-ridden Solomon Islands would have signaled that Australia was willing to concede its status as a leader of the South Pacific region. The government's narrative contained an urgency to respond to the crisis or else find the country's status as leader possibly coming into question. Prime Minister Howard echoed this sentiment when discussing Australia's decision to dispatch an intervention:

It is a challenge to the international community, and the international community naturally and understandably expects Australia to play a leading role. If we do nothing now and the Solomon Islands become a failed state ... [it] will make the inevitable dealing with the problem in the future more costly and more difficult, and we would pay very dearly for our indifference if we were to adopt that course now. (Parliament of Australia 2003b:17483–17484)

Overall, speeches by Australia's leaders illustrated the impact of Australia's status as the leader of the South Pacific and its role of maintainer of regional security on the decision to dispatch an intervention in the Solomon Islands. The government's narrative emphasized the importance of Australia's role of maintainer of regional security, which was owed both to the other South Pacific countries and to the United States. Australia's leaders were concerned that if they did not respond to the crisis, the nation's status as the leader of the South Pacific would come into question. The decision to dispatch an

intervention was consistent with Australia's role and secured Australia's status as the leader of the South Pacific.

CONCLUSION

This paper has contributed to the evolving debate on status in international relations. I have suggested that one way to understand how status affects foreign policy outcomes is to unpack the relationship between status and role. States on top of status hierarchies have the duty to take on additional roles in international politics, including the role of maintaining order and security beyond their borders. When a domestic crisis in a country begins to threaten international security, high-status states are expected by the international community to address the crisis and restore order. I have illustrated the implications of this argument by examining Australia's decision to dispatch an intervention in the Solomon Islands.

A number of questions remain, providing a foundation for future research. First, I used the case of Australia's intervention in the Solomon Islands to illustrate the usefulness of my approach and not to provide a definitive test. It would be simply unpersuasive to state that countries use force to maintain their status all the time. Are states sometimes simply unconcerned about their status, or are other factors at play? For example, states might be hesitant to deploy military force in the case of domestic opposition to intervention. Scholars of international law have found that political leaders often choose not to ratify international treaties because public opinion or opposition parties have been mobilized against the agreement, making the domestic costs of ratification prohibitively high (Kelley and Pevehouse 2015). Domestic opposition might discourage government from dispatching a military intervention even in instances when the country's status is at stake. Nevertheless, this hypothesis might be difficult to reconcile with the finding that citizens will negatively evaluate the government when the government fails to protect the country's status (Viskupic 2020). The development of scope conditions for the argument that states fight for status provides an opening for further research.

Second, the research scope of this paper has been narrow and has examined only one role—maintainer of order and security—that countries with high status take; nevertheless, states on top of status hierarchies hold multiple roles and responsibilities, such as stopping nuclear proliferation and managing global economy. Such roles could become sources of status concerns, and future scholarship should investigate how these responsibilities affect foreign policy decision-making and national security outcomes.

Third, this paper has illustrated how Australia's status as the leader of the South Pacific affected the decision to dispatch an intervention in the Solomon Islands. Consequently, the question of whether Australia succeeded in maintaining its status as the leader of the South Pacific is beyond the scope of this paper. Do demonstrations of military power always lead to status gains? Existing scholarship does not provide a definitive answer (Renshon 2017; Ward 2020). In some instances, such as the U.S. invasion of Iraq in 2003 and Russia's invasion of Ukraine in 2014, the use of force did little to help the country's standing and in fact might have led to status loss. It might

therefore be that the relationship between use of force and status conferral is conditional on the context: the preferences and dominant norms of the status group, which has been understudied by scholars of international relations. Emerging research in psychology suggests that social context is key to understanding what behaviors contribute to status gain (Li, Chen, and Blader 2016). It is plausible to suppose that when considered to be legitimate, the use of force leads to reinforcement of the status whereas in other instances, it might lead to status loss; nevertheless, more empirical research is needed.

ENDNOTES

1. Recently, scholars have begun to investigate how quest for status affects the foreign policies of small states, such as Qatar, Norway, and Cyprus (Baxter, Jordan, and Rubin 2018, Kamrava 2011, Pedi and Kouskouvelis 2019, Wohlforth et al. 2018). Nevertheless, the crux of the scholarship has remained focused on countries on the top of the global status hierarchy.
2. Despite its value, this approach is not without limitations. An analysis of foreign policy speeches and statements is based on interpretation and might be subject to bias. An additional challenge is that leaders and foreign policy elites do not use consistent language when referring to their country's status and seldom use the word *status* directly.

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