Ekonomi-tek Volume / Cilt: 6 No: 1 January / Ocak 2017

Contents / İçindekiler

Contributors / Katkı Yapanlar

Türkmen Göksel
Recep Kök
Aydın Özkan
Gülçin Özkan
Ercan Uygur

Editor's Introduction

This issue of *Ekonomi-tek* starts the sixth volume of our journal and contains two papers.

The first paper is by Aslıhan Atabek Demirhan and H. Burcu Gürcihan Yüncüler, both of the Central Bank of the Republic of Turkey (CBRT). The authors examine the relationship between Turkish employment and measures of uncertainty in the country by means of an estimated panel econometric model. Information for variables like employment and production comes from the balance-sheet data from a large sample of Turkish companies, collected by the CBRT for the 2007-2014 period. Uncertainty measures, on the other hand, are obtained from tendency surveys, conducted by the CBRT as well, on a similar sampling of national firms.

Estimated equations reveal a significant negative reaction of employment to foreign-demand uncertainty. However, no marked effect is seen on employment from production and domestic-demand uncertainty, even though the latter generally has the correct negative effect. The authors also find that smaller size and more credit constraints raise sensitivity of firms to uncertainty.

Our second paper in this issue is by Mehmet Ali Soytaş and Damla Durak Uşar, both of Özyeğin University. The authors explain the sustainability decisions/efforts of firms by examining strategic motives, including competition. They estimate an Instrumental Variables Probit model with US data for the 1991-2014 period. As for data sources, they rely on the MSCI KLD 400 Social Index database and the Wharton Research Data Services COMPUSTAT dataset.

They find that competition decreases the likelihood of entry into the "sustainability market," and strategic motives play a central role in management's sustainability decisions.

We look forward to presenting you with additional interesting articles in our future issues.

Ercan Uygur
Editor
Ekonomi-tek

Editörün Sunuşu

Ekonomi-tek'in bu sayısı dergimizin altıncı cildini başlatmaktadır ve iki makale içermektedir.

Birinci makalenin yazarları Aslıhan Atabek Demirhan ve H. Burcu Gürcihan Yüncüler'dir ve her ikisi de Türkiye Cumhuriyet Merkez Bankası (TCMB) mensubudurlar. Yazarlar, Türkiye'deki istihdam ile farklı belirsizlik ölçütleri arasındaki ilişkiyi bir panel ekonometrik model tahmin ederek incelemişlerdir. İstihdam ve üretim gibi değişkenlerin bilgileri, TCMB tarafından yapılan, büyük sayıda şirketi kapsayan ve 2007-2014 dönemine ilişkin bilanço anketinden elde edilmiştir. Diğer yandan belirsizlik ölçütleri, benzer şirketlere yine TCMB tarafından uygulanan eğilim anketlerinden sağlanmıştır.

Tahmin edilen denklemler, dış talep belirsizliğinin istihdam üzerinde anlamlı bir olumsuz etkisinin olduğunu göstermektedir. Ancak, üretim ve iç talep belirsizliğinin istihdam üzerinde anlamlı bir etkisi olmadığı anlaşılmakta, buna karşılık iç talep belirsizliğinin katsayısı, beklenen olumsuz etkiyi ifade etmektedir. Yazarlar, küçük ölçekli ve kredi kısıtlarıyla karşılaşan firmaların belirsizliğe daha duyarlı olduğunu bulmuşlardır.

Bu sayıdaki ikinci makalemiz, her ikisi de Özyeğin Üniversitesi öğretim üyesi olan Mehmet Ali Soytaş ve Damla Durak Uşar tarafından yazılmıştır. Yazarlar, şirketlerin sürdürülebilirlik kararlarını/çabalarını, rekabet dahil olmak üzere stratejik dürtüleri inceleyerek açıklamaktadırlar. ABD için, 1991-2014 dönemi verilerini kullanarak, bir Araç Değişkenli Probit modeli tahmin etmişlerdir. Veriler için "MSCI KLD 400 Social Index" ve "Wharton Research Data Services COMPUSTAT" veri tabanlarını kullanmaktadırlar.

Yazarlar, rekabetin "sürdürülebilirlik piyasası"na giriş olabilirliği üzerinde olumsuz bir etkisi olduğunu ve yöneticilerin sürdürülebilirlik kararları üzerinde stratejik dürtülerin önemli bir rol oynadığını bulmuşlardır.

Gelecek sayılarımızda sizlere ilginç makaleler sunmayı sürdürmeyi diliyoruz.

Ercan Uygur
Editör
Ekonomi-tek

Ekonomi-tek Volume / Cilt: 6 No: 1 January / Ocak 2017, 1-16

Belirsizliğin İstihdam Artışı Üzerindeki Etkisi: Türkiye Örneği[1]

Aslıhan Atabek Demirhan[2] - H. Burcu Gürcihan Yüncüler[3]

Özet

Bu çalışmada, Türk imalat sanayinde belirsizlik ile istihdam arasındaki ilişki, firma bilançoları ve eğilim anketleri bazlı özgün bir eşleştirilmiş veri seti kullanılarak incelenmiştir. Firma bilançoları, Türkiye Cumhuriyet Merkez Bankası tarafından Sektör Bilançolar veri seti çerçevesinde derlenmektedir, yıllıktır, 2007-2014 dönemini kapsamaktadır ve önemli sayıda firmadan derlenmektedir. Firmaların mevcut durum değerlendirmesi ile gelecek dönem beklentilerinin takip edildiği İktisadi Yönelim Anketi veri seti ise aylıktır ve firmalara ait üretim ile iç ve dış talep belirsizliklerinin oluşturulmasında kullanılmıştır. Farklı belirsizlik ölçütlerinin istihdam artışı üzerindeki etkisi panel tahmin modelleri ile incelenmiştir. Tahmin sonuçları, dış talep belirsizliğinin istihdam artışını olumsuz yönde etkilediğini ancak üretim ve iç talep belirsizliğinin istatistiksel olarak anlamlı bir etkisi olmadığını ortaya koymuştur. Dış talep belirsizliğinde bir standart hatalık artış istihdamda yaklaşık yüzde bir oranında düşüşe neden olurken ihracatçı, küçük ve kredi kısıtı olan firmaların belirsizliğe daha duyarlı olduğu sonucuna varılmıştır.

JEL Kodları: D92, D8, C23

Anahtar kelimeler: Firma verisi analizi, belirsizlik, istihdam ve işgücü piyasası, Türkiye ekonomisi

1 Bu çalışmada yer alan görüş ve yorumlar yazarlara aittir. Türkiye Cumhuriyet Merkez Bankasının görüşlerini temsil etmemektedir.

2 Türkiye Cumhuriyet Merkez Bankası, Ankara, Türkiye, aslihan.atabek@tcmb.gov.tr

3 Türkiye Cumhuriyet Merkez Bankası, Ankara, Türkiye, burcu.gurcihan@tcmb.gov.tr

Employment Growth and Uncertainty: Evidence from Turkey

Abstract

Using a unique matched data set of corporate balance sheets and a survey of tendencies, we investigate the relationship between employment and uncertainty in this paper. The balance-sheet data are collected by the Central Bank of the Republic of Turkey, are annual and drawn from a set of Turkish companies over the 2007-2014 period. The tendency surveys track the firms' current and expected performances and perceptions. The survey results are monthly and are used to measure uncertainties related to production and domestic and foreign demand over the year. The effect of alternative measures of uncertainty are examined by way of panel model estimations. Estimation results indicate that while foreign demand uncertainty has a significant negative effect on employment, the effect of production and domestic demand are insignificant. We find that a one standard deviation rise in foreign demand uncertainty lowers employment by around one percent. We discuss that those firms with smaller size and with more credit constraints are more sensitive to uncertainty.

JEL Codes: D92, D8, C23

Keywords: Firm level data analysis, uncertainty, employment and labour market, Turkish economy

1. Giriş

Son dönemde yaşanan küresel finansal krizle birlikte belirsizliğin iktisadi faaliyet üzerindeki etkisi araştırma ajandasında baş sıralara yerleşmiştir. Teorik yazın belirsizliğin ekonomi üzerindeki etkisini temel olarak iki kanal aracılığı ile açıklamaktadır. Bunlardan ilki ekonomi aktörlerinin belirsizliğin arttığı dönemlerde yanlış bir hamleyi önlemek için benimsedikleri bekle ve gör stratejisidir. Bloom (2009)'a göre belirsizliğin yüksek olduğu dönemlerde, firmalar yatırım ve işe alım kararlarını ertelemektedir. İşe alma ve işten çıkarma maliyetlerinin varlığı girişimcilerin belirsizliğin yüksek olduğu dönemlerde istihdam kararlarında daha tutucu olmalarına neden olarak istihdam kararlarında belirsizliği önemli bir belirleyici haline getirmektedir. Belirsizlik ile iktisadi faaliyet arasındaki ilişkiyi açıklamak için öne sürülen ikinci kanal ise risk primidir. Yüksek belirsizlik borç verenler ile borç alanlar arasındaki bilgi asimetrisini artırmakta ve borçlanma maliyetlerinde artışa neden olabilmektedir. Buna göre, daha yüksek borçlanma maliyetleri, iktisadi faaliyet için ek bağlayıcı kısıtlamalar getirmektedir.

Belirsizliğin iktisadi faaliyet üzerindeki etkisi uygulamalı olarak gerek zaman serisi gerekse ülke, sanayi veya firma düzeyinde panel veri analizleri ile araştırılmıştır. Kullanılan tekniklerden bağımsız olarak belirsizliğin üretim, istihdam ve yatırım gibi farklı ekonomik göstergeler üzerinde olumsuz etkisi olduğu konusunda ortak bir görüş ortaya konmaktadır.[4] Maruz kalınan yüksek belirsizliğe rağmen bu alanda Türkiye ekonomisini konu alan uygulamalı çalışmaların oldukça sınırlı olduğunu görmekteyiz. Mevcut çalışmaların çoğunda, mikro değişimleri göz ardı eden, makro düzeyde analizler yer almaktadır. İstisnai olarak Demir (2010), firma düzeyinde veriler kullanarak döviz kuru oynaklığının istihdam artışına etkisini araştırmış ve belirsizliğin istihdam üzerinde olumsuz etkisi olduğu sonucuna varmıştır. Zaman serisi yöntemleri kullanan Cengiz (2009), daha yüksek döviz kuru riskinin iş piyasasındaki yüksek işsizlik ve kayıt dışılıkla ilişkili olduğunu göstermiştir. İktisadi Yönelim Anketi verileri kullanılarak oluşturulan belirsizlik ölçütü ile Arslan vd. (2015), belirsizliğin ekonomik faaliyet üzerinde olumsuz bir etkisi olduğunu vurgulamıştır.

Uygulamalı yazında firma düzeyindeki belirsizliği ölçmek için çeşitli göstergeler kullanılmaktadır. Bunlardan birisi borsa endeksi oynaklığıdır (Bloom, 2009). Alternatif olarak anket verileri kullanılarak belirsizlik göstergeleri türetilmiştir. Guiso ve Parigi (1999) ve Lensink (2005), gelecekteki muhtemel gelişmelere ilişkin olasılıkların yer aldığı anket verilerini kullanırken; Bach-

[4] Bakınız; Dixit (1989), Ghosal (1991), Carruth vd. (2000), Bloom vd. (2007), Ghosal ve Loungani (1996, 2000), Lensink vd. (2005).

mann vd. (2013) ve Arslan vd. (2015) eğilim anketlerinden elde edilen beklenti hatalarını belirsizlik ölçütü olarak yorumlamaktadır.

Bu çalışmada belirsizliğin istihdam artışı üzerindeki etkisi farklı iki veri setinin birleştirilmesi ile elde edilen özgün bir veri seti kullanılarak incelenmiştir. Analizler 2007-2014 yıllarına ait yıllık veriler kullanılarak yapılmıştır. Arslan vd. (2015) çalışmasında önerilen yaklaşım benimsenerek, İktisadi Yönelim Anketi'ndeki veriler kullanılarak belirsizlik ölçütü firma düzeyinde hesaplanmıştır. Firmaların son üç aya ait durum değerlendirmeleri ve gelecek üç aya ait beklentileri karşılaştırılarak firmaların beklenti hataları hesaplanmış ve her firma için aylık olarak hesaplanan beklenti hata karelerinin yıllık ortalaması firma düzeyinde belirsizlik ölçütü olarak kullanılmıştır.

Bu çalışma belirsizlik yazınına iki türlü katkı sağlamaktadır. İlk olarak, bu çalışmada kullanılan birleştirilmiş veri seti, bizim bilgimiz dâhilinde, ilk ve tektir. Ayrıca, bu çalışma Türkiye ekonomisi için belirsizlik ve istihdam ilişkisini mikro veri çerçevesinde inceleyen kısıtlı uygulama yazınına katkı sağlamaktadır.

Makalenin bundan sonraki bölümleri şu şekildedir: Bir sonraki bölümde veriler, değişkenler ve analizler sunulmuştur. Üçüncü bölümde model ve ilgili bulgular yer alırken, sonuç son bölümde verilmiştir.

2. Veri Setleri ve Değişkenler

Belirsizliğin firma istihdam kararlarına olan etkisini araştırmak amacıyla 2007-2014 yılları için panel tahmin yöntemleri kullanılmıştır. Bu doğrultuda analizlerde kullanılmak üzere oluşturulan özgün veri seti Türkiye Cumhuriyet Merkez Bankası (TCMB) İktisadi Yönelim Anketi (İYA) ve Sektör Bilançoları (SB) veri setlerinde yer alan firmaların bilgilerinin eşleştirilmesinden elde edilmiştir. İYA genişletilmiş ve uyumlaştırılmış hali ile 2007 yılından bu yana imalat sanayinde faaliyet gösteren ve 20'den fazla çalışanı olan firmaların üretim, satış, istihdam, stok, satış fiyatı ve birim maliyeti gibi göstergelerine ilişkin mevcut, geçmiş ve gelecek dönem değerlendirmelerinin derlendiği aylık bir ankettir.[5] SB ise firmalara ait bilanço ve gelir tablosu ile çalışan sayısı, kuruluş yılı, faaliyet alanı gibi bilgileri içermektedir ve 1989 yılından itibaren TCMB tarafından derlenmektedir. Bu iki farklı veri seti firmalara atanan belirleyici kimlik numarası kullanılarak firma bazında 2007-2014 yılları için birleştirilmiştir. SB veri seti istihdam, toplam varlık, net satış, kârlılık gibi firmaya özel değişkenlerin oluşturulması için kullanılırken, İYA firma bazlı belirsizlik ölçütünün oluşturulmasında kullanılmıştır. Tüm gözlem dönemi

[5] İYA hakkında daha detaylı bilgi için TCMB web sitesinde yer alan " İktisadi Yönelim İstatistikleri "ne İlişkin Uygulama Değişiklikleri " başlıklı nota bakınız.

boyunca yönelim anketinde yer alan sorulara ilişkin hep "aynı" cevabını veren 227 firma analizlere dâhil edilmemiştir.

2.1 Belirsizlik Ölçütleri

Her ne kadar teorik olarak belirsizliğin ekonomik faaliyet üzerindeki etkisi kavramsallaştırılmış olsa da, bu ilişkinin pratikte tanımlanması zor ve karmaşıktır. Belirsizlik, farklı yöntemlerle (koşulsuz varyans, tahmin hataları veya anket ölçümleri gibi), farklı toplulaştırma düzeyinde (ülke, sektör veya firma bazında) ve farklı boyutlarda (talep, arz, fiyat, maliyet vb.) ölçülebilir. Bloom vd. (2012), belirsizliği ölçmek için firma ve sektör düzeyinde çeşitli değişkenlerin oynaklığını kullanmaktadır. Leahy ve Whited (1995) ve Bloom (2009) ve daha birçok çalışma, belirsizlik ölçütü olarak borsa oynaklığını kullanmıştır. Bir diğer yaygın olarak kullanılan belirsizlik ölçütü ise beklentilerdeki sapmadır (Bachmann vd. (2013) ve Arslan vd. (2015)). Baker vd. (2016) ise bazı anahtar kelimelerin haberlerde yer alma sıklığına dayanarak belirsizlik ölçütü oluşturmuştur.

Bu çalışmada, Arslan vd. (2015)'nin kullandığı yaklaşıma benzer şekilde İYA eğilim anketinde yer alan üretim, iç talep ve ihracat siparişlerine dair geçmiş üç ay ile gelecek üç aya ilişkin sorulara verilen cevaplar kullanılarak firma düzeyinde üç farklı belirsizlik ölçütü oluşturulmuştur (Tablo 1).

Tablo 1. Belirsizlik Ölçütü Hesaplanmasında Kullanılan İYA Soruları

Üretim Belirsizliği
İYA Soru 1. Son 3 aydaki üretim hacminiz? Arttı/ Aynı kaldı / Azaldı İYA Soru 5. Gelecek 3 aydaki üretim hacmi beklentiniz? Artacak/ Aynı kalacak / Azalacak
İç Talep Belirsizliği
İYA Soru 20. Son üç ayda alınan iç piyasa siparişlerinizin miktarı? Arttı/ Aynı kaldı / Azaldı İYA Soru 21. Gelecek üç aydaki iç piyasa sipariş beklentiniz? Artacak/ Aynı kalacak / Azalacak
Dış Talep Belirsizliği
İYA Soru 18. Son üç ayda alınan ihracat siparişlerinizin miktarı? Arttı/ Aynı kaldı / Azaldı İYA Soru 12. Gelecek üç aydaki ihracat sipariş miktarı beklentiniz? Artacak/ Aynı kalacak / Azalacak

Firma düzeyinde belirsizlik aşağıda verilen formüle göre hesaplanmıştır:

$$\mathrm{unc}_{iT}^{k} = \frac{1}{n_{iT}} \sum_{t \in T} (\text{Son üç aydaki durum}_{it}^{k} - \text{Gelecek üç aydaki beklenti}_{it-3}^{k})^2$$

Formülde i firmayı, k belirsizlik çeşitlerini (üretim, iç talep, dış talep), t ve T ise sırasıyla tarih ve yılı ifade etmektedir. unc_{iT}^{k} , i firmasının T yılına ait k tipi belirsizliğini gösterirken, n_{iT} i firmasının T yılı içerisinde gözlenen beklenti hatalarının sayısını göstermektedir. Beklenti hatası ise $(\text{Son üç aydaki durum}_{it}^{k} - \text{Gelecek üç aydaki beklenti}_{it-3}^{k})$ şeklinde tanımlanmıştır.

(t-3) zamanında gelecek üç aydaki üretim ve talep beklentileri ile t zamanında son üç aydaki üretim ve talep gerçekleşmeleri karşılaştırılarak firmaların beklenti hataları hesaplanmıştır. Beklenti hataları -2 ile 2 arasında değer almaktadır (Tablo 2). Örneğin Nisan 2014 tarihinde gelecek üç ayda üretim hacminin artacağını belirten bir firma Temmuz 2014 tarihinde son üç ayda üretim hacminin azaldığını söylerse beklenti hatası -2 değerini almaktadır. Yıl içerisinde firmaların yapmış olduğu ortalama beklenti hata karesi ise firma bazlı belirsizlik ölçütü olarak kullanılmıştır.

Tablo 2. Beklenti Hataları

		Son Üç Ay Gerçekleşmesi (t)		
		Arttı	Aynı kaldı	Azaldı
Gelecek Üç Ay	Artacak	0	-1	-2
Beklentisi	Aynı kalacak	+1	0	-1
(t-3)	Azalacak	+2	+1	0

2.2 Diğer Firma Özgü Değişkenler

Sektör Bilançoları veri seti 1989 yılından bu yana firmalara ait yıllık frekansta derlenen bilanço ve gelir tablosu gibi finansal tablolara ek olarak çalışan sayısı, kuruluş yılı, hukuki durum, il ve faaliyet alanı gibi bilgileri içermektedir. Her firmaya verilen firma kodu firmaların yıllar itibariyle eşleştirilmesine ve panel veri setinin oluşturulabilmesine olanak sağlamaktadır. Firmaların faaliyet kolları NACE (Nomenclature Générale des Activités Economique dans les Communautes Européennes) Rev. 2'ye göre dörtlü seviyede verilmektedir.

Analizlerde bağımlı değişken olarak istihdam artışı değişkeni kullanılmıştır. Bağımlı değişkene ek olarak analizlerde kullanılan firmaya özgü ölçek (toplam reel varlıklar), performans (net satış büyümesi), kârlılık (faaliyet kârı) ve ihracat oranı (yurtdışı satışların toplam satışlar içerisindeki payı) gibi değişkenler de Sektör Bilançoları veri setindeki bilgiler ışığında oluşturulmuştur.

2.3 Betimsel Analiz

Ortak firma kodları yardımı ile birleştirilen veri seti firmaların finansal tabloları ile yönelim anketine verdikleri cevapları içermektedir. Tablo 3'den de görüleceği üzere 2007-2014 yılları arasında örneklemde ortalama yaklaşık 1500 firma yer almaktadır.

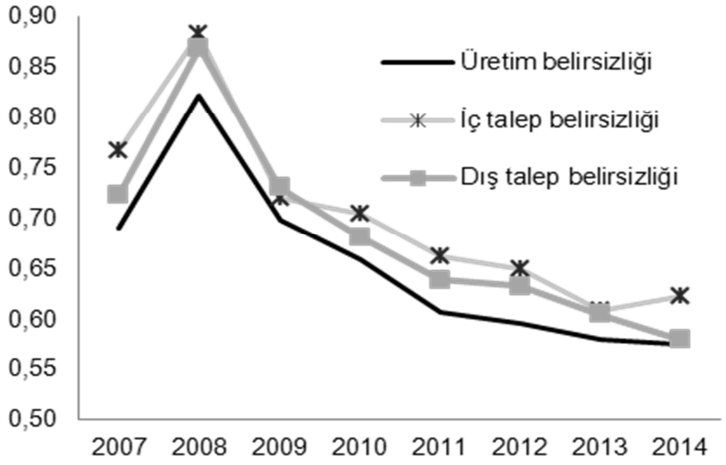
Tablo 3. Eşleştirilmiş Örneklem İçin Betimsel İstatistikler

	2007	2008	2009	2010	2011	2012	2013	2014
Gözlem sayısı (Örneklem)	1056	1346	1372	1563	1721	1776	1663	1448
Ortalama çalışan sayısı	480	405	383	383	378	385	376	399
Reel net satışlar* (2010=100)	119	107	100	100	104	104	113	117
İhracat oranı (%)	29	29	29	28	28	27	27	26
Kârlılık	0.054	0.066	0.059	0.054	0.063	0.057	0.072	0.073

* Sektörel üretici fiyatları ile reelleştirilmiştir.

Eşleştirilmiş örneklemde yer alan firmaların İYA yanıtları kullanılarak firmalara ait üretim, iç talep ve dış talep belirsizlik ölçütleri hesaplanmıştır. Tablo 4 ve grafiklerde oluşturulan belirsizlik ölçütleri özetlenmiştir.

Şekil 1. Belirsizlik Ölçütleri (Ortalama)



Kaynak: Yazarların kendi hesaplamaları.

Şekil 1, beklenildiği gibi belirsizliğin kriz dönemlerinde arttığını, sonraki dönemde ise azaldığına işaret etmektedir. İç ve dış talep belirsizlikleri genel olarak üretim belirsizliğine göre daha yüksek seyretmektedir.

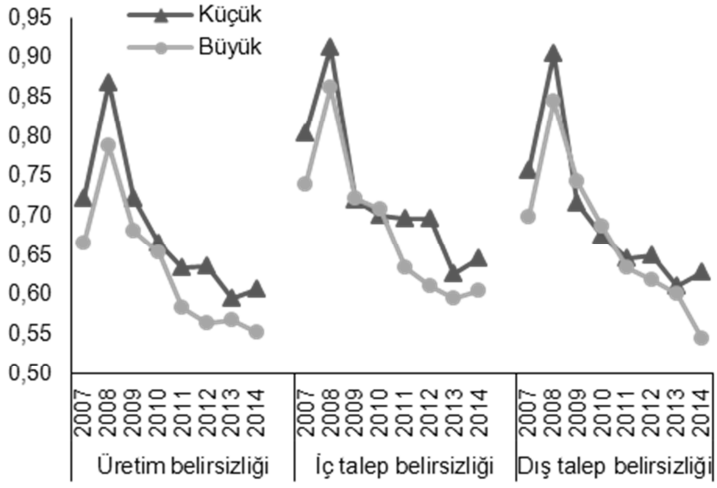
Tanım itibarıyla elde edilen belirsizlik ölçütleri sıfır ile dört arasında değer almaktadır. Belirsizlik ölçütlerinin ortalama ve standart sapmaları yaklaşık 0,6 değerin alırken, yüzde doksan olasılıkla 1,5 seviyesinin altında kalmaktadır.

Tablo 4. Belirsizlik Ölçütleri Özet Bilgiler

		2007	2008	2009	2010	2011	2012	2013	2014	TOPLAM
	Ortalama	0,69	0,82	0,70	0,66	0,61	0,60	0,58	0,58	0,65
Üretim	Standart sapma	0,59	0,73	0,54	0,56	0,52	0,50	0,56	0,56	0,57
Belirsizliği	p90-p10	1,50	1,48	1,21	1,25	1,25	1,22	1,25	1,25	1,33
	Ortalama	0,77	0,88	0,72	0,70	0,66	0,65	0,61	0,62	0,69
İç Talep	Standart sapma	0,65	0,80	0,56	0,59	0,58	0,54	0,57	0,57	0,61
Belirsizliği	p90-p10	1,67	1,72	1,26	1,33	1,38	1,33	1,30	1,33	1,42
	Ortalama	0,72	0,87	0,73	0,68	0,64	0,63	0,61	0,58	0,68
Dış Talep	Standart sapma	0,64	0,79	0,57	0,58	0,59	0,54	0,57	0,56	0,61
Belirsizliği	Ortalama	1,50	1,58	1,32	1,36	1,36	1,27	1,25	1,25	1,40

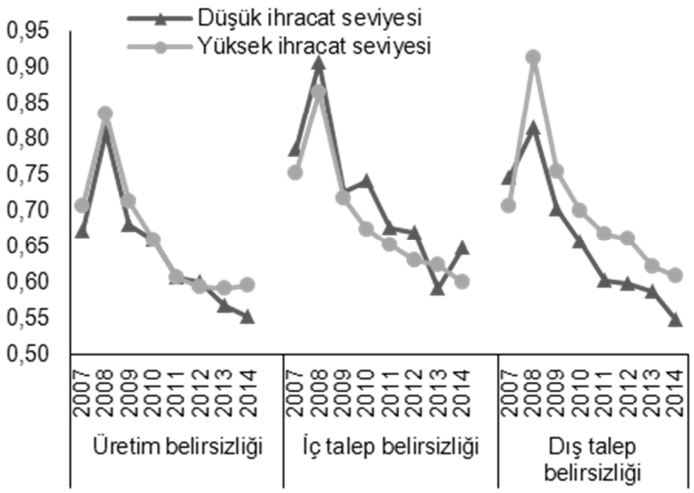
Firma ölçeğine ve ihracat statüsüne göre firmaların belirsizlik algısının farklılaştığını görmekteyiz (Şekil 2 ve 3).

Şekil 2. Firma Ölçeğine Göre Belirsizlik



Kaynak: Yazarların kendi hesaplamaları.
Not: Toplam varlıkları, faaliyette bulunduğu sektörün toplam varlık ortanca değerinin altında (üstünde) olan firma küçük (büyük) olarak isimlendirilmektedir.

Şekil 3. İhracat Yoğunluğuna Göre Belirsizlik



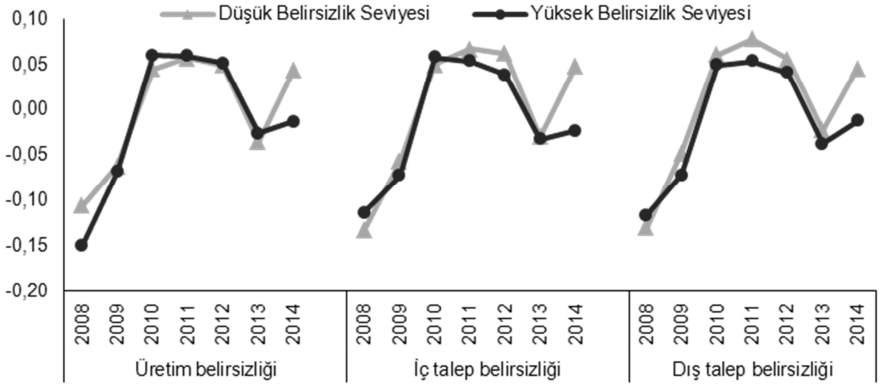
Kaynak: Yazarların kendi hesaplamaları.
Not: Yurtdışı satışı, faaliyette bulunduğu sektörün ihracat ortanca değerinden düşük (yüksek) olan firmalar düşük (yüksek) ihracat seviyesi olarak tanımlanmıştır.

Küçük firmaların belirsizlik algısının büyük firmalara göre daha yüksek olduğu gözlenmektedir. 2008 Küresel Krizi gerek küçük gerekse büyük firmaların belirsizlik algısında belirgin artışa neden olmuştur. Kriz sonrası dönemde ise küçük firmaların üretim ve iç talebe ilişkin belirsizlik algısındaki iyileşmenin büyük firmalarınkinin gerisinde kaldığı gözlenmektedir. Dış talep belirsizliği ise küçük ve büyük firmalarda kriz sonrası dönemde benzer oranda düşüş gösterirken 2014 yılında küçük firmaların belirsizlik seviyesinde hafif yukarı yönlü ayrışma dikkat çekmektedir (Şekil 2).

İhracat seviyesine göre belirsizlik seviyelerine bakıldığında üretim belirsizliğinin her iki grup için benzer bir yapıya sahip olduğunu söyleyebiliriz. Talep belirsizliklerinde ise firmaların ihracat seviyelerine göre belirsizlik algılarının değişiklik gösterdiği gözlenmektedir. Düşük ihracat seviyesine sahip firmaların iç talep belirsizlik algısı yüksek iken, ihracat seviyesi yüksek olan firmaların dış talep belirsizlik seviyeleri daha yukarıda seyretmektedir (Şekil 3).

Bu çalışmanın temel amacı belirsizliğin istihdam artışı üzerindeki etkisini belirlemektir. Belirsizlik ile istihdam ilişkisini görsel olarak incelemek amacı ile Şekil 4'de belirsizlik düzeylerine göre ortalama istihdam artışı verilmiştir.

Şekil 4. Belirsizlik Seviyesine Göre İstihdam Artışı (log fark)



Kaynak: Yazarların kendi hesaplamaları.
Not: Belirsizlik seviyesi, faaliyette bulunduğu sektörün belirsizlik seviyesi ortanca değerinin altında (üstünde) olan firma düşük (yüksek) belirsizliğe sahip olarak isimlendirilmektedir.

Ortalama istihdam artışı ile belirsizlik ölçütlerine ilişkin basit grafiksel gösterimin de ifade ettiği gibi istihdam artışı ile belirsizlik arasında negatif yönlü bir ilişki gözlenmektedir. Bir sonraki bölümde model tahminleri ile bu ilişki daha yakından incelenmiştir.

2.4 Model ve Sonuçları

Teorik olarak belirsizlik ile istihdam arasında negatif bir ilişki beklenmektedir. Bu argümanın Türkiye özelinde geçerliliğini test etmek amacı ile aşağıdaki model kullanılmıştır.

$$\Delta emp_{iT} = \alpha_i + \beta unc_{iT}^{k} + \delta Z_{iT-1} + \gamma T_T + \varepsilon_{iT}$$

Yukarıda verilen formülde, Δemp_{iT} firma i'nin T zamanındaki istihdam artışını (logaritmik fark), unc_{iT}^{k} firma düzeyinde belirsizlik seviyesini (k=üretim, iç talep ve dış talep belirsizliği), Z_{iT-1} firmaya ait kontrol değişkenlerini (toplam varlık, ciro artışı (logaritmik fark)) ifade etmektedir. Makroekonomik değişimleri kontrol edebilmek amacı ile modele yıl kuklaları, T_T, eklenmiştir. α_i gözlemlenemeyen firma spesifik heterojenlik değişkenlerini ve ε_{iT} hata terimini göstermektedir.

Yukarıda verilen model sabit etki panel model tekniği kullanılarak tahmin edilmiştir ve sonuçları Tablo 5'te sunulmuştur.

Tablo 5. Model Tahmin Sonuçları

Bağımlı Değişken: İstihdamın logaritmik farkı
Model: Sabit Terim

	k=		
Değişkenler	Üretim Belirsizliği	İç Talep Belirsizliği	Dış Talep Belirsizliği
Unc^{k}_{iT}	0,000	-0,009	-0,015*
	(0,010)	(0,009)	(0,009)
Unc^{k}_{iT-1}	-0,006	0,008	-0,012
	(0,008)	(0,009)	(0,008)
Kontrol değişkenler	√	√	√
Yıl kuklaları	√	√	√
R^2	0,056	0,057	0,062
Gözlem sayısı	8116	7781	7309
Firma sayısı	2028	1965	1848

Not: Sağlam standart hatalar (robust standard errors) parantez içerisinde verilmiştir. ***, **, * sırasıyla yüzde 1, yüzde 5 ve yüzde 10 seviyelerinde istatistiksel anlamlılığı ifade etmektedir.

Tablo 5'de verilen tahmin sonuçları, istihdam ile sadece dış talep belirsizliği arasında istatistiksel olarak anlamlı bir ilişki olduğunu göstermektedir. Dış talep belirsizliğine ilişkin negatif ve istatistiksel olarak anlamlı katsayı tahmini istihdam artışı ile belirsizlik arasında negatif bir ilişki olduğunu ima etmektedir. Bu, belirsizlik ölçütü olarak döviz kuru oynaklığını kullanarak istihdam artışı ile belirsizlik arasında benzer sonuçlar bulan Demir (2010) ve Cengiz (2009) çalışmaları ile uyumludur. ***Tahmin sonuçlarına göre, dış talep belirsizliğinde bir standart sapmalık artış istihdamda yaklaşık 1 (1,5 * 0,6) puanlık düşüşe neden olmaktadır.***

Belirsizliğin farklı firma türlerinin istihdam artışlarına etkilerini görebilmek amacı ile yukarıda verilen model etkileşim terimleri ile yeniden tahmin edilmiştir. Öncelikle, ihracat statüsüne göre belirsizlik-istihdam ilişkisi değerlendirilmiştir. İhracat statüsü kukla değişkeni firmaların ihracat hacimlerinin sektör ortanca ihracat hacmi ile karşılaştırılması ile oluşturulmuştur. İhracat hacmi sektör ortanca ihracat hacminden yüksek olan firmalar için 1 değerini alırken diğer firmalar için sıfır değerini almaktadır. Benzer şekilde firmalar ölçeklerine göre iki gruba ayrılmıştırlar. Toplam varlık büyüklüğü sektörün ortanca varlık büyüklüğü değerinin üzerinde olan firmalar büyük ölçekli (ölçek kukla değişkeni=1), diğerleri ise küçük ölçekli firma (ölçek kukla değişkeni=0) olarak sınıflandırılmıştır.

Son olarak firmalar kredi kısıtlarına göre gruplanmıştır. Firmanın kredi kısıtı toplam banka kredisinin kullanılan toplam dış kaynak harcamasına oranı olarak ölçülmüştür. Buna göre, firmanın kredi kısıtına ilişkin oluşturulan gösterge sıfır ile 1 arasında bir değer almakta ve bu göstergenin sıfıra yaklaşması

firmanın kredi kısıtının artığı şeklinde yorumlanmaktadır. Kredi kısıtı kukla değişkeni ise yine sektör ortanca değerine göre karşılaştırma ile oluşturulmuştur. Hesaplanan kredi kısıtı oranı sektör ortanca değerinden yüksek olan firmalar kredi kısıtı düşük firmalar olarak değerlendirilirken, ortanca değerine eşit veya düşük kredi kısıtına sahip firmalar ise yüksek kredi kısıtlı firmalar olarak değerlendirilmiştir.

Belirsizliğin farklı firma türlerinin istihdam kararlarına etkisini incelemek amacıyla yapılan tahmin sonuçları aşağıdaki tablolarda sunulmuştur.

Tablo 6. İhracat Statüsü Kukla Değişkeni ile Etkileşimli Model Tahmin Sonuçları

Etkileşim Türü: Kukla=1 eğer ihracat oranı sektör ortanca ihracat oranından yüksek ise diğer türlü sıfır değerini alır.
Bağımlı Değişken: İstihdamın logaritmik farkı
Model: Sabit Terim

	k=		
Değişkenler	Üretim Belirsizliği	İç Talep Belirsizliği	Dış Talep Belirsizliği
Unc^{k}_{iT}	0.027	-0.001	0.001
	(0.015)	(0.012)	(0.014)
Unc^{k}_{iT-1}	0.001	0.009	0.006
	(0.013)	(0.014)	(0.014)
Unc^{k}_{iT}xKukla	-0.046**	-0.015	-0.028
	(0.020)	(0.017)	(0.019)
Unc^{k}_{iT-1}xKukla	-0.013	-0.002	-0.031*
	(0.016)	(0.017)	(0.019)
Gözlem sayısı	8,116	7,781	7,309
R^2	0.058	0.057	0.064
Firma sayısı	2,028	1,965	1,848

Not: 1. Sağlam standart hatalar (robust standard errors) parantez içerisinde verilmiştir. ***, **, * sırasıyla yüzde 1, yüzde 5 ve yüzde 10 seviyelerinde istatistiksel anlamlılığı ifade etmektedir.
2.Tüm modeller firma özel kontrol değişkenleri, yıl ve etkileşim kukla değişkenlerini içermektedir.

İhracat kukla değişkeni ile üretim belirsizliği etkileşim terimine ait katsayı tahmininin negatif ve istatistiksel olarak anlamlı olması, üretim belirsizliğinin ortalamada istihdam artışı üzerinde önemli bir etkisi olmamasına rağmen, ihracat payı yüksek firmalar için anlamlı olduğuna işaret etmektedir. İhracatçı firmaların istihdam artışlarında belirsizliğin etkisi dış talep belirsizliği dikkate alındığında daha da belirginleşmektedir (Tablo 6). İhracatçı firmalar için üretim ve dış talep belirsizliğinde 1 standart sapmalık artış istihdamı sırasıyla yaklaşık yüzde 2,8 ve 1,9 puan aşağı çekmektedir. İhracat statüsüne ek olarak küçük ve kredi kısıtı olan firmalar için de istihdam ve belirsizlik arasındaki ilişkinin genele göre farklılaştığı gözlenmektedir (Tablo 7 ve Tablo 8).

Tablo 7. Ölçek Kukla Değişkeni ile Etkileşimli Model Tahmin Sonuçları

Etkileşim Türü: Kukla=1 eğer firma'nın toplam varlıkları sektör toplam varlık ortancasından büyükse, diğer türlü sıfır değerini alır.
Bağımlı Değişken: İstihdamın logaritmik farkı
Model: Sabit Terim

	k=		
Değişkenler	Üretim Belirsizliği	İç Talep Belirsizliği	Dış Talep Belirsizliği
Unc^{k}_{iT}	-0.001	0.003	-0.026**
	(0.012)	(0.012)	(0.012)
Unc^{k}_{iT-1}	0.001	0.005	-0.003
	(0.011)	(0.012)	(0.011)
Unc^{k}_{iT}xKukla	0.005	-0.030*	0.025
	(0.022)	(0.018)	(0.020)
Unc^{k}_{iT-1}xKukla	-0.018	0.003	-0.023
	(0.017)	(0.018)	(0.018)
Gözlem sayısı	8,116	7,781	7,309
R^2	0.057	0.058	0.064
Firma sayısı	2,028	1,965	1,848

Not: 1. Sağlam standart hatalar (Robust standard errors) parantez içerisinde verilmiştir.
***, **, * sırasıyla yüzde 1, yüzde 5 ve yüzde 10 seviyelerinde istatistiksel anlamlılığı ifade etmektedir.
2. Tüm modeller firma özel kontrol değişkenleri, yıl ve etkileşim kukla değişkenlerini içermektedir.

Tablo 8. Kredi Kısıtı Kukla Değişkeni ile Etkileşimli Model Tahmin Sonuçları

Etkileşim Türü: Kukla=1 eğer firma'nın toplam varlıkları sektör toplam varlık ortancasından büyükse, diğer türlü sıfır değerini alır.
Bağımlı Değişken: İstihdamın logaritmik farkı
Model: Sabit Terim

	k=		
Değişkenler	Üretim Belirsizliği	İç Talep Belirsizliği	Dış Talep Belirsizliği
Unc^{k}_{iT}	0.019	-0.017	-0.015
	(0.014)	(0.013)	(0.013)
Unc^{k}_{iT-1}	-0.004	0.022*	-0.010
	(0.012)	(0.012)	(0.011)
Unc^{k}_{iT}xKukla	-0.037*	0.016	-0.001
	(0.019)	(0.018)	(0.018)
Unc^{k}_{iT-1}xKukla	-0.004	-0.029*	-0.004
	(0.015)	(0.016)	(0.015)
Gözlem sayısı	8,116	7,781	7,309
R^2	0.057	0.058	0.064
Firma sayısı	2,028	1,965	1,848

Not: 1. Sağlam standart hatalar (Robust standard errors) parantez içerisinde verilmiştir.
***, **, * sırasıyla yüzde 1, yüzde 5 ve yüzde 10 seviyelerinde istatistiksel anlamlılığı ifade etmektedir.
2. Tüm modeller firma özel kontrol değişkenleri, yıl ve etkileşim kukla değişkenlerini içermektedir.

3. Sonuç

Bu çalışmada, Sektör Bilançoları veri seti ile İktisadi Yönelim Anketi veri setinin firma düzeyinde eşleştirilmesi ile elde edilen özgün veri seti kullanılarak firmaların istihdam kararlarında belirsizliğin etkisi araştırılmıştır. Analizler 2007-2014 dönemini kapsayan yıllık veriler ile yapılmıştır. Beklenti hatası yaklaşımından yola çıkarak, belirsizlik ölçütleri, son üç aylık dönemdeki üretim ve talep gerçekleşmesi ile gelecek üç aylık döneme ait beklentilerin arasındaki farklar esas alınarak oluşturulmuştur. Bildiğimiz kadarıyla bu çalışma, firma bilançolarının ve eğilim anketlerinin eşleşmesi ile oluşturulan örneklemi kullanan ilk çalışma olma özelliğini taşımaktadır.

Bulgularımız, genel olarak sadece dış talep belirsizliğinin istihdam artışına istatistiksel olarak anlamlı olumsuz etkisi olduğunu göstermektedir. Bu, belirsizliği döviz kuru oynaklığı olarak tanımlayan mevcut çalışmaların bulguları ile uyumludur. Tahmin sonuçları dış talep belirsizliğinde bir standart sapmalık artışın istihdamda yaklaşık 1 puanlık düşüşe neden olduğunu ima etmektedir. Üretim belirsizliğinin genel örneklem için önemli bir etkisi olmamasına rağmen, alt grupların istihdam artışlarını olumsuz yönde etkilediği gözlenmiştir. Bunlara ek olarak ihracatçılar, dış talep belirsizliğinden daha fazla etkilenirken, iç talep belirsizliği özellikle küçük ve mali açıdan kısıtlı firmaların istihdam kararları üzerinde olumsuz etkiye sahiptir.

Bu çalışmanın uzantısı olarak, iş çevrimi boyunca belirsizliğin asimetrik etkilerine bakmanın faydalı olacağını düşünmekteyiz.

Kaynakça

Arslan, Y., A. Atabek, T. Hülagü ve S. Şahinöz, (2015), "Expectation Errors, Uncertainty, and Economic Activity," *Oxford Economic Papers*, 67, ss. 634-660.

Bachmann, R., S. Elstner ve E. R. Sims, (2013), "Uncertainty and Economic Activity: Evidence from Business Survey Data," *American Economic Journal: Macroeconomics*, 5, ss. 217-249.

Baker, S. R., Bloom, N. ve Davis, S. J., (2016), "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, 131(4), ss. 1593-1636.

Bloom, N., (2009), "The Impact of Uncertainty Shocks," *Econometrica*, 77, ss. 623-685.

Bloom, N., S. Bond ve J. Van Reenen, (2007), "Uncertainty and Investment Dynamics," *The Review of Economic Studies*, 74, ss. 391-415.

Bloom, N., M. Floetotto, N. Jaimovich, I. Saporta-Eksten ve S. J. Terry, (2012), "Really Uncertain Business Cycles," *Working Paper No. 18245, National Bureau of Economic Research.*

Carruth, A., A. Dickerson ve A. Henley, (2000), "What Do We Know about Investment under Uncertainty?" *Journal of Economic Surveys*, 14, ss. 119-154.

Cengiz, S., (2009), "Ekonomideki Kur Belirsizliği ve Şokların İşgücü Piyasası Üzerine Etkisi: 1989-2006 Türkiye Örneği," *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 23 (1) ss. 327-343.

Demir, F., (2010), "Exchange Rate Volatility and Employment Growth in Developing Countries: Evidence from Turkey". *World Development*, 38, ss. 1127-1140.

Dixit, A., (1989), "Entry and Exit Decisions under Uncertainty," *Journal of Political Economy*, 97(3), ss. 620-638.

Ghosal, V., (1991), "Demand Uncertainty and the Capital-Labor Ratio: Evidence from the U.S. Manufacturing Sector," *The Review of Economics and Statistics*, 73 (1), ss. 157-161.

Ghosal, V. ve P. Loungani, (1996), "Product Market Competition and the Impact of Price Uncertainty on Investment: Some Evidence from US Manufacturing Industries," *The Journal of Industrial Economics*, ss. 217-228.

Ghosal, V. ve P. Loungani, (2000), “The Differential Impact of Uncertainty on Investment in Small and Large Businesses," *Review of Economics and Statistics*, 82, ss. 338-343.

Guiso, L. ve G. Parigi, (1999), “Investment and Demand Uncertainty, "*Quarterly Journal of Economics*, ss. 185-227.

Leahy, J. V., ve T. M. Whited, (1995), “The Effect of Uncertainty on Investment: Some Stylized Facts,” *Working Paper No. w4986, National Bureau of Economic Research.*

Lensink, R., P. Van Steen ve E. Sterken, (2005), “Uncertainty and Growth of the Firm," *Small Business Economics*, 24, ss. 381-391.

Ekonomi-tek Volume / Cilt: 6 No: 1 January / Ocak 2017, 17-46

Role of Strategic Interactions in Corporate Sustainability Decisions: An Empirical Investigation

Mehmet Ali Soytaş[*] *- Damla Durak Uşar*[**]

Abstract

There is a large amount of empirical literature on the relationship between corporate sustainability and corporate financial performance. However, the literature considers company-specific aspects affecting the link but omits the influence of the competition. A firm's gains from its sustainability efforts, however, depend on whether its industry competitors also perform sustainable actions—whether similar in type or different. Thus, we consider the sustainability decision making of companies to be of a strategic nature and show that strategic motives, typically ignored in the literature, can be an important factor in the process. We estimate an Instrumental Variable (IV) Probit model using inclusion in the MSCI KLD 400 Social Index and draw on financial information from the Wharton Research Data Services COMPUSTAT dataset in order to identify the effect of competition. We find that the effect of competition on the likelihood of entry into the sustainability market is negative, but this is only true if the endogeneity is correctly taken into account. Probit estimates present an upward bias, which means that results from raw models can be misleading in designing policies on sustainability. Overall evidence suggests a central role for strategic motives in management's sustainability decisions.

Jel Codes: C36, D22, L10, L21, L60, M14, Q01

Keywords: Corporate sustainability, strategic interactions, market entry, MSCI KLD 400 Social Index ratings

[*] Özyeğin University, Faculty of Business
[**] Özyeğin University, Faculty of Business

1. Introduction

Much of the existing empirical literature in sustainability research studies the link between sustainability and financial performance (Molina et al., 2009, Lu et al., 2014). The empirical findings do not converge, however, and the /direction of this relationship remains open to further investigation (Salzmann et al., 2005). Margolis et al. (2009) have reviewed 251 studies, published between 1972 and 2005, and report that 28% find a positive, 2% find a negative, and 59% of the studies find an inconclusive relationship between corporate financial performance and corporate sustainability performance.

A limitation of this literature is that sustainability is endogenous with respect to financial performance, i.e., a company's decision to adopt sustainability initiatives is likely to correlate with unobservable characteristics of that enterprise that may also affect financial performance. Different approaches, such as the Instrumental Variable Approach (Garcia-Castro et al., 2010, Soytaş et al., 2015) or the Regression Discontinuity Approach (Flammer, 2015), have been applied to correct for this endogeneity bias. Most rigorous quantitative evaluations of sustainability policies use a two-stage approach—the first stage controls for the self-selection of a sustainability approach by the firm through an instrumental variable or matching method, while the second stage compares the sustainability performance of adopting companies against non-adopting ones.

Sustainability research uses the MSCI KLD 400 Social Index dataset[1], the CSRHUB[2], the GRI (Global Reporting Initiative)[3], the Dow Jones Sustainability Index[4], or similar datasets for analyzing the sustainability efforts and ratings of companies. There is a fairly sizable empirical literature on the determinants of the sustainability score of the firms appearing in the MSCI KLD 400 Social Index. When the data in this Index are investigated, it is generally assumed that the listed companies in a particular year are there for having taken fundamental economic/sustainable actions over the previous year. However, a framework based on this assumption lacks any input for competitive factors affecting sustainability decisions and the possibility of strategic interactions between companies.

We introduce the concept of "the sustainability market," which is the competitive environment that can award or penalize firms according to whether they invest in sustainability or not. We refer to the situation where a corpora-

1 https://www.msci.com/documents/10199/904492e6-527e-4d64-9904-c710bf1533c6
2 http://www.csrhub.com/
3 www.globalreporting.org
4 http://www.sustainability-indices.com/

tion undertakes a significant amount of sustainability-related activities as that entity's entrance into the sustainability market. We argue that entry into the sustainability market by investing in sustainable practices is valued by stakeholders: it can reduce production costs, improve workplace productivity, and potentially increase financial returns. A company's gains from its sustainability efforts, however, depend on whether its industry competitors also perform similar or different sustainable actions.

It is likely that various sustainability activities will have different effects on overall competition in the market (Galbreth and Ghosh, 2013). The decomposition of competition into negative effect and positive effect (spillover) provides better understanding of how strategic interactions influence the sustainability decisions of companies.

i) Negative Effect of Competition

If the entry decision of company *j* changes the expectation of stakeholders from company *i* (a sustainable version of the product or a lower price), then the net benefit of company *i* will decrease. Company *i* either does not change its product line in keeping with sustainability principles or price and loses demand and market share, or it decides to adapt to the shifting expectations of stakeholders and incurs new costs. The negative effect of competition in the sustainability market follows the conventional effect of competition on market entry, which has long been recognized in industrial-organization literature.

ii) Positive Effect of Competition—Spillover

It is likely that various sustainability actions will have different effects on overall competition in the market (Galbreth and Ghosh, 2013). If the sustainability efforts of a company lead to an improved stakeholder perception of the whole industry, there may be sustainability spillovers where other market participants piggyback on the sustainability activities of the pioneering company. For instance, a public-education campaign to promote dental health, underwritten by one toothpaste producer, may boost overall sales of the product. Similarly, if a company imitates its competitors' sustainability activities, its implementation cost in doing so will be lower than its rivals' costs. The copycat company benefits from the spillovers without bearing the full cost of the investments.

The likelihood of undertaking sustainability initiatives is influenced positively by sustainability spillovers and negatively by the number of companies adopting the same sustainability policies. If the spillover effect exceeds the competition effect, we expect to obtain positive and significant coefficients. Thus, estimation of the sign of the competition coefficient becomes an im-

portant question. However, the endogeneity due to the strategic motive will influence the coefficient estimate of competition and will produce an upward-biased coefficient if one does not control for it in the model. We consider that this might be a major oversight when estimating the likelihood of a company's going ahead with a substantial investment to enter the sustainability market.

We assume that the sustainability initiatives of a company have an impact on its marketplace and vice versa, since they are likely to follow a diffusion process similar to that seen in technology adoption. Several innovations became the norm over the course of time because of industrywide aspirations to gain competitive advantage and produce surpluses (Christensen, 1997). Similarly, those companies that observe their competitors getting positive returns from engaging in sustainability initiatives are inclined to follow their counterparts' lead and invest in sustainability in order to exploit the producer surplus as well. Thus, sustainability investments will disseminate across the industry and transform the market for the better (Matisoff, 2015). If more and more industry players commit to sustainability, the holdouts are more likely to invest in sustainability—if only to remain competitive with the sustainability pioneers. In his *Harvard Business Review* article, Unruh (2010) presents anecdotal evidence of corporations getting involved in sustainability because industry peers had already invested in the concept. We propose that strategic interactions up the probability of entry into the sustainability market.

While the effect of competition may produce a negative or positive bias, depending on the level of spillovers, we expect that the strategic-interaction effect raises the coefficient of the Probit estimate. The econometric challenge is to estimate the combined effect of strategic interactions and competition, if the interrelatedness of the decisions is not accounted for. If we do not control for strategic interactions, Probit estimation would be biased upward. At the same time, we are prone to make incorrect inferences about the direction and magnitude of the competition.

We use the Instrumental Variable (IV) (Angrist et al. 1996) technique to control for the effect of strategic interactions and estimate the causal effect of competition on the likelihood of entry into the sustainability market and compare our results with those from the Probit models. We use the inclusion in the MSCI KLD 400 Social Index as the dependent variable and draw on financial information from the Wharton Research Data Services as controls. Our analysis demonstrates that our use of the number of competitors as a measure for competition in the model without controlling for strategic interactions means that we cannot conclude that it is the pure competition effect that is producing this positive association.

We empirically show that the IV approach controls for the effect of strategic interactions, and the number of competitors in the sustainability market negatively affects the likelihood of follow-up entry into that market by the focal company. This "causal" effect of competition in the sustainability market is in line with the conventional effect of competition on market entry, which has long been recognized in the industrial-organization literature. Furthermore, our results suggest that companies entering the sustainability market for the first time are affected more profoundly. This finding constitutes a foundation for policymakers and those tasked with promulgating regulations for the future direction of sustainable development.

The rest of the paper proceeds as follows: Section 2 presents a brief theoretical base on sustainability. Section 3 lays out the estimation framework and describes the nature of the endogeneity problem. Section 4 describes the dataset and the variables. Section 5 discusses the estimation results and their implications. Section 6 contains the conclusion and discusses possible extensions.

2. Theory and Main Hypothesis

Sustainability research has turned up not only anecdotal accounts but also empirical evidence of the causal link between corporate sustainability and financial performance. Eccles et al. (2014) report that high-sustainability companies outperform low-sustainability ones in terms of both stock-market performance and accounting measures. Further evidence comes from Unruh (2016): organizations that have adopted a sustainability-related business model are twice as likely to report profits from sustainability activities as those that haven't.

Sustainability research has also addressed the different mechanisms behind corporate behavior regarding sustainability and the resulting financial outcomes. According to the Stakeholder Theory, stakeholders reward sustainable companies. For example, consumers are willing to pay a price premium for less polluting and environmentally friendly products (Gonzales and Padron Fumero, 2002 and Conrad, 2005). Stakeholder engagement and transparency around sustainability performance are followed by better access to finance, and firms with better sustainability records face on average lower capital constraints (Cheng et al., 2014). According to Unruh (2016), investors believe that a solid sustainability ranking of a company is rewarded with higher revenues, reduced risk, and lower capital costs.

Based on Resource Based View (RBV), we expect that companies' operating costs should decrease in the wake of better practices and processes

brought about by sustainability initiatives. Unlike Conrad (2005), who assumes higher costs for producing sustainable goods, we presume that the variable costs will fall due to process improvement and greater employee productivity. Examples of sustainability initiatives that pushed down operating costs are environmentally mandated product designs, responsible sourcing of raw materials, conservation of natural resources, reductions in energy consumption and greenhouse-gas emissions, better inventory management and warehousing, cut-downs on waste generation, more enlightened modes of packaging and transportation, and shared responsibility with suppliers (Hitchcock and Willard, 2009).

The majority of researchers agree that promotion of sustainability lowers operating costs: Schoenherr (2012) presents empirical evidence of the positive and significant impact on costs of pollution prevention and waste reduction, whereas the benefit of materials recycling proves to be negligible. Lee (2012) studies the conditions under which the conversion of a wastewater stream into a useful and saleable byproduct should be viewed as a process innovation that reduces the marginal cost of the original product (Lee, 2012). Battini et al. (2014) extend the traditional Economic Order Quantity (EOQ) model by incorporating the environmental impact of transportation and inventory and point out that intermodal transportation exhibits cost advantages over monomodal road transportation. Mangala et al. (2013) identify the interrelationships between capacity utilization, customer satisfaction, energy consumption reduction, and costs in a product recovery setting.

As stated by Mendoza and Clemen (2013), certain sustainability initiatives, such as recycling or reducing energy consumption (which lead to cost reduction), may generate more direct net benefit than overall social-responsibility policies, which enhance the social infrastructure. While the latter improves the reputation of the company, stokes consumer goodwill, and raises financial performance through the mechanisms of the Stakeholder Theory, the former brings in more profits through the mechanisms of both the RBV and the Stakeholder Theory. If sustainability efforts, such as recycling or energy-consumption reduction, are made known to the stakeholders, a company‘s reputation should move up as well. Since sustainability is a multidimensional construct, it is likely that investment in a variety of its dimensions will have different effects on a business’s overall competitive position within its industry (Galbreth and Ghosh, 2013).

Drawing on the Stakeholder Theory, one can also argue that sustainability programs contribute to producer surpluses. As mentioned above, those companies that see their competitors reaping the gains from pursuing sustainability are more inclined to follow suit in order to exploit the producer surplus as

well. Moreover, according to the RBV, companies investing in sustainability, especially in environmental sustainability, gain a competitive advantage (Golicic and Smith, 2013, Yadav et al., 2017). Thus, other firms in that industry are incentivized to pour money into sustainability, too, if only to compete with their pioneering rivals. Several innovations have become the norm over the course of time due to businesses' aspiration to secure both a competitive advantage and producer surpluses (Christensen, 1997). Since sustainability initiatives should be considered similar to other innovations, it is safe to presume that, at some future time, the majority of the companies operating in a particular industry will decide to invest in sustainability. The general upward trend for the MSCI KLD scores of S&P 500/Domini firms documented by Carroll et al. (2016) supports the same view.

At the same time, those that decide to go this route may not be doing so based only on anticipated higher profits but, also, on keeping up with their competition. Competitors' sustainability decisions, like any other strategic decision, affect the financial fate of the company. Thus, there is a need to consider the sustainability decisions of companies as strategic interactions. This will bring complications into the analysis, since the decision of a single corporation now is a complex object that takes all possible alternative decisions of each and every competitor into account. To clarify, the entry of company j into a product market decreases the net profit of company i, since the two companies will compete for market share. According to Bajari et al. (2010), the entry of competitor *j* into the market decreases the net benefit of focal company *i*, and they predict the influence of competition on the likelihood of entry as negative. However, the effect of the competitor's entry into the virtual market of sustainability should be approached cautiously.

If the entry decision of company *j* changes the expectation of stakeholders from company *i* (a sustainable version of the product or a lower price), then the net benefit of company *i* will shrink. Company *i* either does not change its product to comply with sustainability requirements or its price for that product and thus loses demand and market share, or it decides to adapt to the shifting expectations of its stakeholders and incurs new costs. Either way, the net benefits of company *i* will decrease. Thus, the entry of company *j* into the sustainability market will negatively affect the net profit of company *i*.

Ellickson and Misra (2012) show that revenues fall if more competitors adopt the same pricing strategy. As more manufacturers take on the same sustainability profile, those who do not join up will not be able to compete with their sustainable counterparts. With sustainability becoming the norm, ever more companies will be investing in sustainability in order to survive. However, the value stakeholders assign to this concept will inevitably tumble

as it becomes the standard across industries. For example, consumers will no longer be willing to pay a price premium for a sustainable product or choose one brand/product over a competing one because of the manufacturer's reputation for sustainability. Thus, the demand for sustainability will wither over time, and as happens with growing competition in a given market, a fall in revenue may be seen. This, in turn, will constrain the impetus for investing in sustainability, manifesting itself as a negative and significant coefficient.

Moreover, we expect that if the goods or services of the competitors are substitutable, i.e., the level of competition is high (low industry concentration), the negative effect of sustainability competition will be even more pronounced. This implies that sustainability investments are related negatively to the level of competition in the industry. However, due to the spillovers, the effect of increasing competition on net benefits is not that clear

The influence of competition on sustainability interactions not only depends on the competition level but also on the existence of spillovers in the market. On the one hand, if there are no spillovers, outfits that invest in innovations before their competitors gain the first-mover advantage (Gaimon, 1989). On the other hand, if there are sustainability spillovers, and company *i* copies the sustainability efforts of company *j*, it may gain the second-mover advantage. Tetrault, Sirsly, and Lamertz (2008) discuss the conditions under which the sustainability leader can maintain the first-mover advantage.

If the sustainability efforts of company j cause an improved stakeholder perception of the whole industry, there may be a rise in revenues industry-wide, which transforms to abnormal returns for company *i* as well. Moreover, if a company imitates its competitors' sustainability reconfigurations, the implementation cost for that company will be lower than for its competitors. The follower benefits from the spillovers without bearing the full cost of the investments and again—to a certain extent—gets a free ride from the sustainability activities of its industry rivals. Spillovers occur in the form of 1) improved stakeholder perception of the whole industry, which results in increased revenues and 2) decreased initial investment costs due to imitability of sustainability investments, which are generally not protected by patents. Regardless of the channel-revenue increase or cost reductions, spillovers increase the expected net benefits, which, in turn, heighten the likelihood of entry.

The likelihood of embarking on a sustainability mission is affected positively by sustainability spillovers and negatively by the number of companies doing the same thing. If the spillover effect exceeds the competition effect, we expect to obtain positive and significant coefficients. However, strategic

interactions among companies create an upward bias, and the overall effect will be a combination of the upward biases from this source and the positive effect of spillovers and the negative effect due to the competition.

3. The Estimation Framework

Sustainability decisions are strategic decisions that may be conceptualized in alternative ways. On the one hand, we can model companies' sustainability decisions as the level of investment put into sustainability activities. On the other hand, we can model businesses' sustainability decisions as a discrete choice— whether they decide to invest in sustainability or not.

There is a great deal of literature on empirical industrial organization that develops and estimates the effect of competition on market entry (Bresnahan and Reiss, 1991a, 1991b). As stated by Draganska et al. (2008), the interrelatedness of corporate decisions and the game theoretical nature of the framework complicate the discrete-choice estimation. The main concern in this literature is to find innovative ways to account for the interdependency of the decisions. If not accounted for, the estimation will not capture the effect of competition due to this inherent endogeneity.

Researchers developed an equilibrium modeling framework to overcome this problem. Since the decisions are related in the strategic environment, one way to account for the effect of completion is to model the entry game directly and estimate the empirical counterparts of the game's theoretical solutions. The nested fixed-point method has been used in the estimation of discrete-choice models in the context of static games (see, e.g., Seim 2006; Orhun 2013). However, the key econometric problem is that there is at least one fixed point (equilibrium), which has to be solved at each iteration of the likelihood estimation. Moreover, if there is more than one fixed point, an equilibrium-selection rule has to be prescribed. Due to the computational cost of the nested fixed-point algorithm, alternative methods have been developed, such as the two-step approach of Hotz and Miller (1993) and Bajari et al. (2010).

Another approach that would help us estimate the effect of competition, yet does not require modeling of the equilibrium choices, is the IV approach. Our model is a Probit regression model with the likelihood of entry into the sustainability market as the dependent variable and the number of competitors in the sustainability market along with a set of controls as the explanatory variables. This model is first estimated with the Probit model and then with a Probit model combined with continuous endogenous regressors, using market size as an instrument for the number of firms. Only with the second method do we control for the endogeneity in the relationship. Comparing with the

potentially biased Probit estimates, we highlight possible mechanisms through which endogeneity works and discuss how IV estimation corrects for this bias.

3.1. Market entry

Since companies are assumed to be rational decision makers, in each period they make sustainability decisions, which maximize their expected net benefits. If the sustainability decisions are defined as continuous sustainability investments, w_i for company i, then the set of all possible decisions of the focal company and competitors becomes infinitely big, and the estimation becomes computationally costly. Thus, we develop the following discrete-choice model[5], where each player simultaneously chooses an action, $x_i \epsilon \{0,1\}$.

$$x_i = \begin{cases} 1 \text{ if } w_i > 0 \\ \\ 0 \text{ otherwise,} \end{cases} \quad (1)$$

We assume that there are a finite number of companies (players); $N = \{1, \dots, i, .., n\}$. Let $\boldsymbol{x}_N = (x_1, \dots., x_{i,}, \dots, x_n)$ denote the vector of actions taken by all players. Player i chooses an action x_i by taking the actions of competitors into account: $\boldsymbol{x}_{N/i} = (x_1, \dots., x_{i-1,} x_{i+1}, \dots, x_n)$ denotes the vector of actions for all players, excluding player i.

Let $S_i = (s_1, \dots., s_k)$ denote the vector of k state variables for player i and $s_l \in S_i$ denote the l^{th} state variable for player i. The state variables in S_i may include variables such as firm size, firm age, leverage, R&D intensity, and advertising activity as well as past sustainability decisions of the players, which are the variables that may affect the current decision on sustainability besides the strategic interaction. $\boldsymbol{S} = (S_1, \dots., S_n)$ denotes the vector of state variables for all n players. $\boldsymbol{\vartheta}$ is a (nx1) vector of parameters measuring the impact of $\boldsymbol{S}$ on the expected total net benefit.

Player i's problem is to maximize the expected net benefits subject to the competitors' actions in each period, whereas the net benefit function of entering into the sustainability market subject to the competitors' sustainability decisions is composed of two parts. In the first term in (2), $\boldsymbol{\vartheta}$ measures the influence of state variables $\mathbf{S}'$on the total net benefit $\pi_i(x_i, \boldsymbol{x}_{N/i}, \boldsymbol{S})$—the condi-

[5] In this model, a company is considered an entrant into the sustainability market if $w_i > 0$. The model can be extended to companies that have made substantial investments to enter the sustainability market. Then a company will be considered an entrant if its sustainability investments w_i exceed a threshold value.

tions that lead the company to adopt sustainability—while the term δ captures the influence of other companies' choices on the entry decision.

$$\pi_i(x_i, \boldsymbol{x}_{N/i}, \boldsymbol{S}; \boldsymbol{\vartheta}) = \begin{cases} \boldsymbol{\vartheta}\boldsymbol{S}' + \delta\left(\sum_{i \neq j}^{n} 1\{x_j = 1\}\right) & \text{if} x_i = 1 \\ 0 & \text{if} x_i = 0 \end{cases} \quad (2)$$

Even though we are not going to model the equilibrium-choice strategies of the firm directly in this paper[6], it is essential that we explain the economic environment of industry participants, as well as the interdependency of their decisions, to illustrate the inherent endogeneity. In the estimation, a measure for the x_i along with the competitive environment and the relevant state variables should be carefully constructed.

3.2. Evidence for Causality

In the study of discrete choices, the type-I extreme-value distribution has common applications behavior due to its analytical properties[7] and empirical implications[8] (McFadden, 1984):

$$P_i(x_i = 1|\boldsymbol{S}) = \frac{\exp(\boldsymbol{\vartheta}\boldsymbol{S}' + \delta \sum_{i \neq j} P_j(x_j = 1|\boldsymbol{S}))}{1 + \exp((\boldsymbol{\vartheta}\boldsymbol{S}' + \delta \sum_{i \neq j} P_j(x_j = 1|\boldsymbol{S}))} = \Gamma_i(\boldsymbol{\vartheta}, \delta, P_j(1|\boldsymbol{S}), \forall j). \quad (3)$$

where the statistical reaction function $\Gamma_i(\boldsymbol{\vartheta}, \delta, P_j(1|\boldsymbol{S}), \forall j)$ orders the probability of different actions according to their expected net benefits. Since the dependent variable "entry into the sustainability market" takes only two values, '1'and '0,' which represent the outcomes invest/not invest in sustainability initiatives, we assume that the net benefits come from a binary logit model, where the probability of a particular outcome is determined as follows:

$$P_i(\boldsymbol{x}_i = 1) = \Gamma_i\left(\boldsymbol{\vartheta}S_i + \delta E(\boldsymbol{x}_{N/i}|\, \boldsymbol{S}_{N/i})\right)$$

$$P_i(\boldsymbol{x}_i = 0) = 1 - \Gamma_i\left(\boldsymbol{\vartheta}S_i + \delta E(\boldsymbol{x}_{N/i}|\, \boldsymbol{S}_{N/i})\right) \quad (4)$$

The Probit model does not indicate a causal relationship. In other words, we do not observe the likelihood of a corporation entering the sustainability market, if, all else being equal, N+1 companies compete in the sustainability

---

6 This is a topic of another paper. See Soytas et al. (2017).

7 The limiting distributions for the minimum or the maximum of a very large collection of random observations from the same arbitrary distribution can only be described by generalized extreme-value distribution models —specifically, the Gumbel, Fréchet, and Weibull distributions, also known as type I, II, and III extreme-value distributions.

8 The difference of two type-I extreme-value distributed variables follows a logistic distribution, of which the logit function is the quantile function.

market instead of N companies. Instead, what is exhibited is an association between the number of competitors and the likelihood of entry into the sustainability market. The IV approach at least can produce the initial reduced-form evidence about the direction and the significance of competition in shaping the strategic investment decisions in the sustainability market. An instrument is used to identify the effect of competition (number of firms at a particular time in the market) on the market-entry probability of the focal company. The exclusion restriction here is that the instrument affects the entry decision of the competitors independent of the strategic motive. In other words, companies react to the level of the instrument, without considering how their competitors will react to that level. Then, the effect of competition with this IV estimation should tell us the sign and the magnitude of the effect of competition, possibly accounting for some of the endogeneity coming from the interdependency of the decisions[9].

4. Data and Variables

4.1. Data

We have collected annual company data on corporate sustainability and corporate financial performance for the years 1991-2014. We used social-performance ratings from the MSCI KLD 400 Social Index database as the sustainability measure. [10] The MSCI KLD 400 Social Index considers large, mid-, and small cap companies in the MSCI US IMI Index. It excludes those that are involved in sectors such as Nuclear Power, Tobacco, Alcohol, Gambling, Military Weapons, Civilian Firearms, and Adult Entertainment. Ratings of the remaining firms are based on their strengths and failures (concerns) in seven categories: Community (Com-), Corporate Governance (Cgov-), Diversity (Div-), Employee Relations (Emp-), Environment (Env-), Human Rights (Hum-), and Product (Pro-). Organizations were deleted from the index if (i) they had been struck from the MSCI USA IMI Index, (ii) they had failed the exclusion screens, or (iii) their ratings had fallen below minimum standards. We obtained 40,485 firm-year observations. Moreover, we extracted sustainability ratings of 4,613 companies between 1991 and 2014.

---

[9] Identification in an IV framework should be approached with caution. There are always application-specific concerns. For instance, Imbens and Angrist (1994) formalize the notion that when there is heterogeneity in response, IV measures a Local Average Treatment Effect (LATE). The LATE parameter is consistently estimated, given that the instrument satisfies the standard assumptions, but it consistently estimates the desired effect only for a selected subset of the population of firms—those whose decisions are affected by the level of competition, in our case, by a change in the instrument.

[10] https://www.msci.com/resources/factsheets/index_fact_sheet/msci-kld-400-social-index.pdf

We collected company financial information from the Wharton Research Data Services COMPUSTAT dataset. We focused on its North American sample. We obtained 12,458 firm-year observations, excluding companies with revenues of less than $50 million. We extracted total assets, total stockholders' equity, revenue, net sales, net income, and market value for 2,371 companies between the fiscal years 1991 and 2014. Out of 2,371 companies, 657 of them were also in the MSCI KLD 400 Social Index data set. Thus, we derived an unbalanced panel of 657 companies over the years 1991-2014.

We likewise discarded those businesses with roa $\leq$ -3 and roa $\geq$ 3 so that outliers did not contaminate the results. We further restricted the sample by taking out entities with leverage > 2 over the sample period. We imposed the time limitation (1999-2014) to ensure the continuity of the time series. Furthermore, we cast out corporations that had never entered the sustainability market as well as those that had entered it every year for the observed time period, so that there would be variation in terms of entry.

COMPUSTAT provides Standard Industrial Classification (SIC) code information on the primary line of business for each firm. Since sustainability initiatives are industry specific, a comparison of companies in different industries, such as agriculture, forestry, and fishing, mining, construction, manufacturing, wholesale trade, retail trade, finance, insurance, and real estate and services is not adequate. Besides sector-specific sustainability practices, financial institutions have idiosyncratic financial reporting practices, which further complicate a comparison of corporations. We confined our sample to manufacturers to ensure comparability in terms of sustainability and financial performance; we distinguished operationalized sub-industries by referring to the two-digit SIC codes.

We were left with a panel of 419 manufacturing companies over the years 1999-2014. The sample consists of 22 makers of food and kindred products (sic 20), 3 tobacco products (sic 21), 5 textile mill products (sic 22), 6 apparel and other finished products made from fabrics and similar materials (sic 23), 8 lumber and wood products, except furniture (sic 24), 5 furniture and fixtures (sic 25), 1 paper and allied products (sic 26), 4 printing, publishing, and allied industries (sic 27), 84 chemicals and allied products (sic 28), 12 petroleum refining and related industries (sic 29), 10 rubber and miscellaneous plastics products (sic 30), 4 leather and leather products (sic 31), 7 stone, clay, glass, and concrete products (sic 32), 18 primary metal industries (sic 33), 17 fabricated metal products, except machinery and transportation equipment (sic 34), 55 industrial and commercial machinery and computer equipment (sic 35), 62 electronic and other electrical equipment and components, except computer equipment (sic 36), 29 transportation equipment (sic 37), 50 measuring,

analyzing, and controlling instruments (sic 38), and 5 miscellaneous manufacturing industries (sic 39). Since the data for the independent and dependent variables are collected from two completely different sources, common-method bias does not affect the analysis.

4.2. Variables

We need to evaluate the influence of competition and spillover on the likelihood of a manufacturer's entering the sustainability market. We assume that any companies that are graded by the MSCI KLD 400 Social Index have decided to enter the sustainability market and construct a binary variable, which is denoted as *entry* and is the empirical equivalent of x_i.

Since not all sustainability initiatives are independent of industry characteristics, we can deduce that the competition level regarding sustainability might be influenced indirectly by the competition level in the goods and/or services market. We operationalize the sustainability competition as the number of companies in the MSCI KLD 400 Social Index for a given industry and year, whereas the company itself is excluded. We denote the variable as *number_of_competitors*, which corresponds to $\boldsymbol{x}_{N/i}$ in the empirical model presented in 3.1.

Since past sustainability decisions, firm size, financial performance, R&D intensity, and advertising expenditures can affect the sustainability decisions, we consider them as control variables. These control variables are the empirical counterpart of the set of *k* state variables, $S_i = (s_1, \ldots\ldots, s_k), \forall i = 1, \ldots, n$. We incorporate past years' sustainability decisions and denote the variable as *past_entry*. Furthermore, we control whether or not a company enters the sustainability market for the first time. We denote the related variable as *first_time_entry.*

We also include company size into the analysis as a control variable. To be able to compare producers in labor-intensive versus capital/technology-intensive industries, we consider the variables of number of employees and total assets in millions of dollars. Due to missing values in the data, adding the control variable consisting of the natural logarithm of the number of employees into the analysis decreases the sample size and does not improve model fit. Thus, we omit this control variable from the final analysis. Since the total assets are skewed to the right, we use the natural logarithm and denote the variable as *ln_asset.*

As stated before, there is a reciprocal relationship between sustainability activity and financial performance. While RBV and stakeholder theory posit that sustainability commitment affects financial performance positively, the

slack-resources theory supports the recursive relationship (Waddock and Graves, 1997). Firms that financially outperform their industry average have slack resources to invest in corporate sustainability activities (Surroca et al., 2010). We employ leverage, lagged leverage, return on assets, and lagged return on assets as indicators of financial performance to control for financial performance and isolate the influence of slack resources. Leverage is the ratio of debt to total assets, and its variable is denoted as *leverage*. Lagged leverage is the leverage of the previous year, and its variable is indicated as *leverage_lag1*. Return on assets is the ratio of net income to total assets, and it is represented as *roa*. Lagged return of assets is the return on assets of the previous year, and its symbol is *roa_lag1*.

Furthermore, since we aim to assess the influence of sustainability on financial performance from the stakeholder-theory perspective, we isolate the effect of advertising on stakeholder returns and include advertising intensity as a control variable. The advertising intensity is calculated as the ratio of advertising expenses to net sales.

In the context of sustainability research, RBV suggests that corporate initiatives in this area are intangible resources of the firm, promoting efficiency and better financial performance. To isolate sustainability from other intangible resources of the corporation, we control for R&D intensity, as an intangible resource. R&D intensity is calculated as the ratio of R&D expenses to net sales. Due to missing values in the data, our adding the control variables of advertising intensity and R&D intensity into the analysis decreases the sample size. Furthermore, it does little to improve the model fit. Since qualitatively similar results were found for this data set, we do not report them in the interest of brevity and exclude the control variables of advertising intensity and R&D intensity from the final analysis, reported in Section 5.

5. Results and Discussion

Table 1 displays the summary statistics for entry into the sustainability market (*entry*), past entry into the sustainability market (*past_entry*), first-time entry into the sustainability market (*first_time_entry*), financial performance (*roa, leverage*), one-year lagged financial performance (*roa_lag1, leverage_lag1*), firm size (*ln_asset*), market share of the company (*marketshare*), and market size of the industry (*total_market_revenue*). About 52.79% of the companies in our dataset are identified as having invested in sustainability at least once between 1999 and 2014. Some 37.83% of the companies are first-

time entrants into the sustainability market. The average roa is -0.1167%[11]. The average market share in the data is 0.169, an indication of the market being highly fragmented. We can infer that the sustainability market is a highly competitive market.

Table 1. Summary Statistics

Variable	Observations	Mean	Standard Deviation	Min.	Max.
entry	6674	0.5278693	0.4992601	0	1
past_entry	6674	0.4799221	0.4996341	0	1
first_time_entry	6674	0.3783338	0.4850078	0	0.01
roa	6674	-0.001167	0.2035407	-1.90174	0.953365
leverage	6674	0.1957615	0.1935569	0	1.862799
roa_lag1	6238	0.0002634	0.1987613	-1.88511	0.953365
leverage_lag1	6238	0.1938975	0.1914547	0	1.704765
ln_asset*	6674	6.863983	2.01462	0.470628	13.08138
marketshare	6674	0.0016903	0.0064244	0	0.085924
total_market_revenue*(IV1)	6674	40.77536	9.443293	24.43899	52.91414
total_market_sales*(IV2)	6674	14.84223	0.2472014	14.34878	15.12907

* Divided by 100,000

5.1. Evidence for Causality

In all the estimations in Table 2, the dependent variable *entry* indicates whether a company has entered the sustainability market or not. Due to the binary nature of the dependent variable, Probit estimation is conducted in all specifications. The explanatory variable *number_of_competitors* is calculated as the number of companies that entered the sustainability market, whereas the focal company is excluded. In Model 1, we include the control variables *past entry, roa, ln_asset, leverage, market share, first time entry*. In Model 2, we control for the time-trend effects by incorporating trend and $trend^2$ in addition to the full set of controls.

We calculate *trend* as the difference between the year of observation and 1998. We include the variable of $trend^2$, the squared *trend*, thereby allowing a nonlinear relationship between time-trend effects and *entry*. In Model 3, we run a random-effects model, since the differences across companies might have some influence on the dependent variable *entry*. We incorporate the full

[11] The negative mean value for roa raises concerns of whether companies with poor financial positions are overrepresented in our sample. As you can see from Table 1 in the Appendix, the mean roa values for 2001, 2002, and 2008 are negative and substantially large. These observations lead the mean roa to be less than 0 for the whole sample. In 2001-2002, there was a recession in the US economy due to the bust of the dot-com business and the 9/11 terrorist attacks. The low mean roa values of 2008 can be explained by the subprime-mortgage crisis of that year. The roa values for other years are mostly significantly positive. We already control for the time trends in the analysis.

set of controls as well as *trend* and *trend*^{2}. In this way, we control both for individual and time-trend effects. In Model 4, we restrict the sample to firms that enter the sustainability market for the first time and control for *roa, ln_asset, leverage,* and *market share*.

Table 2. Probit Estimates of the Effect of Competition

	Model 1	Model 2	Model 3	Model 4
number_of_competitors	0.00327***	0.00888***	0.00914***	0.00798***
	[0.000251]	[0.000610]	[0.000624]	[0.00134]
past_entry	1.037***	1.106***	1.030***	
	[0.0503]	[0.0518]	[0.0561]	
Trend		-0.234***	-0.227***	-0.0487
		[0.0311]	[0.0317]	[0.0681]
trend2		0.00664***	0.00644***	-0.000625
		[0.00133]	[0.00136]	[0.00308]
Roa	0.383***	0.339***	0.355***	0.0875
	[0.106]	[0.108]	[0.118]	[0.174]
Lnasset	0.149***	0.151***	0.168***	0.109***
	[0.0132]	[0.0133]	[0.0161]	[0.0213]
Leverage	-0.0118	-0.0256	-0.0621	-0.208
	[0.106]	[0.107]	[0.120]	[0.190]
Marketshare	-12.33***	-13.23***	-13.78***	-21.73***
	[3.371]	[3.409]	[4.113]	[7.073]
first_time_entry	-0.652***	-0.728***	-0.697***	
	[0.0572]	[0.0587]	[0.0639]	
Constant	-1.990***	-2.013***	-2.199***	-3.000***
	[0.123]	[0.129]	[0.151]	[0.178]
Fixed effects	None	time trend	Individual & time trend	First-time entry
Log likelihood	-2832.6501	-2777.4474	-2769.7992	-883.59771
Pseudo- R^2	0.3863	0.3983		0.1289
Observations	6,674	6,674	6,674	2,525
Number of gvkey			419	

Standard errors in brackets, *** p < 0.01, ** p < 0.05, * p < 0.1

For all specifications, we can infer that if more competitors enter the sustainability market, the likelihood of the focal company also joining it will increase. This finding suggests that the spillover effects exceed the competition effect. However, it is not clear whether the spillover effects stem from the demand or supply side. As discussed in Section 2, spillovers may occur in the form of improved stakeholder perception of the whole industry, where all players in the industry then benefit from greater demand, or the implementation cost is lower for companies that imitate their competitors' sustainability initiatives. Either way, such a firm benefits from the spillovers without bearing the full cost of the investments, thus raising the probability of its getting

involved with sustainability, compared to the likelihood of its entry into a sustainability market where no spillovers exist.

Nonetheless, this finding suggests that companies are more likely to invest in sustainability if they observe that their competitors are already doing so. Furthermore, it follows that sustainability as "the thing to do" over time becomes the norm, like any other innovation or disruptive technology.

Matisoff (2015) claims that the sustainability behavior of industry leaders inspire their followers to follow suit, pointing to evidence of dissemination of best practices across a given industry in the sustainability literature. Moreover, this finding is consistent with the business cases described in Gregory Unruh's *Harvard Business Review* article (Unruh, 2010). He presents anecdotal evidence of manufacturers investing in sustainability in the wake of their industry peers having already gone that route. He names industrywide sustainability pressures as the green domino effect. In line with previous findings, our results also support the "sustainability dissemination" or "green domino effect." However, to measure the causal effect of competition, we need to assure that the coefficient of the *number_of_competitors* is an unbiased estimator of sustainability competition.

Considering the results in Table 2, we reason that past financial performance can be a key factor in the sustainability decision making of a company. To incorporate this, we repeat the same analysis by including the lagged financial performance to control for the possible reverse relationship suggested by slack-resources theory. For all specifications in Table 2, we included one-year lagged roa and leverage and reported the results in the Appendix. In Table A2, we find similar results to Table 2. In Models 1 and 2, the coefficients of lagged roa are not significant, and for the other two specifications, the coefficients of roa are only significant at the 10% level, while the coefficients of leverage are not significant in any of the specifications.[12]

5.2. Correcting for Endogeneity Bias with the IV Model

The analysis in Table 2 obviously does not indicate a causal relationship. In other words, we do not establish the likelihood of a company entering the sustainability market, all else being equal, if N+1 companies compete in that market instead of N companies. Thus, the models in Table 2 do not provide an indication of a causal effect of competition on the entry decision into the sus-

[12] When we conducted the IV analysis with lagged variables, the results were not affected. Thus, in the IV model specifications, we did not include past financial performance variables, as they are discussed in Section 5.2.

tainability market. Instead, what emerges is an association between the number of competitors and the likelihood of entry into the sustainability market.

To control for the endogeneity in the relationship, the IV method can be used. If there is an observable instrument, one that affects the sustainability decisions of competitors but is uncorrelated with the unobserved factor affecting the sustainability decision of the focal company, then an IV estimator based on this instrument will yield a consistent estimate of the effect of the number of competitors on the likelihood of entering into the sustainability market.

Bresnahan and Reiss (1991a, 1991b) note that market size is highly correlated with the number of firms in a market. Assuming the number of competitors in the market is fixed, an increase in the industry size would boost the expected revenue, which makes the entry of the focal company into the market more likely. Berry and Waldfogel (1999) use market size as an instrument for the number of firms. This IV measure, though arguably not the ideal instrument, still has the potential to correct for the endogeneity in the relationship (Berry and Waldfogel (1999). We employ total market revenue (*total_market_revenue*) as a measure of industry size and use it as an instrument.

Since the focal company makes the entry decision conditional on the actions of its competitors, if the unobserved factor affects its sustainability decision as well as those of its competitors positively, then the coefficient of the *number_of_competitors* will be upward biased.

As seen in Table 4, when the IV approach is implemented, the coefficient of the explanatory variable, which is significant at the 0.01 level and positive in Model 2, becomes significant at the 0.05 level and negative, as one would expect in a market-entry model: the coefficient of the competition effect has a negative sign on average. However, the endogeneity due to the strategic interactions leads to the upward bias in the Probit estimates, and we obtain the positive coefficients in Table 2.

In Table 3, results of the main IV specification are presented, and we show that the effect of competition is indeed negative. In Table 4, we employ total market sales (ln_*total_sales*) as a measure of industry size and use it as an instrument for the robustness of the result obtained in Table 3. This estimation is presented in column 3 in Table 4. In column 1, we restate the result with endogeneity. In column 2, we reproduce the result for the main IV specification for comparison. Finally, in column 4, the specification with both instruments used as IVs is presented. We see from the results that in all IV specifications the coefficient of the competition is not positive and significant, as the Probit estimation suggested.

The negative and significant relationship between the likelihood of entry and number of competitors indicates that the effect of competition exceeds that of spillovers. The first stage of the IV estimates indicates a significant association between the number of competitors and the market size variables. The corresponding F-statistics are all significantly high. Also, the Wald test of exogeneity employed for IV (1), IV (2), and IV (3) produces 5.02, 6.93, and 8.78, respectively, for the chi-squared (1), with the corresponding p-values of 0.0251, 0.0085, and 0.0030.

Table 3. Probit Model with Endogenous Regressors

	Model 2	Model 2_IV1
number_of_competitors	0.00888***	-0.0165**
	[0.000610]	[0.00829]
past_entry	1.106***	0.638**
	[0.0518]	[0.260]
Trend	-0.234***	0.736**
	[0.0311]	[0.305]
trend2	0.00664***	-0.0246**
	[0.00133]	[0.00977]
Roa	0.339***	0.419***
	[0.108]	[0.0916]
Lnasset	0.151***	0.102***
	[0.0133]	[0.0327]
Leverage	-0.0256	-0.055
	[0.107]	[0.0904]
Marketshare	-13.23***	-9.084**
	[3.409]	[3.938]
first_time_entry	-0.728***	-0.706***
	[0.0587]	[0.100]
Constant	-2.013***	-0.555
	[0.129]	[0.649]
Fixed effects	time trend	time trend
Log likelihood	-2777.4474	-34962.717
Pseudo- R^2	0.3983	
Observations	6,674	6,674

Standard errors in brackets, *** p < 0.01, ** p < 0.05, * p < 0.1

The comparison of Table 4 to Table 2 verifies that employing *number_of_competitors* as the variable to control for the effect of competition leads to upward biased results. According to Caroll et al. (2016), companies have diverse motivations for adopting sustainability initiatives, such as moral or value-based ones, legitimacy concerns, managerial-agency-based pressures, institutional biases, responsiveness to activists, and strategic imperatives.

This finding reflects the tendency of companies to turn to sustainability out of market-share considerations, even though they might not benefit financially

in the short term. Thus, the decision to adopt sustainability policies is primarily driven by demand-side factors and is strategic. As a matter of fact, Cassimnon et al. (2016) point out that companies relying solely on the net present value or cost-benefit approach, which ignores the strategic value of sustainability investments, often decide not to invest into sustainability.

Table 4. IV Specifications

	Model 2	Model 2_IV1	Model 2_IV2	Model 2_IV1&2
number_of_competitors	0.00888***	-0.0165**	-0.0177**	-0.0194***
	[0.000610]	[0.00829]	[0.00706]	[0.00621]
past_entry	1.106***	0.638**	0.601**	0.542**
	[0.0518]	[0.260]	[0.233]	[0.221]
Trend	-0.234***	0.736**	0.779***	0.842***
	[0.0311]	[0.305]	[0.259]	[0.226]
trend2	0.00664***	-0.0246**	-0.0260***	-0.0280***
	[0.00133]	[0.00977]	[0.00829]	[0.00722]
Roa	0.339***	0.419***	0.417***	0.411***
	[0.108]	[0.0916]	[0.0904]	[0.0889]
Lnasset	0.151***	0.102***	0.0973***	0.0901***
	[0.0133]	[0.0327]	[0.0299]	[0.0287]
Leverage	-0.0256	-0.055	-0.0559	-0.0573
	[0.107]	[0.0904]	[0.0889]	[0.0865]
Marketshare	-13.23***	-9.084**	-8.686**	-8.053**
	[3.409]	[3.938]	[3.738]	[3.625]
first_time_entry	-0.728***	-0.706***	-0.693***	-0.672***
	[0.0587]	[0.100]	[0.0963]	[0.0973]
Constant	-2.013***	-0.555	-0.462	-0.32
	[0.129]	[0.649]	[0.573]	[0.530]
Fixed effects	time trend	time trend	time trend	time trend
Log likelihood	-2777.4474	-34962.717	-34960.741	-34959.46
Pseudo- R^2	0.3983			
Observations	6,674	6,674	6,674	6,674

Standard errors in brackets, *** p < 0.01, ** p < 0.05, * p < 0.1

Flammer (2015) finds that the value gains are larger for companies with relatively low levels of sustainability, which indicates that the sustainability-financial relationship is concave. She states that in the initial stages of sustainability, manufacturers harvest the low-hanging fruits. Although common sense supports Flammer's finding, she studies enterprises that have already pursued sustainability and committed to a minimum threshold of activity. Likewise, we build our models on diminishing returns from additional sustainability initiatives, but we don't agree that initial implementation of sustainability is as easy as suggested by Flammer (2015).

We study whether companies decide to invest or not. As proposed in Section 2, competition increases the cost of market entry, while spillover effects

decrease these costs. Since sustainability initiatives, some of which require little effort to implement, are prone to being eventually taken up by all market participants, we would observe the effect of spillovers, if it were substantial. Thus, the effect of competition and spillovers as *ex ante* measures of market entry becomes important. We document that first-time entry into sustainability decreases the likelihood of entry; hence, we infer that initial sustainability investments are costly due to competition.

The results show evidence of sustainability decision making being a function of strategic considerations. As seen in Table 2, the results are biased upwards and overestimate the true relationship between the number of competitors and the likelihood of entry, if this strategic interaction is not properly taken into account. We document that the number of competitors affects the likelihood of entry negatively with the IV models. The empirical findings confirm that firms might decide to invest in sustainability to gain a competitive advantage (or risk falling short of the market) in the long run, regardless of the financial return in the short term.

6. Conclusion

Our goal was to understand how competition and the strategic and interrelated nature of sustainability decisions affect the likelihood of sustainability investments of companies. Similar to classical industrial-organization research, we have explored how the number of firms in the sustainability market, outfits' sizes, their financial positions, and potential competitors affect market entry.

We presented an IV estimation approach to the model that incorporates the possibility of the competitors' actions having an impact on the decision of the focal company. We provided reduced-form evidence of how estimation of an interrelated-choice model determines the direction and the significance of competition in shaping the strategic investment decisions in the sustainability market.

When strategic interaction is not accounted for, we find that a higher number of competitors up the likelihood of sustainability investments. When we control for the strategic interaction of sustainability through an instrumental variable, the relationship between the number of competitors and the likelihood of entry into the sustainability market becomes negative and significant. We also repeat the Probit and IV Probit estimations with lagged financial performance measures and show that our estimation results propagate. Thus, the effect of strategic interactions is prominent compared to endogeneity arising from reverse causality.

We were able to provide empirical evidence that the effect of competition on the likelihood of entry into the sustainability market is greater than the effect of spillover. Furthermore, this finding is more profound for the first-time entrants. This result has substantial regulatory policy implications. Government policymakers should give incentives to new entrants in order to compensate for the negative impact of competition on the total sustainability outcome of the market. Future research questions arise, such as the full maximum likelihood estimation of the strategic interaction model[13] and the formalization of sustainability interactions in a multiperiod model, since investments in sustainability are likely to have dynamic effects over time, which the static model does not capture. Moreover, the decomposition of latent profits into revenue and costs components would provide a better understanding of how strategic interactions influence sustainability decisions.

[13] This model is developed and estimated in a companion paper by Soytaş et al. (2017).

References

Athey, S., J. Levin, and E. Seira, (2008), "Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions," *Working Paper*, Stanford University.

Bajari, P., A. Hortacsu, (2003), "The Winner's Curse, Reserve Prices, and Endogenous Entry: Empirical Insights from e-Bay Auctions," *RAND Journal of Economics*, 34 (2), pp. 329-355.

Bajari, P., H. Hong, J. Krainer, D. Nekipelov, (2010), "Estimating Static Models of Strategic Interactions," *Journal of Business & Economic Statistics*, Vol. 28:4, pp. 469-482.

Battini, D., A. Persona, F. Sgarbossa, (2014), "A Sustainable EOQ Model: Theoretical Formulation and Applications," *International Journal of Production Economics*, Vol. 149, pp. 145-153.

Berry, S. T., (1992), "Estimation of a Model of Entry in the Airline Industry," *Econometrica*, Vol. 60, pp. 889-917.

Berry, S. and P. Reiss, (2007), "Empirical Models of Entry and Market Structure," *Handbook of Industrial Organization*, Vol. 3, Chapter 29, pp. 1845-1886.

Berry, S. T. and J. Waldfogel, (1999), "Social Inefficiency in Radio Broadcasting," *Rand Journal of Economics*, Vol. 30:3, pp. 397-420.

Birkinshaw, J., J. Ridderstrale, (1999), "Fighting the Corporate Immune System: A Process Study of Subsidiary Initiatives in Multinational Corporations," *International Business Review*, Vol. 8, pp. 149-180.

Björn, P. and Q. Vuong, (1984), "Simultaneous Equations Models for Dummy Endogenous Variables: A Game Theoretic Formulation with Application to Labor Force Participation," *Californian Institute of Technology*.

Bresnahan, T. F. and P. C. Reiss, (1991a), "Empirical Models of Discrete Games," *Journal of Econometrics*, Vol. 48:1-2, pp. 57-81.

Bresnahan, T. F. and P. C. Reiss, (1991b), "Entry and Competition in Concentrated Markets," *Journal of Political Economy*, Vol. 99:5, pp. 977-1009.

Carroll, R. J., D. M. Primo, and B. K. Richter, (2016), "Using Item Response Theory to Improve Measurement in Strategic Management Research: An Application to Corporate Social Responsibility," *Strategic Management Journal*, Vol. 37, pp. 66-85.

Cassimon, D., P. Engelen, and L. Van Liedekerke, (2016), "When Do Firms Invest in Corporate Social Responsibility? A Real Option Framework," *Journal of Business Ethics*, Vol. 137, pp. 15-29.

Conrad, K., (2005) "Price Competition and Product Differentiation When Consumers Care for the Environment," *Environmental & Resource Economics*, Vol. 31, pp. 1-19.

Cheng, B., I. Ioannou, and G. Sefafeim, (2014), "Corporate Social Responsibility and Access to Finance," *Strategic Management Journal*, Vol. 35, pp. 1-23.

Christensen, Clayton M., (1997), *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press, Boston, Massachusetts, USA.

Draganska, M., S. Misra, V. Aguirregabiria, P. Bajari, L. Einav, P. Ellickson, D. Horsky, S. Narayanan, Y. Orhun, P. Reiss, K. Seim, V. Singh, R. Thomadsen, and T. Zhu, (2008), "Discrete Choice Models of Firms' Strategic Decisions," *Marketing Letters*, Vol. 19, pp. 399-416.

Eccles, R. G., I. Ioannou, and G. Serafeim, (2014), "The Impact of Corporate Sustainability on Organizational Processes and Performance," *Management Science*, Vol. 60:11, pp. 2835-2857.

Ellickson, P. B. and S. Misra, (2008), "Supermarket Pricing Strategies," *Marketing Strategies*, Vol. 27:5, pp. 811-828.

Flammer, C., (2015), "Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach," *Management Science*, Published online in *Articles in Advance* 19 Feb 2015.

Gaimon, C., (1989), "Dynamic Game Results of the Acquisition of New Technology," *Operations Research*, Vol. 37:3, pp. 410-425.

Galbreth, M. and B. Ghosh, (2013), "Competition and Sustainability: the Impact of Consumer Awareness," *Decision Sciences*, Vol. 44:1, pp. 127-159.

Garcia-Castro, R., M. A. Ariño, M. A. Canela, (2010), "Does Social Performance Really Lead to Financial Performance? Accounting for Endogeneity," *Journal of Business Ethics*, Vol. 92, pp. 107-126.

Golicic, S. and C. D. Smith, (2013), "A Meta-Analysis of Environmentally Sustainable Supply Chain Management Practices and Firm Performance," *Journal of Supply Chain Management*, Vol. 49:2, pp. 78-95.

Hitchcock, D. E., M. L. Willard, (2009), *The Business Guide to Sustainability: Practical Strategies and Tools for Organizations*. 2nd ed. London: Routledge.

Hotz, J. and R. Miller, (1993), "Conditional Choice Probabilities and the Estimation of Dynamic Models," *Review of Economic Studies*, Vol. 60, pp. 497-529.

Imbens, G. W., J. D. Angrist, (1994), "Identification and Estimation of Local Average Treatment Effects," *Econometrica*, 62 (2), pp. 467-475.

Keane, M. and K. Wolpin, (1997), "The Career Decisions of Young Men," *Journal of Political Economy*, Vol. 105, pp. 473-522.

Lee, D., (2012), "Turning Waste into Byproduct," *Manufacturing & Service Operations Management*, Vol. 14:1, pp. 115-127.

Lu, W., K. W. Chau, H. Wang, and W. Pan, (2014), "A Decade's Debate on the Nexus between Corporate Social and Corporate Financial Performance: A Critical Review of Empirical Studies, 2002-2011," *Journal of Cleaner Production*, Vol.79, pp. 195-206.

Mangala, S., J. Madaan, F. T. S. Chan, (2013), "Analysis of Flexible Decision Strategies for Sustainability-focused Green Product Recovery System," *International Journal of Production Research*, Vol. 51: 11, pp. 3428-3442.

Margolis, J. D., H. A. Elfenbein, and J. P. Walsh, (2009), "Does it Pay to be Good...And Does it Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance," http://ssrn.com/abstract=1866371.

Matisoff, D., (2015), "Sources of Specification Errors in the Assessment of Voluntary Environmental Programs: Understanding Program Impacts," *Policy Sciences*, Vol. 48, pp.109-126.

McFadden, D. L., (1984), "Econometric Analysis of Qualitative Response Models," In Z. Griliches and M. D. Intriligator (eds.) *Handbook of Econometrics*, Vol. II, pp. 1395-1447. Amsterdam: Elsevier.

McKelvey, R. and T. Palfrey, (1995), "Quantal Response Equilibria for Normal Form Games," *Games and Economic Behavior*, Vol. 10:1, pp. 6-38.

Mendoza, A. J., R. T. Clemen, (2013), "Outsourcing Sustainability: A Game Theoretic Modeling Approach," *Environment Systems and Decisions*, Vol. 33, pp. 224-236.

Molina, J. F., A. E. Claver, D. López, G. J. J. Tarí, (2009), "Green Management and Financial Performance: A Literature Review," *Management Decisions*, Vol. 47:7, pp. 1080-1100.

Moraga-González, J. L. and N. Padrón-Fumero, (2002), "The Adverse Effects of Environmental Policy in Green Markets," *Environmental and Resource Economics*, Vol. 22:3, pp. 419-447.

Orhun, A.Y., (2013) "Spatial Differentiation in the Supermarket Industry: The Role of Common Information," *Quantitative Marketing and Economics*, Vol. 11:1, pp. 3-37.

Ryan, P. and C. Tucker, (2012), "Heterogeneity and the Dynamics of Technology Adoption," *Quantitative Marketing & Economics*, Vol. 10, pp. 63-109.

Salzmann O., A. Ionescu-Somers, and U. Steger, (2005), "The Business Case for Corporate Sustainability: Literature Review and Research Options," *European Management Journal*, No. 23, pp. 27-36.

Schoenherr, T., (2012), "The Role of Environmental Management in Sustainable Business Development: A Multi-country Investigation," *International Journal of Production Economics*, Vol. 140:1, pp. 116-128.

Seim, K., (2006), "An Empirical Model of Firm Entry with Endogenous Product-type Choices," *RAND Journal of Economics*, Vol. 37:3, pp. 619-642.

Soytaş, M. A., M. Denizel, D. Uşar, (2015), "Corporate Sustainability: Empirical Evidence of Causality on Financial Performance," *18th Informs Applied Probability Society Conference*, July 5-8, 2015, Istanbul, TURKEY.

Soytaş, M. A., D. Uşar, M. Denizel, (2017), "Estimation of the Static Corporate Sustainability Interactions Model," *Working Paper.*

Soytaş, M. A., M. Denizel, D. Uşar, I. Ersoy, (2017), "Corporate Sustainability Investments and the Financial Performance Relationship in Turkey," *Journal of Management and Economics Research*, 15 (2), pp. 140-162.

Stern, S. and B. Heidemann, (1999), "Strategic Play Among Family Members When Making Long-Term Care Decisions," *Journal of Economic Behavior and Organization*, Vol. 40, pp. 29-57.

Surroca, J., J. A. Tribo, S. Waddock, (2010), "Corporate Responsibility and Financial Performance: The Role of Intangible Resources," *Strategic Management Journal*, Vol. 3, pp. 463-490.

Tetrault Sirsly, C. and K. Lamertz, (2008), "When Does a Corporate Social Responsibility Initiative Provide a First-Mover Advantage?" *Business & Society*, Vol. 47: 3, pp. 343-369.

Unruh, G., (2010), "Can You Compete on Sustainability?" *Harvard Business Review*, https://hbr.org/2010/03/can-you-compete-on-sustainability.

Unruh, G., D. Kiron, N. Kruschwitz, M. Reeves, H. Rubel, and A. M. zum Felde, (2016), "Investing For a Sustainable Future," *MIT Sloan Management Review*, May 11.

Yadav, P. L., S. H. Han, H. Kim, (2017), "Sustaining Competitive Advantage Through Corporate Environmental Performance," *Business Strategy and The Environment*" Vol. 26, pp. 345-357.

Zhu, T. and V. Singh, (2009), "Spatial Competition and Endogenous Location Choices: An Application to Discount Retailing," *Quantitative Marketing and Economics* Vol. 7:1, pp. 1-35.

Appendix

Table A1. Mean *roa* and Mean *leverage* Values Over the Years

Year	mean(roa)	mean(leverage)
1999	0.001646	0.2136563
2000	0.0200803	0.2161479
2001	-0.0243864	0.2248794
2002	-0.0421554	0.2227454
2003	-0.0038984	0.1999115
2004	0.0043814	0.1872487
2005	0.0091688	0.1835304
2006	0.0065774	0.183802
2007	0.0165807	0.1812367
2008	-0.0430181	0.1956679
2009	-0.0174803	0.1718536
2010	0.016922	0.1691612
2011	0.022011	0.1813711
2012	-0.0021923	0.190307
2013	0.0071749	0.1962101
2014	0.0098839	0.2142258

Table A2. Probit Estimates of the Effect of Competition (with Lagged Financial Measures)

	ModelA1	ModelA2	ModelA3	ModelA4
number_of_competitors	0.00397***	0.00916***	0.00954***	0.0127***
	[0.000278]	[0.000626]	[0.000645]	[0.00153]
past_entry	1.203***	1.239***	1.152***	
	[0.0528]	[0.0535]	[0.0577]	
trend		-0.248***	-0.240***	-0.446***
		[0.0371]	[0.0381]	[0.0908]
trend2		0.00758***	0.00737***	0.0173***
		[0.00160]	[0.00164]	[0.00411]
roa	0.304**	0.248*	0.274*	-0.115
	[0.143]	[0.144]	[0.151]	[0.222]
roa_lag1	0.178	0.229	0.281*	0.412*
	[0.141]	[0.141]	[0.148]	[0.233]
lnasset	0.139***	0.140***	0.161***	0.101***
	[0.0136]	[0.0138]	[0.0173]	[0.0222]
leverage	-0.147	-0.086	-0.0992	-0.137
	[0.229]	[0.232]	[0.240]	[0.384]
leverage_lag1	0.169	0.0917	0.0623	-0.0682
	[0.226]	[0.229]	[0.236]	[0.372]
Marketshare	-13.61***	-14.27***	-15.48***	-22.30***
	[3.450]	[3.493]	[4.469]	[7.391]
first_time_entry	-0.390***	-0.495***	-0.438***	
	[0.0610]	[0.0626]	[0.0701]	
Constant	-2.284***	-2.112***	-2.364***	-2.310***
	[0.133]	[0.149]	[0.175]	[0.199]
Fixed effects	None	time trend	individual& time trend	first time entry
Log likelihood	-2705.0433	-2658.363	-2646.7411	-849.13417
Pseudo- R^2	0.3693	0.3802		0.1087
Observations	6,238	6,238	6,238	2,164
Number of gvkey			419	

Standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1