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Editor's Introduction

This issue starts the fifth volume of our *Ekonomi-tek* journal. It contains three papers, one of which is a methodological explanation of the axiomatic approach in science and in economics. The other two are empirical papers on structural economic reforms and consumption spending, both subjects having been the focus of recent debate in our field.

Our first paper is by Hasan Ersel, formerly of Ankara University, the Central Bank of Turkey, and Sabancı University. His paper provides a review of the axiomatic approach, first developed by the German mathematician David Hilbert in the late 19th and early 20th centuries. It also includes a framework for applying the approach in different areas, including mathematics and physics.

The author then recounts how Gerard Debreu was able in the 1950s to show the coordination and existence of competitive equilibrium in an economy within a Walrasian framework by means of the axiomatic approach. Here, reference is also made to Debreu's joint work with Kenneth Arrow, particularly their proof of general equilibrium. The author finally mentions the criticisms of John von Neumann, who sometimes disagreed with the use of the axiomatic approach in scientific work.

The second paper is by Tolga Aksoy, of Yıldız Technical University. It sets out to explain how structural economic reforms affect voter behavior and thus election results and shape political stability. More precisely, the author seeks to determine the probability of a government that has brought in structural economic reforms being voted out of power in subsequent elections. Economic reforms in the areas of international trade, product markets, and domestic finance are accounted for.

For his empirical work, the author has drawn on data from a sample of 122 countries for the 1975-2006 period. In addition to variables representing reforms, variables of macroeconomic conditions, institutional development, and the strategy of reform sequencing make their way into the estimated equations. The results reveal that in countries where macroeconomic stability is attained,

voters reward governments for introducing economic reforms. Yet, if those reforms are enacted in unstable environments, there is a significant probability of that government's being turned out of office at the next elections. It also appears that voters will reward governments if institutional quality has been achieved and an optimal sequencing of reforms has been followed.

The third paper in this issue is by Ünay Tamgaç Tezcan, of TOBB University of Economics and Technology, whose goal was to identify the determinants of household consumption, with an eye on group or peer effects in particular. The author relies on estimated consumption functions to carry out her tests, and her data source is the Turkish Household Budget Survey (HBS) for the years 2003-2012.

This author's empirical findings are in line with those of earlier researchers when higher-income groups (peer effects) are excluded; income and number of children turn out to be the most significant effects. When peer effects are included, the consumption of lower-income households in urban areas is definitely influenced by that of the higher-income groups. The effect is most apparent for urban residents in the bottom half of the income percentiles. However, no peer effects are observed for households in rural areas.

We look forward to presenting you with other interesting papers in our future issues.

Ercan Uygur
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Editörün Sunuşu

Bu sayı, Ekonomi-tek dergimizin beşinci cildini başlatmaktadır ve üç makale içermektedir. Birincisi bir yöntem makalesidir, bilimde ve iktisatta belitsel (axiomatic) yaklaşımı açıklamaktadır. Diğer ikisi, yapısal ekonomik reformları ve tüketim harcamalarını ele alan uygulamalı çalışmalardır. Bunlar, iktisat alanında yakın zamanda tartışılan konulardır.

Birinci makalemizin yazarı, geçmişte Ankara Üniversitesi, T. C. Merkez Bankası ve Sabancı Üniversitesi kadrolarında yer alan Hasan Ersel'dir. Bu makalede yazar, ilk olarak 19. Yüzyıl sonları, 20. Yüzyıl başlarında Alman matematikçi David Hilbert'in geliştirdiği belitsel yaklaşımın bir değerlendirmesini yapmaktadır. Makalede ayrıca bu yöntemin matematik ve fizik gibi alanlarda uygulanmasıyla ilgili bir çerçeve de vardır.

Yazar daha sonra Gerard Debreu'nun 1950'lerde belitsel yaklaşımı kullanarak Walras'gil bir çerçevede rekabetçi ekonominin eşgüdüm ve dengesinin varlığını nasıl gösterdiğini açıklamaktadır. Burada, Debreu'nün Kenneth Arrow ile ortak çalışmalarına, özellikle genel dengeyi kanıtlamalarına da atıf yapılmaktadır. Yazar son olarak belitsel yaklaşımın bilimsel çalışmalarda kullanılmasını bazı durumlarda uygun bulmayan John von Neumann'ın bu konudaki eleştirilerine yer vermektedir.

İkinci makale, Yıldız Teknik Üniversitesi'nden Tolga Aksoy'undur. Bu makale, yapısal ekonomik reformların seçmen davranışlarını ve böylece seçim sonuçlarını nasıl etkilediğini ve politik istikrarı nasıl biçimlendirdiğini açıklamaya girişmektedir. Daha belirgin olarak yazar, yapısal ekonomik reformları getiren bir hükümetin daha sonraki seçimleri kaybetme olasılığını araştırmaktadır. Uluslararası ticaret, mal piyasaları ve iç finansman alanlarındaki ekonomik reformlar dikkate alınmaktadır.

Yazar, uygulamalı çalışmasını 122 ülkeyi ve 1975-2006 dönemini kapsayan örneklem verileri ile yürütmüştür. Tahmin edilen denklemlerde ekonomik reformları temsil eden değişkenler yanında, makroekonomik koşulları, ku-

rumsal gelişmeyi ve reformların stratejik sıralamasını temsil eden değişkenler de yer almıştır. Elde edilen sonuçlar, makroekonomik istikrarın sağlandığı ülkelerde, seçmenlerin ekonomik reformları getiren hükümetleri ödüllendirdiğini göstermektedir. Ancak reformları istikrarsız ortamlarda getiren hükümetlerin sonraki seçimlerde iktidarı kaybetme olasılığı yüksektir. Ayrıca, seçmenler, kurumların kalitesini sağlamış ve reformları en uygun sıralama ile yapmış hükümetleri oylarıyla ödüllendirmektedirler.

Bu sayıdaki üçüncü makale, TOBB Ekonomi ve Teknoloji Üniversitesi'nden Ünay Tamgaç Tezcan'ındır ve amacı, özellikle grup (zenginlere özenme) etkisini de dikkate alarak, hanehalkı tüketimini etkileyen unsurları belirlemektir. Bu bağlamda yazar, 2003-2012 dönemindeki Türkiye Hanehalkı Bütçe Anketleri verilerini kullanarak bazı sınamalar yapmak üzere tüketim işlevleri tahmin etmiştir.

Bu çalışmada yazarın elde ettiği bulgular daha önceki çalışmaların sonuçları ile tutarlıdır ve grup etkileri dikkate alınmadığında tüketimi etkileyen en önemli unsurlar gelir ve ailedeki çocuk sayısıdır. Grup etkisi dikkate alındığında, şehirlerdeki grup içindeki düşük gelirli hanehalklarının tüketim harcaması, yüksek gelirlilerin tüketiminden etkilenmektedir. Bu etkilenme, şehirlerde yaşayan düşük gelir dilimlerinde daha kesin olarak görülmektedir. Diğer yandan, kırsal kesimlerdeki hanehalkları için böyle bir etkilenme gözlenmemiştir.

Sizlere gelecek sayılarımızda başka ilginç makaleler sunmayı umut ediyoruz.

Ercan Uygur
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Ekonomi-tek

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BELİTSEL YAKLAŞIM, İKTİSAT VE Von NEUMANN'IN KAYGILARI

Hasan Ersel[*]

Özet

Modern belitsel yaklaşım David Hilbert tarafından geliştirilmiştir. Hilbert bu yaklaşımı önce geometriye sonra fiziğe uygulamıştır. Hilbert'in belitsel yaklaşım anlayışı zaman içinde evrilmiş ve matematik ve fizik alanlarındaki çalışmaları arasında önemli farklılıklar göstermiştir. Hilbert'in matematiğin tutarlılığını göstermek konusundaki derin ilgisi onu "biçimsel belitsel yaklaşıma" dayanmaya yönlendirmiştir. Buna karşılık Hilbert belitsel yaklaşımın fizikte katı bir biçimde uygulanamayacağını görmüş, fizikte ve daha sonra "esnek belitsel yaklaşım" olarak adlandırılan daha gevşek bir yaklaşımı izlemiştir.

Hilbert bilim dünyası üzerinde çok büyük bir etki yapmıştı. Onun geliştirdiği belitsel yaklaşım, özellikle Bourbaki'nin çalışmalarının katkısıyla, matematikte yaygın olarak kullanılmış, fizik ve iktisat dahil diğer bilim alanlarındaki araştırmacıların dikkatini çekmiştir. Belitsel yaklaşım iktisada üç değerli bilim insanının çalışmaları yoluyla kazandırılmıştır. Bunlar John von Neumann, Gerard Debreu ve Kenneth J. Arrow'dur. Gerard Debreu, Bourbaki'nin biçimsel belitsel yaklaşımını izleyerek Walras'gil genel denge kuramının biçimselleştirilmesi üzerinde çalışmış ve tutarlılığını göstermiştir. Von Neumann ve Arrow ise aynı yaklaşımı tamamen yeni iki araştırma alanını, sırasıyla oyun kuramı ve toplumsal tercih kuramı, geliştirmek için kullanmışlardır.

Belitsel yaklaşımı iktisatta kullanmalarının benzerliğine rağmen, von Neumann, bu yaklaşımın genelde bilim alanında kullanılmasına yönelttiği eleştirileriyle, Debreu ve Arrow'dan farklı konumda görülebilir. Von Neumann, iktisada belirtik biçimde gönderme yapmamakla birlikte, hem fizik alanında yaptığı çalışmalarda hem de yöntem konusundaki görüşlerinde, biçimsel belitsel yaklaşımın "matematiğin estetiğine" kapılma tehlikesine açık

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olduğu uyarısını yapmıştır. Von Neumann'ın bu konudaki çözümü matematiğin katı biçimselciliği ile bilimsel araştırma alanının gereksinimleri arasında belirtik ve etkin bir ödünleşim kurulmasıdır. Bunun bilim insanı ile matematikçi arasında güçlü bir işbirliği gerektirdiği açıktır.

Jel Kodları: B16, B23, B41, C02

Anahtar kelimeler: Belitsel yaklaşım, Debreu, biçimsel belitsel yaklaşım, von Neumann, esnek belitsel yaklaşım

THE AXIOMATIC APPROACH, ECONOMICS, AND Von NEUMANN'S CONCERNS

Abstract

The modern axiomatic approach was developed by David Hilbert, the prominent German mathematician of the last century, who first applied it to geometry and then to physics. His concept evolved over time, exhibiting considerable differences between its application in mathematics and in physics. Motivated by his deep interest in demonstrating the consistency of mathematics, Hilbert decided on pursuing the so-called "formalist axiomatic approach" for that field. However, realizing that this strict interpretation would not do for use in physics, Hilbert came up with a more relaxed scheme for the latter, which was later termed the "soft axiomatic approach."

Hilbert had an enormous influence on the scientific community, and his axiomatic approach was adopted widely throughout the mathematics community. This was notably due to Nicholas Bourbaki's work, which drew the attention of researchers involved in physics and other sciences, including economics. Economists learned of the axiomatic method through the publications of three distinguished scientists: John von Neumann, Gerard Debreu, and Kenneth J. Arrow. Following Bourbaki's formal axiomatic approach, Debreu aimed to formalize Walrasian general equilibrium theory and proved its consistency. Von Neumann and Arrow, on the other hand, used the same approach to develop completely new fields of research, i.e., game theory and social choice theory, respectively.

Despite the similarity of their applications of the axiomatic method to economics, von Neumann distinguishes himself from both Debreu and Arrow with his criticism of the axiomatic approach's use in science in general. Despite never having explicitly referred to economics, he warned of the vulnerability of the formalist axiomatic approach to capture by what he called the "aesthetics of mathematics." Von Neumann's solution was to introduce an explicit and effective trade-off between the strict formalism of the mathematical reasoning and the requirements of the scientific field of research. Obviously, this requires rather strong cooperation between the scientist and the mathematician.

JEL Codes: B16, B23, B41, C02

Keywords: Axiomatic approach, Debreu, formal axiomatic approach, von Neumann, soft axiomatic approach

1. Giriş

İktisatta yöntem açısından 1950'lerde köklü bir değişim yaşandı. Bu değişim iktisadın "biçimselleşmesi" [formalization], bir "matematiksel bilime [mathematical science] dönüşmesi" ya da "belitselleşmesi" [axiomatization] biçiminde başlıklar altında ele alınıyor. Üç farklı kavramın aynı olguyu ifade etmek için kullanılması ilk bakışta şaşırtıcı gelebilir. Biçimselleştirme matematiğin yanı sıra bilime, sanata, müziğe, edebiyata da uygulanabilen geniş bir kavram. Matematikselleşme ise ele alınan konunun matematik ile ifade edilmesi ve matematiksel düşünme yoluyla bazı sonuçlar türetilmesi çabası olarak tanımlanabilir. Belitselleşme ise, bir alanda kuramsal sonuçlar elde etmek için, aynı adı taşıyan düşünme yönteminin benimsenmesi demektir.

Kuşkusuz iktisatta 1950'lerde yaşanan köklü değişimi ele alan araştırmacılar bu kavramların farklı olduklarını biliyorlardı. Dolayısıyla bu üç kavramın aynı sorun bağlamında bir arada yaşaması bir rastlantı ya da hata olarak düşünülemez. Bu birliktelik bir tarihsel temelden kaynaklanıyordu. Sorunun kökeninde XIX. Yüzyılın sonlarında David Hilbert'in (d.1862- ö.1943) "*Matematiğin* temellerini *biçimsel belitsel* yöntem (formal axiomatic method) yoluyla ortaya çıkarma" çabası yatmaktadır.[1] Hilbert'in bu çalışması matematikte büyük yankı yapmış, sadece onu izleyenlerin değil Hilbert'in programını kısmen de olsa sekteye uğratan Kurt Gödel'in (d.1906-ö.1978) ünlü teoremleriyle de, mantık ve matematik alanlarında önemli gelişmelere yol açmıştır. 1950'lerde iktisatta yaşanan değişim, Hilbert'in bu katkılarının iktisada gecikmeli bir yansıması olarak düşünülebilir. Dolayısıyla, bu yansımayı değerlendirmeye yönelik çalışmaları yapanların, Hilbert'in bu üç kavramı yoğuran yaklaşımını önemli gördükleri boyutuna ağırlık vererek, kendi çalışmalarını adlandırdıklarını düşünmek daha doğru olur.

Bu yazıda "belitleştirme" vurgusunun öne çıkarılmasının nedenleri şöyle sayılabilir. Bir kere iktisatta matematik çok uzun süredir kullanılmaktadır.[2] "İktisatta matematik kullanmak" ile "iktisadı matematikselleştirmek" arasındaki sınırın bulanıklığı nedeniyle, bu kavram ile matematiğe yapılacak bir göndermenin iktisatta yaşanan değişimi yeterince açıklığa kavuşturamayacağı söylenebilir. İkinci neden ise Hilbert'in yöntemsel yaklaşımını iktisada ilk taşıyan kişi olan John von Neumann'ın (d.1903-ö.1957)[3] matematik dışındaki

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1 Hilbert'in belitsel yöntem anlayışı konusunda bkz. Corry (2006a).

2 İktisatta ilk matematiksel metin olarak Giovanni Ceva'nın 1711 de yayımlanan 60 sayfalık kitapçığı kabul edilmektedir. XIX yüzyılda, özellikle Marjinalist Okul içinde yer alan iktisatçılardan pek çoğu iyi matematik biliyor ve bu bilgilerini iktisat çalışmalarında kullanıyorlardı.

3 Macar asıllı olan von Neumann'ın doğumunda adı *Margittai Neumann János Lajos idi.*

bilimlerde (örneğin fizikte) belitselleşmeyi, biçimselleştirmeyi dışlayan bir yorumuyla benimsemiş olmasıdır. Bu noktada von Naumann'ın iktisat bağlamında yaptığı çalışmalarda biçimsel belitsel yaklaşımı uygulamış olduğunu dolayısıyla yöntem konusundaki bu genel tutumu ile çelişki yarattığını belirtmek gerekir. Ancak von Neumann'ın, Debreu gibi iktisat kuramına ilişkin tartışmalarda bulanıklık ve özensizlikten şikâyetçi olduğu, bu nedenle de öncelikle bu sorunları ele almaya yöneldiği düşünülebilir. von Neumann'ın iktisada ve hatta toplumsal bilimlere en önemli katkısı olarak kabul edilen *Oyun Kuramı* biçimsel belitsel yöntemin en başarılı uygulamalarından birisidir. von Neumann ve Morgenstern (1944).

Öte yandan, Hilbert'in çalışmalarının iktisada etkisine bakıldığında von Neumann'ın, çok önemli olmakla birlikte, tek kanal oluşturmadığı da söylenebilir. Bu bağlamda en az onun kadar önemli ikinci kişi Gerard Debreu'dur. Debreu'nun Hilbert'ten etkilenmesi von Neumann kadar doğrudan ve çok yönlü olmamıştır.[4] Debreu, Ecole Normale Superior'da Henri Cartan'ın öğrencisi olmuştu. Bourbaki grubunun[5] bir üyesi olan Cartan'dan çok etkilendiği anlaşılan Debreu, söz konusu grubun matematik ve belitsel yöntem anlayışını benimsemişti.

Bourbaki'nin matematik dünyasında ve matematik eğitimindeki etkisi çok büyük oldu. Modern matematik büyük ölçüde onun açtığı yoldan ilerledi. Ancak, Bourbaki'nin matematik dışı alanlarla hiç ilgilenmediğinin de altını çizmek gerekir. Dolayısıyla Debreu'nun katkısı Bourbaki'nin benimsediği belitsel yaklaşımı alıp iktisada uygulamış olmasına indirgenemez. Debreu, bu yöntemin iktisat gibi bir alanda nasıl kullanılabileceği ve neler katabileceği üzerinde dikkatle düşünmüş ve kendi geliştirdiği çizgide ilerlemiştir.

İktisatta belitsel yöntemin kullanılması konusunda üçüncü öncü isim Kenneth J. Arrow'dur. Arrow bu üç öncü arasında, deyim yerindeyse, "en iktisatçı" olandır. İlgilendiği sorunları hep iktisat/toplumsal bilim alanından

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[4] Von Neumann, Hilbert'in bir süre asistanı olmuştu ve onun matematiğe katkıları çerçevesinde küme kuramının belitselleştirilmesi, matematiğin temelleri gibi konularda çok önemli katkılar yapmıştı. Öte yandan von Neumann, Hilbert gibi, niceysel işleybilim (quantum mechanics) alanında çalışmış, bu alanın matematikselleşmesi yönünde köklü adımlar atmasını sağlamıştı; von Neumann (1932 [1955]).

[5] Bourbaki grubunun kısa öyküsü ise şöyle özetlenebilir: 1930'larda Nicholas Bourbaki (1934-?) takma adı altında toplanan bir grup matematikçi matematiğin büyük bir kısmını belitsel temele oturtmaya ve bu anlamda birörnekleştirmeye yönelik devasa bir projeyi başlatmışlardı. 1934 yılında ilk toplantısını yapan grup, 1939'da *Éléments de Mathématique* adlı dizinin ilk kitabını yayımladı. Grubun çalışmaları üyelerinin farklılaşmasına rağmen (grubun kurallarına göre 50 yaşına gelen her üye ayrılmak zorundaydı) devam etti. Bourbaki'nin son kitabı 1998'de yayımlandı.

seçmiş, varsayımlarını ve akıl yürütmesini iktisadın gerekleri doğrultusunda yapmıştır. Arrow'un herkesçe takdir edilen, örneğin Feiwell (1987, Robert J. Aumann ile söyleşi bölümü), sağlam matematik bilgisi onun matematikteki gelişmeleri yakından izleyebilmesine ve iktisat açısından gerekli gördüğü konularda matematiğe katkı yapmasına olanak sağlamıştır. Arrow'un belitsel yöntem konusunda bilgi sahibi olması, büyük ölçüde kendisinin gençliğinde matematiksel mantığa duyduğu ilgiden kaynaklanmış görünmektedir. Ancak, Arrow öğrenciliğinde bu açıdan önemli bir şansa sahip olmuş, Polonya'lı büyük mantıkçı Alfred Tarski'den (d.1901-ö.1983) ders almış ve onun ilgisini çekmiştir. Tarski bunun üzerine ünlü mantık kitabının, Tarski (1941), İngilizce ilk basımının editörlüğünü yapmasını Arrow'dan rica etmişti.

Sağlam bir matematik/mantık bilgisinin yanı sıra geniş bir ilgi alanı olan Arrow, iktisadın ve buradan hareketle diğer toplumsal bilimlerin pek çok alanına önemli katkılar yapmıştır. Belitsel yöntem kullanımı bağlamında yaptığı iki önemli katkıdan ilki, Walras'gil rekabetçi genel denge modelinde dengenin varlığı ve Pareto anlamında etkin olduğunun kanıtlamasıdır. Arrow (1951a), Arrow ve Debreu (1954).[6]

Arrow'un ikinci katkısı ise ilkinden nitelik olarak farklıdır. Arrow doktora tezinde Marquis de Condorcet'in (d.1743-ö.1794) ünlü karşıtlamından (paradox) hareketle bireysel tercihler ile toplumsal tercihler arasında tutarlı bir bağlantı kurulup kurulamayacağını araştırmıştır. Bu bağlamda ulaştığı ünlü *Arrow Olanaksızlık Teoremi*, daha sonra "toplumsal tercih kuramı" adı verilen yeni bir disiplinin doğmasına yol açmıştır.[7] Bu nedenle de Arrow'un bu katkı-

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[6] Arrow bu konunun hem belitsel yaklaşım ile özenli bir biçimde ele alınmasının yolunu açmış hem de eleştirisi konusunda da öncü olmuştur. Arrow'un ikinci başlık altında ele alınabilecek ilk yazısı Arrow (1952, [1964])dır. Bu yazının iktisatta belirsizlik, eksik (incomplete) piyasalar gibi daha sonra çok büyük önem kazanan alanların araştırılmasına öncülük ettiği söylenebilir. Öte yandan rekabetçi genel denge modelinin iktisada neler kazandırdığı ve sınırları üzerine durmuş, bu konudaki çalışmalarını Frank Hahn ile birlikte yazdıkları kitapta, Arrow ve Hahn (1971), ortaya koymuştur. Bu kitabın, rekabetçi genel denge modelinin sağlam bir eleştirel temele dayanılarak ele alındığı ve sınırlarının sorgulandığı ilk ve klasikleşmiş bir çalışma olduğu söylenebilir. Hemen aynı tarihte, bu çalışmadan bağımsız olarak Macar iktisatçısı Janos Kornai'nin de Walras'gil rekabetçi genel denge modelinin köklü eleştirisini yapan kitabını yayımlanmıştı. Kornai (1971). Bu çalışmalardan birkaç yıl sonra Türkiye'de Tuncer Bulutay'ın bu modelin dikkatli bir sunumunu ve eleştirisini içeren kitabını yayımlamış olduğunu vurgulamak gerekir, Bulutay (1979).

[7] Arrow bu katkısını önce Arrow (1950)'de, daha sonra da büyük ilgi çeken Arrow (1951b)'de kamuoyuna kazandırmıştır. 1963'de ikinci baskısı yapılan) bu klasik metin, Arrow (1963, toplumsal tercih kuramının kurucu başyapıtı olarak kabul edilmektedir. Arrow olanaksızlık teoremi daha sonra da iktisat, siyaset bilimi, matematik, mantık ve felsefe gibi alanlarda pek çok araştırmacının ilgisini çekmiştir. Bu konuyu kapsamlı bir biçimde ele alan klasikleşmiş bir başka yapıt Sen (1970)'dir. Yakın yıllardaki gelişmeleri de kapsayacak bi-

sıyla von Neumann gibi yeni bir alanı temellendirmede biçimsel belitsel yöntemden yararlandığı söylenebilir.

Bu açıdan bakıldığında Debreu'nun iktisatta biçimsel belitsel yaklaşımı kullanması von Neumann ve Arrow'dan farklılık göstermektedir. Von Neumann ve Arrow biçimsel belitsel yaklaşımı uygulamak yoluyla önemli katkılarını yaparken yeni disiplinlerin (oyun kuramı ve toplumsal seçme kuramı) temellerini atıyorlardı. Bu nedenle onlar biçimselleştirmeyi yaparken, bu disiplinlerin gereksinmeleri doğrultusunda hareket ediyor ve dolayısıyla Debreu'ya oranla daha özgürce varsayımlarını seçebiliyorlardı. Oysa Debreu Walras'gil rekabetçi genel denge, karar ve fayda kuramları bağlamında önemli katkılarını yaparken bu alanların tarihçelerinden gelen kısıtları ve yönlendirmeleri hesaba katmak zorundaydı. Bu ifade Debreu'nun bunlara tümüyle bağlı kaldığı ve dolayısıyla orijinal bir katkısı olmadığı anlamına kesinlikle gelmemekte, tersine bu onun daha çapraşık bir yolu izlemeyi göze alarak, bir anlamda, daha cesur bir maceraya atılmış olduğunu göstermektedir.[8]

Belitsel yöntem hiçbir zaman iktisadın tek yöntemi konumuna gelmemiştir. İktisadın ele aldığı farklı sorunlar göz önüne alındığında bu doğal karşılanabilir. Burada şaşırtıcı olan bu yöntemin, belki de Debreu'nun tahmin ettiğinden fazla, iktisat alanında etki yaratmasıdır. Bu etki kendisini iki kanaldan göstermiştir. Bunlardan ilki, bu yöntemi kullanarak yapılan çalışmaların, belli alanlarda toplanmakla birlikte, artmasıdır.[9] İkinci etki kanalı ise iktisadın bu yöntemin vurguladığı açıklık (clarity), özenlilik (rigor) ve mantıksal tutarlılık gibi ölçütleri eskiye oranla çok daha fazla benimsemiş olmasıdır. Nitekim iktisat alanyazınının son 50 yılına bakıldığında bu ölçütler açısından daha önceye oranla çok daha dikkatli olunduğu görülür.

2. Belitsel Yaklaşım (Axiomatic Approach)

Belitsel yöntem bir bilimsel kuramın belit olarak adlandırılan bazı başlangıç (primitive) varsayımları[10] ile temellendirilmesi ve kurama ilişkin diğer teo-

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çimde bu konuyu ele alan önemli bir kaynak Maskin ve Sen (2014)'dir. Toplumsal tercih kuramı zaman içinde daha da gelişmiş ve kendi başına bir çalışma alanı oluşturmuştur. Bu konuda yakın yıllarda yapılan katkılara örnek olarak Aleskerov (1999) ve konuyu tarayan çok değerli bir derleme olan Arrow, Sen ve Suzumura (2002 ve 2011) verilebilir.

8 Bu yazının ilk taslağında bu noktayı yanlış ifade ettiğimi saptayarak beni uyaran Sayın Kemal Yıldız'a teşekkür borçluyum.

9 Bu konuda iktisat alanında XXI. yüzyıl başına kadar yapılan çalışmaları tarayan bir kaynak olarak bkz. Thomson (2001).

10 Bir sonucu kanıtlayabilmek için başka kanıtlanmış bilgilerin kullanılması gerekir. Böyle olunca da kanıtlama "sonuz geriye giden" bir sürece dönüşmektedir (infinite regress). Bu so-

remlerin bu belitlerin mantıksal sonuçları olarak türetilmesi yoluyla oluşturulması demektir. Matematikte mantıksal olarak teoremler türetmek üzere belirlenen herhangi bir belit kümesi ve türetme kuralları/süreçlerinin bütününe *belitsel dizge* (system) adı verilir. Bir (matematiksel) *kuram* da bir belitsel dizge ve bundan türetilen tüm teoremlerin bütünüdür. Belitsel dizgelerde aşağıdaki özelliklerin sağlanması istenir:

i) Bağımsızlık (independence): Bir belitsel dizgenin hiçbir belitinin diğerlerinden türetilmiş bir teorem olmadığı durumdur.

ii) Tutarlılık (consistency) : Bir belitsel dizgenin çelişkisiz olması demektir. Burada çelişkisizlik bir dizgeden hem bir önerme hem de onun *olumsuzunun* (negation) türetilememesi olarak tanımlanır.

iii) Tamlık (completeness): Her önerme ya da onun olumsuzunun dizgeden türetilmesidir.

Belitsel yaklaşımın tarihçesi M.Ö. IV. yüzyıla kadar uzanır. Bu bağlamda akla gelen ilk isim *Euklides* (Öklid) (d.M.Ö. 330-ö.M.Ö. 275) olsa da, bu yöntemin ondan önce Yunanlı düşünürler tarafından bilindiği ve tartışıldığı anlaşılmaktadır. Örneğin Aristotoles (d.M.Ö. 384-ö.M.Ö. 322), *Analytica Posteriora* adlı kitabında bu yöntemin ana fikirlerini tartışmıştı. Buna karşılık, Euklides'in *Elements* adlı yapıtı, belitsel yöntemin ilk önemli uygulaması olarak öne çıkmaktadır.[11]

Çağdaş belitsel yaklaşım anlayışını geliştiren ve biçimlendiren ise David Hilbert'dir. Hilbert 1899'da yayımlanan *Grundlagen der Geometrie* [Geometrinin Temelleri], adlı kitabında Euklides'gil geometrinin modern belitsel temellerini atmıştır, (Hilbert, 1899 [1950]). Hilbert'in bu katkısının önemini artıran bir unsur da onun belitsel yöntemin matematik dışında her bilimsel çalışma için geçerli olduğuna olan inancı ve bu inancını fizik alanındaki çalışmalarıyla desteklemiş olmasıydı.[12]

Matematiği yapısal bir çerçeve içine oturtmak isteyen Hilbert, ve onu bu anlamda izleyen Bourbaki belitsel yönteme dayanmışlardır. Bu yaklaşımda matematik bazı yapılardan (örneğin kümeler) hareket edilmesi ve bunlar ara-

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runu çözebilmek için başvurulan bir yöntem bazı bilgilerin kanıtlanmalarına gerek olmaksızın doğru kabul edilmesidir. Bu tür bilgilere *belit* (başlangıç varsayım) adı verilir.

[11] Euklides öncesi dönemde belitsel yöntemin gelişmesine katkı yapanlar sayıldığında Thales, Phytogoras ve, matematikçi olmamasına rağmen, özellikle Aristotoles'in adları öne çıkmaktadır. Ancak, elde bilgiler bu yöntemi kimin ilk defa ortaya attığını saptamaya yeterli görünmemektedir. Bu konuda Bkz. Eves (1997, s. 1-25 ve 29-32).

[12] Hilbert, olgunlaşmış fiziğin bir matematiksel bilim olduğu görüşünü savunuyordu. Hilbert'in fizik alanındaki çalışmalarının değerlendirilmesi için Bkz. Corry (2004 ve 2006b).

sındaki bağıntıların belitsel yöntem yoluyla incelenmesi hedeflenmiştir. Başka bir deyişle, belitsel yöntem, yapılarla ilgili önermelerin değil, yapıların kendilerinin belitselleştirilmesine odaklanmıştır. Hintikka (2011, s. 70).

Bu çerçeve içinde belitsel yaklaşımın aşağıdaki aşamalardan oluştuğu söylenebilir. Debreu (1986, s. 1265):

1) Bazı başlangıç kavramlarının (primitive concepts) belirlenmesi ve bunların birer matematiksel nesne ile temsil edilmesi. Bu araştırmacının üstlendiği bir çabadır. Kendi amacına uygun olarak bunları belirler. İlkel kavramların belli bir anlamı olmayabilir ya da bunlar bulanık bir biçimde tanımlanmış olabilirler. Ancak yine de onları matematiksel nesnelerle ilişkilendirmek olanaklıdır. Örneğin Debreu mal kavramını uzun uzun tanımlayıp, neyin mal olduğunu anlatmamakta, buna rağmen buradan hareketle tüketimi mal uzayının bir alt kümesi (belit) olarak tanımlamaktadır.

2) İlkel kavramları temsil eden matematiksel nesnelere ilişkin varsayımların ortaya konulması ve bunun sonuçlarının matematiksel yolla türetilmesi, başka bir deyişle kanıtlanması (proof). Bu aşamada yapılan işlemlerde eldeki matematiksel yapıyla ilgilenilmekte, bunun içeriğiyle uğraşılmamaktadır. Örneğin tüketim kümesinin n-boyutlu Öklid uzayının bir dışbükey alt kümesi olmasının sonuçları (teoremler) tüketimin niteliğinden tümüyle bağımsızdır.

3) Son aşamada ise ulaşılan sonuçların yorumlanması söz konusudur. Matematiksel yapılar söz konusu olduğunda bir teoremin kanıtlanması bir son değildir. Poincare bu noktada ortaya konulan sonucun hangi yeni sorulara yol açtığı üzerinde durulması gerektiğini söylemektedir. Debreu de bilim alanında (iktisat) belitsel yaklaşımın uygulanması durumunda, ulaşılan sonuçların ele alınan konu bağlamında ne anlama geldiğinin bu aşamada tartışılması gerektiğini ısrarla vurgulamaktadır.[13]

Bu yaklaşıma sıkıca bağlanılarak sonuçlar türetilmesine Redei ve Stöltzner (2006) *"biçimsel belitsel yaklaşım"* (formal axiomatic approach) adını vermektedir. Genelde belitsel yaklaşım denildiğinde akla gelen bu anlayıştır. Matematik alanında Hilbert ve Bourbaki, iktisatta ise Debreu bu yaklaşımın önde gelen savunucuları olarak kabul edilebilir.

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[13] Debreu rekabetçi genel denge modelinin çözümü olduğuna ilişkin kanıtlamasına verilen tepkilerin farklılığının, olumlu bir biçimde, görüşünü desteklediğini söylemektedir. Ona göre bazı iktisatçılar siyasa (policy) önermelerini bu sonucun üzerine inşa ederken (ya da hiç olmazsa bunla ilişkilendirirken) diğerlerinin seçilen varsayımların kısıtlılığı nedeniyle bu kanıtlamanın piyasa ekonomilerini anlayabilmek için pek anlam taşımadığını savunmakta olmaları izlenen yöntemin bir zaafı değil, meziyetidir. Debreu (1986, s. 1266).

3. Belitsel Yaklaşımın Uygulanmasını Anlamaya Yönelik Bir Çerçeve

Bu alt bölümün amacı belitsel yaklaşım konusunda bir yenilik getirmek değil, nasıl çalıştığına ilişkin, yazının amacına uygun, basit bir çerçeve sunmaktır.

A) X_0 herhangi bir belit kümesi olsun. Bu kümenin bir belitsel dizgeyi tanımlayabilecek ölçüde zengin olduğunu ve tanım gereği tutarlılık, bağımsızlık ve tamlık koşullarını sağladığını düşünelim.

B) F, X_0 belit kümesinin kendi üzerinde yapılmasına izin verdiği tüm eşlemeleri (mapping) ifade etsin. Bu kümenin tipik öğesini f_j ile gösterelim. j=1,…,m olsun.

C) İlk aşamada sadece X_0 içinde yer alan belitler kullanılarak yeni sonuçlar elde edilmektedir. Bunun anlamı sadece belitlere dayanılarak bu sonuçların kanıtlanabileceğidir. Bu yolla elde edilen sonuçlara "birinci sıra teoremler" adını verelim. Bunların oluşturduğu kümeyi de X_1 ile ifade edelim. Öte yandan bu işlemin sonunda araştırmacının elinde hem belitler kümesi ve hem de birinci sıra teoremlerden oluşan bir bilgi kümesi oluşmuş olmaktadır. Bu durum aşağıdaki eşleme bağıntısı ile ifade edilebilir.

$$(X_1, X_0) = f_1 (X_0) \quad (1)$$

(1)'de verilen ifade iktisattaki bağlı üretim (joint production) modeline benzemektedir. X_0, f_1 yoluyla hem kendisini ve hem de X_1 kümesini beraberce üretmektedir. Bu aşamada ulaşılan yeni sonuçlar sadece belitlere dayanmaktaysa da buradaki sonuçlar belitlerden türetildiği için bağımsızlık koşulunu sağlamamaktadırlar. Bu nedenle de bunlara belit değil, "teorem" adı verilmektedir.

D) İkinci aşamada ise belit birinci sıra teoremlerin bazıları ile birlikte kullanılarak yeni sonuçlara ulaşılabilir.

$$(X_2, X_1, X_0) = f_2 (X_1, X_0) \quad (2)$$

E) Bu süreci devam ettirildiğinde n-inci sıradaki sonuç kümesi

$$(X_n, X_{n-1},\ldots,X_1, X_0) = f_n (X_{n-1}, X_{n-2},\ldots,X_1, X_0) \quad (3)$$

biçiminde elde edilir. Bu sonuçtan da anlaşılacağı üzere k'ıncı (k, n'den küçük bir doğal sayı) aşamadaki teoremler belitler ve tüm k-h'ıncı (Burada h, 0 ile k arasında yer alan bir doğal sayı) aşamalarda yer alan teoremlerin bir kısmı kullanılarak kanıtlanmıştır.

Bu çerçeveden hareketle belitsel yöntem hakkında yapılabilecek ilk gözlem bu yolla belitlerce oluşturulan çerçeve içinde sonuçlar elde edilebileceği,

bu yöntemin yeni bir şey icat etmek amacıyla kullanılamayacağıdır.[14] Nitekim f_j eşlemelerinin zincirleme kullanılması durumunda (3) aşağıdaki gibi ifade edilebilir:

$$(X_n, X_{n-1},\ldots,X_1, X_0) = f_n \bullet f_{n-1} \bullet f_{n-2} \bullet \ldots \bullet f_1 (X_0) \qquad (4)$$

Yani sonuç başta kabul edilen belitler tarafından tamamen belirlenmektedir. Bu özellik belitsel yöntem ile uğraşanlarca, başta Hilbert olmak üzere, hep vurgulanmıştır. Ancak bu belitsel yöntem ile hiçbir yeni bilgi elde edilemeyeceği anlamına da gelmemektedir. Tam tersine bu yöntem sadece belitlere bakılarak kolayca çıkarılamayacak sonuçların türetilmesine, ele alınan konunun zenginleştirilmesine, derinleşmesine ve bunların sonucunda yeni konulara açılım yapılmasına olanak sağlamaktadır. Unutulmaması gerekir ki bir alanda kanıtlanan bir teorem bir başka alanda, tekrar kanıtlanmaya gerek olmaksızın, belit olarak kullanılabilir.

Eğer her hangi bir k-ıncı sıradaki sonuç kümesi, x_k, bir boş küme ise, bir önceki sırada elde edilen sonuçlar, yani teoremler, x_{k-1}, bu belitsel dizge içinde bir işe yaramıyor demektir. Başka bir deyişle Poincare'nin dikkat çektiği önemli bir sorunla karşılaşılmıştır. Poincare, bir teoremin kanıtlanmasının sorunun sonu değil, başlangıcı olduğunu, araştırmacıların zihinlerinde yeni ufuklar açmayan bir teorem kanıtlamasının değeri olmadığını ifade etmişti.[15]

Burada akla gelen bir başka soru da bir belitsel çalışmanın yeni sonuçlara yol açma sürecinin kaçıncı sırada sona ereceğidir. Eğer kabul edilen belitler kümesi, güçlü bir taban ve sürecin işleyişini belirleyen zengin bir çözümlemesel (analytical) araç kümesini belirleyebiliyorsa bu yolla çok sayıda yeni sonuçlara ulaşılabilir. Dolayısıyla bu sürecin hangi aşamada sona ereceğini önceden kestirmek olanaklı değildir. Doğal olarak bu sürecin ne kadar süreceği zamanla da ölçülemez. Bir sonraki sıraya geçmek çok hızlı olabileceği gibi yıllar da alabilir.

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[14] Poincare bu noktayı sezgiciliğe pay çıkararak şöyle belirtiyor: *"Biz mantık yoluyla kanıtlarız ama sezgiyle keşfederiz"*.

[15] Erdal İnönü (d.1926-ö.2007), videosu izlenebilen bir toplantıda her zamanki şakacı tavrıyla ile şöyle bir anısını anlatmaktadır: *"Hocam Eugene Paul Wigner (1902-1995) ile yaptığımız bir ortak çalışmada bir teorem kanıtladık (İnönü-Wigner Büzülme Teoremi). Bir süre sonra bir araya gelip bu teoremin ne işe yaradığını araştırdık. Hiçbir şeye yaramadığını bulduk!"* Söz konusu teoreme yapılan göndermelerin çokluğu göz önüne alındığında bu ifadenin son cümlesinin şaka oluğu kolaylıkla anlaşılır. Aslında Erdal İnönü'nün dikkat çekmek istediği ikinci cümlesidir. İnönü ve Wigner, Poincare'nin önerisi çizgisinde kanıtladıkları teoremin ne gibi açılımlar getirebileceği üzerinde durmuş, kanıtı yapmış olmakla görevlerinin bittiğini düşünmemişlerdir.

Yukarıda belitsel yaklaşım yoluyla türetilen bir belitsel dizgenin bağımsızlık, tutarlılık, ve tamlık ölçütlerini sağlaması gerektiği belirtilmişti. Bağımsızlık ilkesi belitlerin herhangi bir bileşiminin yeni bir belit olmayacağı bunun ancak bir teorem olarak kabul edilebileceği anlamına gelir. Dikkatli bir araştırıcının bu hataya düşmemesi beklenir. Buna karşılık diğer iki belitin sağlanması bu kadar kolay değil hatta bazı durumlarda olanaksızdır.

Örneğin başta Hilbert olmak üzere bu konuyla uğraşan mantıkçıların ve matematikçilerin üzerinde duyarlıkla durdukları tutarlılık koşulunu sağlamayan dizgeler vardır. XX. Yüzyıl başlarında Rus mantıkçılar Nicolai Alexandrovich Vasil'ev (d.1880-ö.1940) 1910 yılında ve Ivan Efimovich Orlov (d.1886-ö.1936) ise 1929'da bu konuda öncü sayılabilecek çalışmalar yapmışlardı. Bu çalışmalardan bağımsız olarak Polonyalı mantıkçı Jan Lukasiewicz (d.1878-ö.1956) Aristoteles'in *Çelişmezlik İlkesi* konusundaki görüşlerini eleştirmiş, öğrencisi Stanislew Jaskowski (d.1906-ö.1965) ilk defa çelişkiyi kapsayan biçimsel bir sistem geliştirmişti. Bu alandaki çalışmalar özellikle Florencio Gonzales Asenjo (d.1926-ö.2013) ve Newton C. A. Da Costa Jr. (d.1929)'ın öncülüğünde Güney Amerika'lı felsefeci, mantıkçı ve matematikçilerin çabalarıyla giderek ilgi topladı ve bu konunun alan-yazını içinde yer almaya başladı.[16] Bu çabaları Peru'lu felsefeci Miró Quaseda *tutarlımsı mantık* (paraconsistent logic) olarak adlandırmıştı. Daha sonra bu isim dünya ölçüsünde benimsendi ve bu konuda pek çok ülkede araştırmalar yapılmaya başlandı. Bu yaklaşım çeşitli disiplinlerde de uygulama alanı buldu.[17]

Tamlık ölçütü de Hilbert'in düşünce dünyası açısından ciddi bir soruna yol açmıştı. Hilbert Programı adı verilen çalışmasının amaçlarından birisi, tüm klasik matematik için tutarlılık kanıtlaması yapılabileceği, başka bir deyişle, klasik matematiğin bir belitsel temele oturtulabileceği ve belitsel yöntem ile tüm matematiksel kanıtlamaların elde edilebileceğini göstermekti. Bu program matematik dünyasında derin yankılar yaptı. Bu yönde atılan ilk adımlar olarak Hilbert'in geometri, Wilhelm Ackerman (d.1896-ö.1962) ve John von Neumann'ın doğal sayılar ile ilgili kanıtlamaları izledi. Ancak von Neumann 1929'da benzer bir tutarlılık kanıtının küme kuramı için yapılabilirliğine ilişkin kaygısını dile getirdi. 1930 yılında ise Kurt Gödel (d.1906-ö.1978) Königsberg'de toplanan felsefe kongresine sunduğu tebliğinde bu yolun çıkmaz olduğunu ortaya koydu. Gödel, 1931 yılında makaleye dönüştürdüğü bu çalışmasında iki önemli sonucu ortaya koyuyordu: a) Yalın aritmetiği içeren herhangi bir belitsel dizge tutarlı ise tam değildir, tam ise tutarlı değildir ve

[16] Bu konuyu tarayan önemli bir kaynak için bkz. Priest, Koji ve Z. Weber (2015). Ayrıca Usó-Domènench vd. (2015, s. 2-6) bu konuda yararlı bir tarihçe vermektedir.

[17] İktisatta bu türde uygulamaya örnek olarak Dill, Da Costa Jr. ve Santos (2013) gösterilebilir.

b) Yalın aritmetiği içeren herhangi bir belitsel dizgenin tutarlığını söz konusu dizge içinde (onun kuralları kullanılarak) kanıtlamak olanaksızdır.[18]

Kolaylıkla tahmin edilebileceği üzere Gödel'in kanıtlaması büyük ilgi topladı. Gödel'in Köningsberg toplantısında sunduğu I. Teoreminin önemini ilk kavrayanlardan birisi von Neumann oldu. Toplantı sonrasında bu konuyla uğraşıp II. Teoremi ortaya attı ve kanıtladı. Bu sonucu Gödel'e gönderdi. Ancak Gödel de II. Teoremi bulmuştu. Bunun üzerine von Neumann kendi kanıtını bastırmaya kalkışmadı. Gödel'in ulaştığı sonuçlar, zaten uygulamaya yönelmekte olan von Neumann'ın, büyük bir olasılıkla, matematiği belitsel bir yapıya dayandırma projesinden uzaklaşmasına katkı yaptı.

XX. yüzyılın kalanında, her ne kadar Hilbert Programının gerçekleşemeyeceği konusunda genel kanı oluştuysa da bu durum Hilbert'in belitsel yöntem konusundaki katkılarının önemini etkilemiş değildi. Bu nedenle de Hilbert'in çizgisi bir yandan "kanıt kuramının" (proof theory) geliştirilmesine uzanırken, öte yandan da bilim alanında uygulanmaya devam etti.

4. Debreu'nun Belitsel Yöntem Anlayışı

Bu tartışmalar sonrasındaki dönemde aykırı sayılabilecek bir yaklaşım Bourbaki grubunca izlenmiştir. Bourbaki matematiği diğer bilim dallarından kesin olarak ayırmak ve bağımsızlığını oluşturmak düşüncesinden hareket ediyordu. Böylelikle mükemmel bir özen (rigor) ile matematiği tümüyle biçimlendirip, sağlam bir belitsel temele oturtarak bütünlük kazanmasına çalışıyordu. Bu çabayı sürdürmesi modern matematiğin kurgulanmasında Gödel Teoremlerinin önemli bir engel teşkil etmediğini düşündüklerini gösteriyor. Bu yaklaşımın doğru olup olmadığı tartışmalıdır. Ancak açık olan

[18] Bu teoremlerden ilkine göre tutarlı olarak kabul edilen bir dizge (örneğin matematik) ne doğruluğu ne de yanlışlığı kanıtlanamayacak en az bir önerme içerir. İkinci teorem ise bir dizgenin tutarlı olduğunu göstermek için kendi kuralları yetmez, mutlaka bir dış dayanak noktasına gerek vardır. Ancak ilk değinilen sorun bu noktayı da içeren daha geniş dizge için de geçerlidir. Bu durumda bir matematiksel kanıtın "ebedi doğru" sonuç verdiğinden söz edilemez. Dolayısıyla matematikle ifade edilebilen diğer yapılar (örneğin fizik, iktisat) aynı sorunla karşı karşıyadır.
Gödel'in yaşamı ve ünlü teoremleri için görece kolay anlaşılabilir kaynaklar olarak Casti ve DePauli (2000[2004]) ile Nagel ve Newman (2001) verilebilir. Holfstadter (1979 [2001]) Gödel'in teoremlerini farklı alanları kapsayacak biçimde ele alan düşündürücü ve hoş bir kitaptır. Bu teoremler konusunda daha derinlemesine bir çalışma için ise bkz. Smith (2013).

Boubaki'nin belitsel yaklaşımı uygulayarak matematik dışında herhangi bir bilim dalının biçimselleştirilmesi yönünde hiçbir çaba göstermediğidir.[19]

Debreu'nun iktisatta yapmak istediği Bourbaki'nin programından farklıydı. Nitekim Debreu Bourbaki'den etkilenmiş olduğunu gizlememekte birlikte kendi yaptıklarıyla bu grubun sorunsalı arasında dolaylı bile olsa bir sorumluluk bağıntısı kurmamaya dikkat etmiştir. Debreu'nun yaşamöyküsüne bakıldığında iktisatla ilgilenmeğe başladığında bu alandaki özenlilik eksikliği ve bulanıklıktan (lack of clarity) rahatsız olduğu anlaşılmaktadır. Debreu bu iki köklü sorunun çözümünün, ne yapıldığının anlaşılabilmesi için birincil önemde olduğunu düşünmekteydi. Dolayısıyla çalışmalarını bu yönde ilerletmiş ve Hilbert'in anlayışına uygun olarak "tutarlılığa" (consistency) çok önem vermişti.[20]

Debreu bu görüşü doğrultusunda Adam Smith'den beri tartışılan, XIX. yüzyılın ikinci yarısında, özellikle Leon Walras'ın katkılarıyla biçimlenen ve daha sonra da tartışılmaya devam eden rekabetçi ekonominin eşgüdüm (coordination) işlevini sağlayıp sağlayamayacağı sorununun çözümü ile ilgilenmişti. Eşgüdüm sorunun çözümü, basit anlamda, bütün piyasalarda istem ve sunumun eşitliğini sağlayacak, daha doğru bir deyişle "istem fazlasının" (excess demand) artı olmayacağı, bir denge fiyat kümesi olabileceğini göstermekten geçiyordu. Debreu'nun bu sorunu 1950lerin başında, Debreu (1951 ve 1952), ele almış ve daha sonra da bulgularını Arrow'unkilerle birleştirerek Walras'gil rekabetçi genel dengenin varlığını kanıtlamıştır. Arrow ve Debreu (1954). Debreu'nun bu alandaki en önemli yapıtı ise, hiç kuşkusuz, bu konuyu Walras'gil rekabetçi dengenin Pareto etkin olduğunu da eklediği klasikleşmiş kitabıdır, Debreu (1959). Debreu, bu çalışmalarıyla iktisatta belitsel yöntemin kullanılmasının en önemli ilk örneklerini sunmuştur.

Debreu bu yolculuğunda yalnız değildi. Yukarıda değinildiği üzere Arrow ile ortak bir yazı yazmıştı. Bunlar dışında hemen aynı yıllarda Lionel W. McKenzie (d.1919-ö.2010) de bu sonucu kanıtlayan yazısını yayımlandı.

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[19] Bourbaki'nin yaklaşımı konusunda bkz. Bourbaki (1950)), Mashaal (2006) ve Düppe (2015). Bourbaki'nin yaklaşımının eleştirisi için ise Mathias (1992) ve Velupillai (1992)'den yararlanılabilir.

[20] Debreu'nun içine kapalı kişiliğinin gizem kattığı yaşam öyküsü ve çalışmalarının değerlendirilmesi için bkz. Arrow (2011) ve Düppe ile Weintraub (2014, s.47-64). Weintraub'un Debreu'ya olan ilgisi Walras'gil rekabetçi genel denge modelinin tarihçesine ilişkin yaptığı kapsamlı çalışmalarla 1980lerin başına kadar uzanmaktadır. Kendisinin iktisadi yöntem bağlamında Debreu'yu ele alan çalışmalarına iyi bir örnek olarak Weintraub (2002, s. 101-154) gösterilebilir. Düppe'nin Debreu'ya olan ilgisi doktora tezi çalışmasıyla ilk ürününü vermiştir, Düppe (2009, s. 254-342). Kendisi, daha sonra, bu tez çalışmasından Debreu'nun iktisatta oynadığı rolü yorumlayan bir dizi makale yayımlamıştır. Düppe (2010, 2012a, 2012b).

McKenzie (1954). Daha sonraki yılarda bu konuda başka iktisatçılar (örneğin David Gale, Hukukane Nikaido) da benzer kanıtlar ortaya koydular. Daha sonra ise genellikle Arrow-Debreu modeli olarak bilinen bu yapıyı ele alan, genişleten çok sayıda çalışma ortaya çıktı.[21]

Bu öncü çalışmalar iktisatta "genel denge kuramı" başlığı altında bir alt dalın gelişmesine yol açtı. Bu çalışmalar iktisat alanı içinde belitsel yöntemin yerleşmesinde önemli bir rol oynadılar. Hatta bu yolla tüm iktisadın belitsel bir çerçeveye oturtulabileceği görüşü bile filizlenmeye başladı. Bekleneceği üzere bu görüşe karşı çıkanlar oldu. Bu çalışmaların bazıları iktisatta matematik kullanımına ilişkin eleştiriler getirirken, bir kısmı da genel denge kuramı adı verilen yaklaşımın uğraştığı konuların iktisadi açıdan geçerliliğini sorgulamıştır. Bu eleştirilerin bir kısmı iktisat kuramının gelişmesine ve yön arayışlarına katkı yaptı. Belitsel yöntemin iktisada uygulanmasına ilişkin eleştiriler arasında dikkati çekenlerin başında ise Clower (1995) ve Weintraub (1998) gelir. Her iki yazar da iktisatta yöntem konusundaki tartışmaların matematik kullanımına yönelmesini anlamlı bulmamakta, bunun yerine belitsel yöntemin iktisada kazandırdıkları ve sorunlarının değerlendirilmesinin gerektiğini savunmaktadırlar.

Debreu, uzun süre iktisatta benimsediği yöntemi (kısaca biçimsel belitsel yaklaşım ve bunun doğal sonucu olarak matematik kullanımı) kendi çalışmaları ve çevresi dışına yaymak için özel bir çaba harcamadı. Bunun yararını çalışmalarıyla göstermekle yetindi. Debreu bu suskunluğunu Nobel iktisat ödülünü aldığı 1983 yılından sonra terk etti ve ne yapmak istediğini açık bir dille tartışan bir dizi yazı yayımladı.[22]

Bu yazılardan da anlaşılacağı üzere Debreu, yukarıda birinci bölümde özetlenen "biçimsel belitsel yaklaşımı" temel almıştı. Bu önerisi ile tutarlı olarak Debreu'ya göre iktisatta bir kuramsal çalışma her şeyden önce özenli (rigorous) ve tutarlı olmalı, ayrıca ulaştığı sonuçların nasıl elde edildiği de açık (clear) bir biçimde ortaya koyabilmeliydi. Bu akla yakın koşulların sağlanabilmesi için ise Debreu belitler ortaya konulduktan sonra ortaya çıkan yapılar arasındaki bağıntıların belirlenmesini, bu belitlerin içeriklerinden tamamen ayrı bir uzayda tanımlıyordu. Ona göre biçim ile içerik bu biçimde ayrıldığı takdirde

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[21] McKenzie'nin kanıtlamasının Arrow ve Debreu (1954) ile aynı zamanda olmasına rağmen, adının ihmal edilerek, konunun Arrow-Debreu modeli olarak anılmasının eleştirisi için bkz. Düppe ve Weintraub (2014) ve Weintraub (2011). Walras'gil genel dengenin varlığını gösteren çalışmaların değerlendirilmesi için ise bkz. Weintraub (1983, 1985).

[22] Debreu'nun, ele aldığı konular itibariyle, kısmen örtüşen bu yazıları tarih sırasıyla Debreu (1983, 1986, 1991).

mantık/matematik kuralları uygulanarak "doğru" sonuçlara (teoremlere) ulaşılabilirdi.

Debreu'nun bu ifadesi iki önemli noktayı içermektedir. Bunlardan ilki, Debreu'nun Bourbaki'yi izleyerek, matematiksel kanıtlama yoluyla elde edilen sonuçların "ebedi doğrular" olduğunu kabul etmesidir.[23] Bu görüşün Gödel'in teoremleri ışığında sağlamlığı kuşkuludur. İkinci nokta ise uygulamada önem kazanmaktadır. O da belitsel yöntemin ikinci aşamasında, yani sonuçların türetilmesinde, içeriğin değil biçimsel yapılar arasında olabilecek ilişkilerin ele alınmasıdır. Bu söz konusu aşamada iktisatçının değil matematikçinin olayı sahiplenmesi anlamına gelmektedir. Bu nokta ise von Neumann'ın belitsel yöntemin bilimde uygulanmasına yönelttiği temel itirazın kaynağıdır.

5. von Neumann'ın [Belitsel Yönteme İlişkin] Kaygıları

von Neumann bilimsel yaşamına adımını attığından itibaren Hilbert'in geliştirdiği belitsel yöntemle tanışmış, bu yöntemi büyük bir titizlikle kullanarak saf matematiğe (özellikle küme kuramına) önemli katkılar yapmıştı. Daha sonra kendi başına yaptığı fiziğin (özellikle niceysel işleybilimin) matematikselleşmesi yönündeki çalışmalarını 1926'da David Hilbert ve Lothar Wolfgang Nordheim (1899-1985) ile ortak yazdıkları bir yazıda birleştirmiştir. Bu yazı, belitsel yöntemin matematik dışında bir bilim alanında kullanılmasına ilişkin sorunları da ortaya koyduğu için ayrıca önem taşımaktadır. Nitekim bu yazıda biçimsel belitsel yöntemin matematik dışında bir bilim alanında doğrudan kullanılması eleştirilmekte ve sonradan *"fırsatçı"* (von Neumann'ın kendi deyimidir) *esnek (soft) belitsellik* olarak adlandırılan yaklaşım izlenmektedir.[24]

von Neumann, bilim alanında belitsel yönteme ilişkin kaygılarını,[25] özünde, fizik bağlamında ortaya koymuştur. Bunu değerlendirirken iki noktaya dikkat etmek gerekir. Bunlardan ilki von Neumann'ın biçimsel belitsel yöntemin fiziğe uygulanabilirliği konusundaki eleştirilerinde yalnız olmadığıdır. Herman Weyl (d.1885-ö.1955), Richard Feynman (d.1918-ö.1988) gibi ünlü matematiksel fizikçiler de, von Neumann gibi, fiziğin belitsel yöntemin uy-

[23] Matematikte ebedi doğru ve bu konuda Bourbaki'nin anlayışı için bkz. Corry (1997).

[24] von Neumann'ın yaklaşımının bu deyimle nitelendirilmesi için bkz. Redéi ve Stölzner (2006).

[25] von Neumann'ın bilimsel yöntem konusundaki görüşleri çeşitli yazılarına dağılmıştır. Matematik ve bilimsel çalışmada matematikçinin rolü konusundaki görüşleri ise etraflı olarak von Neumann (1947)de tartışılmaktadır. Von Neumann'ın bilimsel yöntem anlayışı konusunda ise Redei ve Stöltzner (2006), Köhegyi (2013) ve özellikle Rashid (2007)'ye başvurulabilir.

gulanmasına olanak sağlayacak ölçüde gelişmediğini, bunun için gerekli olan belitleri türetebilecek düzeye varmadığını savunmuşlardır. İkinci nokta ise von Neumann'ın iktisadı bu açıdan fizikten de geri görmesidir. Von Neumann, iktisadın fiziğe öykünerek matematikselleştiği, dolayısıyla aynı hataları fazlasıyla yaptığı kanısındaydı.[26] Ona göre XX. Yüzyılın ilk yarısındaki iktisatçılar büyük ölçüde XIX. yüzyıl fiziğinin (ve matematiğinin) onlara açtığı (ya da açtığını sandıkları) yolda ilerlemeye çalışıyorlardı. Karşılaştıkları sorun ise özde fizikçilerle aynı, ama daha ağırdı. İktisadın belit olarak kabul edebileceği başlangıç noktaları yetersizdi.

von Neumann'ın iktisada yaptığı iki çok önemli katkı, bir anlamda bu anlayışının sonucudur. Bunlardan ilki 1930larda geliştirdiği genel denge modelidir. Bu modelde von Neumann hâkim Walrasgil anlayışın dışına çıkmış, kendi belitlerini ortaya koyarak büyüyen çok kesimli ekonominin genel dengesinin varlığını göstermiştir.[27] Von Neumann'ın iktisada ikinci ve çok daha önemli katkısı hiç kuşkusuz "oyun kuramıdır". von Neumann bu katkıyı yaparken iktisadı (ve diğer karar alma sorunlarıyla ilgilenen bilimleri) genişleten yeni bir disiplinin temelini atmıştır. Bu açılım ona belitlerini serbestçe seçme özgürlüğü kazandırmış, bu da onun biçimsel belitsel yaklaşımı uygulamasını olanaklı kılmıştır.[28]

von Neumann'ın bu uygulamaları ilk bakışta biçimsel belitsel yönteme ilişkin kaygılarıyla çelişiyor gibi görünmektedir. Ancak, kendi ilginç kişiliği ve konumu göz önüne alındığında böyle olmayabileceği de düşünülebilir. von Neumann belitsel yöntemin uygulanmasında sonuçlara giden yolun matematikçinin dünyasına emanet edilmesine karşı çıkıyordu. Kendi zarif benzetme-

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[26] von Neumann'ın özde XIX. yüzyıl ve XX. yüzyılın ilk yarısında öne çıkan neoklâsik iktisatçılara yöneltmiştir. Ancak bu eleştiri, fizik ile matematik arasındaki farkı belitselleşmeye yatkınlık derecesine indirgediği biçiminde anlaşılırsa eksiktir. Richard Feynman'ın derslerinde söylediği gibi fiziğin bir başka ilginç tarafı "tarih" boyutunun olmamasıdır. Oysa iktisatta tarih boyutunun önemini vurgulayan önemli okullar vardır. Nitekim bu olguya dikkati çeken Joan Robinson yazılarında "tarihsel zaman" ile "mantıksal zaman" ayrımını yapmış ve Neoklâsik yaklaşımın fiziği izleyerek ikinci kavramı seçip tarih boyutunu dışladığı eleştirisini gündeme getirmişti, Robinson (1978). Bu yaklaşımda zaman değişkeni, fizikte olduğu gibi tarihlenmeden kullanılmaktaydı. Dolayısı ile mantıksal zaman anlayışında iki zaman noktası arasındaki sistemde oluşan fark tarihe bağlı olarak değişmiyordu. Robinson ve onun gibi düşünenler ise iktisadi olayların tarih içinde oluşmaları nedeniyle bu özelliği göstermelerinin mümkün olmadığını savunuyorlar.

[27] von Neumann'ın bu çalışması için bakınız von Neumann (1937 [1945/6]. Bu model daha sonra pek çok iktisatçının ilgisini çekmiş ve iktisatta seçkin bir konum elde etmiştir.

[28] von Neumann oyun kuramını ilk kez von Neumann (1928)'de ortaya koymuştur. İktisatta (hatta toplumsal bilimlerde) büyük yankı yapan ünlü kitabını ise Oscar Morgenstern ile birlikte yazmıştır. von Neumann ve Morgenstern (1944). Bu alan daha sonra çok gelişmiş başta iktisat olmak üzere yaygın bir uygulama alanı bulmuştur.

siyle bu alanda "matematiğin estetiğine kapılma" tehlikesi yüksekti. Başka bir değişle matematik açısından ilginç ama ilgili bilim alanı açısından o kadar ilginç olmayan sonuçlara yönelme olasılığı mevcuttu. von Neumann'a göre, biçimsel belitsel yönteme sarılan bir bilim adamının kendi alanının sorunlarının önceliklerinden uzaklaşıp matematiğin derinliklerinde kaybolması söz konusu olabilirdi. Kendi çalışmalarında bu tehlikeyi iki nedenle görmüyordu. Bunlardan ilki matematiğin estetiğine kapılmayacak kadar büyük bir matematikçiydi. İkincisi ise, oyun kuramı konusundaki çalışmalarını Oscar Morgenstern gibi önemli bir iktisatçıyla birlikte kitaplaştırmıştı. Böylece çalışmada sadece iktisadi açıdan önemli konuların ele alınması bir iktisatçının gözüyle de irdelenmişti. Öte yandan von Neumann iktisat alanında özen ve açıklık eksikliğinin önemli olduğu konusunda Debreu'ya çok yaklaşıyordu. Bu nedenle iktisattaki iki önemli katkısı, niceysel fizik alanındaki çalışmalarında izlediği "esnek betimsel yönteme" değil "biçimsel betimsel yönteme" dayanıyordu.

von Neumann bilim adamlarının, kendisi gibi büyük birer matematikçi olmaları gerektiğini düşünmüyordu. Ama matematiğin bilimde çok işe yaradığı kanısındaydı. Hatta bunu kendi deneyiminin ışığında şöyle ifade etmişti: *"matematik tutarlı olmayabilir ama bilimde çok işe yarıyor"*. von Neumann'ın bu sorundan kurtulmak için bulduğu çözüm matematikçinin kendi alanından taviz vermesi, yani onun deyimiyle "fırsatçı" davranmasıydı. Bu yolla akıl yürütme sürecinin sahibi ve yönlendiricisi o bilim dalının uzmanı olacak, matematikçi ona ayak uyduracaktı. Dolayısıyla bilim alanında bir teorem, matematiksel mükemmeliyetiyle değil o alana getirdiği yeniliklerle değerlendirilecekti.

von Neumann'ın bilim alanında belitsel yöntemin uygulanması konusunda bir başka kaygısı ise bilim insanlarının düşünme biçiminin bu yöntemin mantıksal akış yolundan farklı olmasıydı. Belitsel yöntem belitlerin seçilmesi, bunlardan matematiksel ya da mantıksal yöntemlerle teoremlerin türetilmesi ve ulaşılan sonuçların yorumlanması yolunun izlenmesini öneriyordu. Bilim insanları ise önce bir sorun tasarlıyor sonra bunu hangi araçlarla ele alacağını belirliyor, en sonra da bu çizginin başarısı için hangi belitlerin gerekli olduğu üzerinde duruyorlardı. Yani Hilbert'ten farklı olarak belitlerin analitik araçları belirlemesi değil bunun tersi söz konusu oluyordu. Bu durumda da Hilbert'in ortaya attığı ve Debreu'nun vurguladığı içerik ile biçimi ayrık tutma yaklaşımı geçerliğini yitiriyordu.

6. Bitirirken

Belitsel yöntemin en önemli özelliği bilimsel araştırmada çok gerekli olan açıklılık, özenlilik ve tutarlılık ölçütlerinin sağladığı avantajlardır. Bu nedenle, matematik ötesinde çeşitli bilim alanlarında, bu arada iktisatta, oldukça yaygın uygulama alanı bulmuştur. Belitsel yöntem bağlamında dikkat edilmesi gereken bazı noktalar ortaya çıkmaktadır. Bunların başında bu yöntemi uygulayabilecek zenginlikte belitlerin ortaya konulabilmesi gelmektedir. Bunun değerlendirmesi zordur ve seçimin o alanın uzmanlarınca yapılması gerekir. von Neumann, Richard Feynman gibi, fiziğin bile bu zenginlikten mahrum olduğunu düşünüyor iktisadı ise bu açıdan fiziğin de gerisine yerleştiriyordu. Bu nedenle kendisi bir bilim alanının tümünü kapsayacak bir biçimselleştirme çabasına kakışmamış, iyi tanımlanmış dar alanlarda belitsel yöntemi uygulayarak oluşturduğu "modellerle" sınırlı amaçlı sonuçlara varmayı hedeflemiştir. İkincisi belitlerden sonuçlara giden yol mekanik bir matematik uygulaması değildir. Bu yolda hem düşünme araçlarının (matematik, mantık) doğru kullanılması hem de, söz konusu bilim alanının amaçlarına yönelimin sağlanması gerekir. Bunun bir bakıma disiplinler arası yaklaşımın önemini vurgulayan bir yaklaşım olduğu söylenebilir.

Belitsel yöntemin en başarılı kullanımı matematik kullanımından geçmektedir. Ama bu gerekli değildir. Sağlıklı mantık yürütme ile sonuca varılabildiği durumlarda matematiğe başvurulmadan da belitsel yöntem uygulanabilir. Ancak itiraf etmek gerekir ki, bilimdeki gelişmelerin ışığında matematikten yararlanmak her geçen gün biraz daha gerekli olmaktadır.

Son olarak, belitsel yöntemin bilim alanında yepyeni sonuçlar bulmak için tasarlanmadığı unutulmamalıdır. Belitsel yöntem kabul edilen belitler arasında, kolayca görülemeyecek bağıntıları ortaya çıkarmaya ve bunun sonuçlarını ortaya koymaya yarar.

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THE POLITICAL ECONOMY OF STRUCTURAL REFORMS*

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Abstract

Do economic structural reforms have electoral consequences? This paper studies whether voters reward or punish governments for introducing structural economic reforms. Drawing on data from a sample of 122 democratic countries over the 1975-2006 period, I note—at first glance—that no significant relationship can be discerned between the probability of a government's being voted out of office and its having put in place economic reforms in the areas of international trade, product markets, and domestic finance. However, such reforms do appear to have an impact on the outcome of subsequent elections, but to varying degrees, based on the factors of macroeconomic stability, institutional development, and a wise sequencing of proposed reforms. In other words, voters will tend to reward reformist governments if macroeconomic stability is attained, a certain threshold level of institutional quality is achieved, and an optimal sequencing of structural reforms is followed.

JEL Codes: D72, E02, O16, O24

Keywords: Elections, Structural Reforms-Trade, Current Account, Agriculture, Networks, Capital Account, Domestic Finance-Institutions.

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1. Introduction

The last quarter of the twentieth century was witness to substantial economic-reform efforts undertaken by both developed and developing countries. The rationale behind the idea of removing rigidities in markets was that they not only distorted the overall economy and hindered the efficient allocation of its resources, but they also impeded economic growth. However, in spite of the voluminous literature on the growth effects of structural reforms, there has been very little empirical work addressing the political consequences associated with them. Given the concerns about the success and sustainability of structural reforms, a natural question arises as to whether or not reforms help incumbent governments to boost their re-election prospects. The answer to this question might have important political repercussions; in particular, the reluctance of a government to implement reforms to achieve certain economic outcomes for fear of losing the next election.

A priori, it is not obvious whether voters reward or punish governments for their reform activism. Existing literature suggests that structural reforms foster growth in the long-run.[1] If this is the case, rational voters should show their appreciation by keeping governments in power, as they expect that their economic welfare will improve. However, for the question at hand, the short-run impacts of reforms are more likely to matter rather than the long-run ones. Despite the long-term gains, reforms could bear high costs in the short term for many reasons. More importantly, individuals are more likely to make political decisions based on the distribution of the gains and losses caused by economic policies instead of aggregate welfare. For instance, due to the uncertainty about the distribution of costs and benefits, voters may opt to block an efficiency-enhancing reform (Fernandez and Rodrik, 1991), or such a reform may be delayed because of a war of attrition between conflicting groups (Alesina and Drazen, 1991).

This study seeks to assess the effect of structural reforms on the probability of a change in government, a subject which has hitherto been neglected in the literature. Accordingly, the main purpose of this paper is to bring into focus the role played by structural reforms in determining election outcomes. It aims to explain how reforms shape political stability and under which conditions reforms pay off for incumbent governments. I first argue that, on average, governments, by eliminating rigidities in their markets, cannot significantly affect their likelihood of re-election. More importantly, I discover that the

[1] See, among others, Aksoy (2014), Christiansen et al. (2013), Kaminsky and Schmukler (2008), and Prati et al. (2013).

association between reforms and a government's fall from power does not differ according to the type of the reform. When governments reform the international trade sector, product markets, and financial markets, they do not influence the probability of their remaining the ruling party at the next election, neither in developed nor in developing countries. Hence, structural reforms appear to be ineffective in swaying voting behavior.

Baseline results are robust to alternative specifications. I start by estimating the baseline model by logit fixed-effect regression to control for the unobserved country characteristics. Next, I include other possible determinants of government turnover. I first probe whether voters make decisions by comparing their government's performance with other countries'. To this end, I add macroeconomic controls deviating from world averages. Then I check if voters take into consideration overall macroeconomic performance of the government by adding into the regression average economic growth, inflation, and government expenditure during the tenure of the government. In addition, I scrutinize the rationality of voters in terms of structural reforms. If voters are long-sighted, they do not reach a judgment about reform one year before an election; rather, they consider the overall reform picture during the government's tenure. Finally, I test whether endogeneity biases the main results. First of all, there might be some omitted variables that are correlated with both structural reforms and the probability of government turnover. Second, governments may choose to reform or not to reform according to their re-election prospects. They might decide not to undertake reforms if there is a high probability of losing upcoming elections, or vice versa, which will make reforms endogenous variables. To tackle the endogeneity problem, I employ an instrumental-variable approach using the weighted average of reforms of politically allied countries. All these checks for robustness confirm the absence of a statistically significant association between structural reforms and the probability of government turnover.

Yet, these results raise doubts about the political economy of structural reforms, since reforms often carry electoral costs. For this reason, I extend the analysis by studying the heterogeneity of the relationship between the probability of government turnover and structural reforms. In particular, I test whether macroeconomic conditions, institutional development, and the strategy of reform sequencing play any role in determining electoral outcomes. Results show that in countries where macroeconomic stability is attained, voters opt to reward governments for introducing economic reforms. In contrast, there is a positive and statistically significant relationship between reforms and the probability of a government being voted out of office if reforms are enacted in unstable environments. Moreover, I find that structural reforms tend to decrease

the probability of losing elections if a certain threshold level of institutional quality is achieved, whereas reforms undertaken in less institutionally developed countries significantly increase the likelihood of turnover. Finally, the results indicate that the ordering of structural reforms has electoral consequences. The probability of government turnover is significantly higher in countries where an optimal reform- sequencing strategy is not followed—meaning that the international trade sector is liberalized after the capital account—with respect to the countries that carry out an optimal reform-sequencing strategy.

To the best of my knowledge, this paper is the first study to investigate whether reforms in international trade, product markets, and financial markets affect the probability of government turnover. I seek to contribute to two strands of the literature. First, this paper adds to the literature on determinants of re-election. The economic factors that make governments stay in power or fall are widely examined in the literature. The underlying idea is that individuals attach responsibility to governments for the situation of the economy, considering the economic outcomes as the main indicator for electing governments.[2] Alesina et al. in 1998 and 2012 examine the relationship between cabinet changes and several economic indicators. They find that inflation has been positively associated with cabinet changes in OECD countries, while growth does not have a statistically significant effect on them. On the other hand, they find no indication that budget deficits lower the probability of government turnover. Imai et al. (2014) argue that economic growth, irrespective of whether it is caused by internal economic policies or imported from trading partners, greatly reduces the probability of government change. Brender and Drazen (2008), on the other hand, examine the probability of re-election in place of government change and find that, in contrast to the common wisdom, loose fiscal policies are punished rather than rewarded in both developed and developing countries. They also suggest that voters show their gratitude to governments for economic growth only in developing countries and penalize them for presiding over high inflation only in developed countries. In a panel study of 58 countries, Leigh (2009) demonstrates that the probability of re-election increases as both the domestic economy and world economy grow, while better education and media penetration increase the electoral response of voters to domestic growth. Despite the extensive effort to research issues of re-election,

[2] The economic voting behavior is also studied in the political science literature. The hypothesis that voters punish governments for adverse economic outcomes is found to be valid for Latin American countries (Lewis-Beck and Ratto, 2013) and Western Europe (Chappel Jr and Veiga, 2000). In addition, Chwieroth and Walter (2010) and Crespo-Tenorio et al. (2014) point out that crises are positively correlated with government turnover, while the relationship is conditioned by a country's institutional structure.

those studies do not take into consideration the inevitable political consequences of structural reforms.

This work is more closely related to Buti et al. (2009), Buti et al. (2010), and Lora et al. (2005). Buti et al. (2009) argue that in OECD countries, well-developed financial markets increase the re-election probability of reformist governments, as they help to reap the benefits of structural reforms. Buti et al. (2010) draw attention to the importance of separate structural reforms in terms of electoral results and examine to what extent reforms influence re-election chances. They find that structural reforms that are likelier to benefit large groups of insiders, such as employment protection and pensions, are detrimental for governments, whereas reforms in tax wedge and unemployment benefits up the odds for re-election. Finally, Lora et al. (2005) analyze the electoral impact of Washington Consensus policies in Latin American countries. They demonstrate that voters there are inclined to punish their governments for pushing through market-friendly reforms.

My paper differs from these three contributions in several key respects. While they investigate the electoral consequences of structural reforms by focusing on a limited set of countries, I consider a larger country sample that encompasses least developed countries, as well as advanced and emerging-market economies. Hence, the results and the policy implications that I derive are not confined to a particular set of countries. In addition, I examine a broader set of reforms: those in international trade, product markets, and financial markets. The extensive data set allows me to investigate the repercussions of structural reforms in different sectors. Finally, in order to go deeper into the analysis, I address the issues of whether macroeconomic conditions, institutional development, and reform ordering, which have drawn scant attention in the literature, are central for predicting the electoral consequences of economic reforms.

Second, I aim to contribute to the literature on the political economy of structural reforms. The existing literature speaks to some but not all aspects of political-economy considerations. Studies of the determinants of structural reforms, for instance, state that domestic financial reforms are put in place by both right-wing and left-wing administrations and both by presidential and parliamentary regimes (Abiad and Mody, 2005). Campos and Coricelli (2012) find a U-shaped relationship between political and financial liberalization, suggesting that there is no unilateral relationship between democratization and economic reforms, and, more importantly, that a lack of democratization might hinder reforms and even bring about reform reversals. De Haan and Sturm (2003), on the other hand, claim that democratic institutions lead to economic reforms in developing countries, which is a result later confirmed

for a larger sample of developed and developing countries by Giuliano et al. (2013). Drazen and Easterly (2001) emphasize that high inflation and black-market premiums spur reforms, while Lora and Olivera (2004) report that crises are what induce reforms in Latin America. However, the literature seems much less forthcoming on the issue of the fate of governments that have ushered in structural reforms. Establishing the truth in this sub-area is essential if governments are to fulfill their responsibility of eliminating rigidities from their economies while ensuring their own political survival. As such, this paper's analysis of reforms and the probability of government turnover will, it is hoped, enable economists to fully understand why countries differ in reform initiation, as well as the genesis of policy reversals and the magnitudes of their reforms.

The rest of the paper is organized as follows. Section 2 presents the data and motivating evidence. Section 3 describes the empirical specification and discusses the contributions made by structural reforms to a government's departure from office. In Section 4, I consider some alternative explanations of baseline results by taking into consideration the underlying macroeconomic environment, institutional quality, and reform sequencing. The last section is the conclusion.

2. Data and Motivating Evidence

2.1. Data

The data set used in this study comes from various sources. The information on structural reform has been compiled by the Research Department of the IMF and covers regulations for different sectors. For economic variables, I use the World Development Indicators of the World Bank (WB, 2011). The political and institutional variables come from the Database of Political Institutions (Keefer, 2012) and Quality of Government (Teorell et al., 2011). The combination of data sources enables me to employ data for 122 democratic countries over the 1975-2006 period.

Elections. Following Alesina et al. (1998, 2012), I employ the change of the chief executive as a dependent variable. In my view, replacing the chief executive indicates displeasure on the part of the voters with the current policy. The dependent variable is a binary variable that equals 1 if an election takes place in year t and country I and the current chief executive is not in office in year $t + 1$.

In the sample period, there were 571 elections, of which 288 were parliamentary and 283 presidential. It is also worth noting that elections occur more

often in developing countries than in developed ones. Of those 571 elections, 175 of them were carried out in developed countries, 397 of them in the developing world. The incumbent leaders were ousted in 284 elections, compared to 287 contests where they held onto power. In the developing-country category—from where 70% of the data originates—the frequency of government change is slightly lower (48%) than in the developed contingent (51%).

Reforms. The structural-reform data set consists of de jure indicators of international trade, product markets, and the financial sector. International trade is measured by average tariff rates and restrictions on current-account transactions. The former measures average tariffs and is normalized between 0 and 1, where a 0 means that tariff rates are 60% or higher and 1 means that tariff rates are 0. The latter captures the extent to which a government is compliant with its obligations under the IMF's Article VIII to free from government restriction the proceeds from international trade in goods and services.

There exist two indicators of product-market reforms. The first indicator I consider refers to the telecommunications and electricity markets. It covers the degree of regulation, including the extent of competition in the provision of these services, the presence of an independent regulatory authority, and privatization. The second reform variable is related to the agriculture sector. It captures intervention in the market for the main agricultural export commodity in each country, including the extent of public intervention, the presence of administered prices, and public ownership.

There are two financial sector reforms: domestic financial reform and capital-account reform. The domestic financial reform index is derived from Abiad et al. (2009). The index is constructed as the average of six sub-indices: (i) credit controls, such as subsidized lending and directed credit; (ii) interest-rate controls, such as floors, ceilings, or interest-rate bands; (iii) entry barriers, such as restrictions on the participation of foreign banks and on the scope of their activities; (iv) the degree of state ownership in the banking sector; (v) the quality of banking supervision and regulation, such as risk-based capital-adequacy ratios as based on the Basel I capital accord, and an independent banking supervisory agency; (vi) securities-market policy, which includes the auctioning of government securities, establishment of debt and equity markets, and policies to encourage development of these markets, such as tax incentives or development of depository and settlement systems. The capital-account reform index measures a broad set of restrictions on financial credits and personal capital transactions of residents and financial credits to non-residents, as well as the use of multiple exchange rates.

Each reform indicator is a continuous variable between 0 and 1, with a higher value indicating a greater degree of liberalization. In order to determine whether governments significantly influence their own re-electability by carrying out economic reforms, I also construct an aggregate reform variable by calculating first principal components of the reforms in all sectors, as in Giuliano et al. (2013), in addition to the individual reform indicators.

Other Variables. I employ standard control variables that are found in the literature. In particular, I control for the macroeconomic and political environment as well as for cabinet characteristics, which have been shown to display profound effects on election outcomes. Prior studies argue that economic growth, inflation, and government expenditure are leading macroeconomic factors in the probability of government turnover. The per capita GDP growth rate as a measure of economic growth captures the state of the economy and the electoral consequence of change in total output.

In their study, where they consider all cases of government changes, Alesina et al. (1998) and Alesina et al. (2012) do not establish a significant link between growth and the probability of government turnover in OECD countries. Using the same set of countries but looking only at election years, Buti et al. (2009) and Buti et al. (2010) reach a similar conclusion, whereas Brender and Drazen (2008) state that economic growth materially promotes re-election only in developing countries. I also use inflation, defined as the rate of change in the GDP deflator, to measure how price stability affects election results.

While Buti et al. (2010) do not see a connection between re-election and inflation in OECD countries, Alesina et al. (1998) and Alesina et al. (2012) show that inflation definitely raises the probability of government turnover. Similarly, Brender and Drazen (2008) maintain that inflation is negatively associated with re-election, albeit only in developed countries. In addition, government share of GDP is included to control for the role of fiscal policy.[3] The expected sign of government share of GDP can be either negative or positive. The sign will show whether governments can change the probability of their re-election through public spending.

In accordance with the previous literature, I also take into account the political system and cabinet characteristics. The former is captured by dichoto-

[3] I use the government share of GDP in place of a government surplus owing to the lack of data for the latter. Although there is no consensus about the effects of fiscal policy on re-election in the literature, the conventional wisdom is that incumbent governments spend excessively in order to attract votes.

mous variables indicating whether the political system of each country is parliamentary (or presidential), and whether the electoral system is proportional

(or majoritarian). The expected signs for these variables are positive, since political competition is more intense in parliamentary democracies and proportional electoral systems. However, previous studies provide mixed results with regard to the electoral system. Buti et al. (2009) and Buti et al. (2010) assert that re-election is more likely if candidates are elected by proportional representation. On the other hand, in a larger sample of developed and developing countries, Brender and Drazen (2008) conclude that the probability of re-election is significantly higher with majoritarian voting rules. Finally, cabinet characteristics include the number of years the cabinet has been in power, whether it is composed of a coalition of parties (or a single party), and whether it holds the majority (or minority) in the parliament.

An unpopular government could be more vulnerable to punishment from the public, especially when power is shared among diverse parties in a coalition, or the party of the executive does not have an absolute majority in the legislature. While Alesina et al. (1998) show that coalition governments are more susceptible to being voted out of power, and regimes holding a majority of the seats in the parliament enjoy greater assurance of staying in power, they later (2012) are unable to establish a correspondence between the likelihood of a change in government and margin and majority on the one hand and the possible advent of coalition governments on the other. In addition, Alesina et al. (1998) and Alesina et al. (2012) find a positive association between the probability of a government's being voted out of office and the length of its tenure. Table 1 presents summary statistics.

2.2. Motivating Evidence

When all countries are taken together, there is evidence of deregulation in each sector. Networks industries have been the most reformed area across all sectors. The networks index soared from 0.01 to 0.48 in the sample period. The domestic-finance sector is the second most regulated area. That index rose from 0.20 to 0.77. Progress in other sectors is more limited. The trade index increased from 0.59 to 0.80; the current-account index climbed from 0.49 to 0.78; the agriculture index doubled from 0.30 to 0.60; and the capital-account index moved up from 0.48 to 0.72. It should also be mentioned that the reform attempts have not been confined to developed countries.

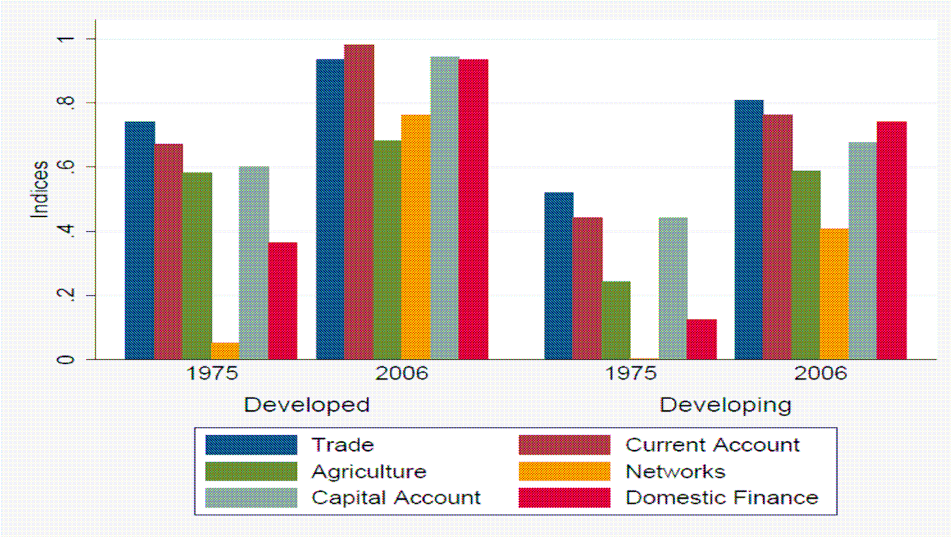
As can be seen in Figure 1, developing countries liberalized markets as well, albeit at a different pace and timing.

Table 1. Summary Statistics

Variables	Observation	Mean	Std. Dev.
Government Change (t)	509	0.50	0.50
Trade (t-1)	447	0.75	0.20
Current Account (t-1)	447	0.66	0.27
Agriculture (t-1)	347	0.51	0.38
Networks (t-1)	371	0.16	0.26
Capital Account (t-1)	447	0.63	0.27
Domestic Finance (t-1)	361	0.53	0.29
Inflation (t-1)	497	19.75	64.00
Growth (t-1)	488	1.62	4.87
Government Share of GDP (t-1)	507	17.26	7.39
Proportional Representation (t)	453	0.66	0.47
Parliamentary System (t)	509	0.48	0.50
Coalition (t)	509	0.46	0.50
Margin of Majority (t)	482	0.49	0.50
Duration (t)	509	4.26	1.93

Notes: Averaged over election term. Source: Author's estimations.

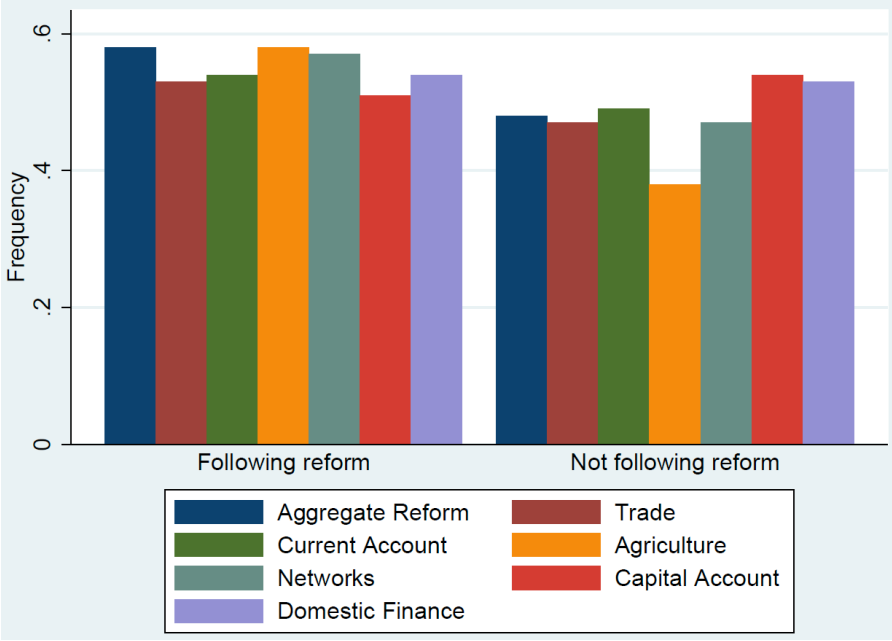
Figure 1. Structural Reform Indices



Notes: The latest year for which data are available is 2004 for networks agriculture reforms; 2005 for trade and domestic financial reforms; and 2006 for current-account and capital-account reforms. Source: IMF Estimates.

Figure 2 displays the frequency of government change following reforms versus not following reforms. According to the aggregate reform variable, which is defined as the first principal component of all reforms, it appears that enacting reforms is associated with a higher probability of government change. The probability of government turnover following reforms or not following reforms is 58% and 48%, respectively. Hence, voters seem to punish reformist governments. However, certain types of reforms might provoke different political outcomes. For this reason, the frequencies of government change associated with each reform are also depicted in Figure 2. In regard to reforms in trade, the current account, agriculture, and networks, the probability of government change is lower post-reform than pre-reform.

Figure 2. Frequency in Changes of Government and Structural Reforms



Notes: Aggregate reform is the first principal component of all reform indicators. Source: IMF Estimates.

In contrast, capital-account reform is associated with a lower probability of government turnover. Finally, in terms of domestic financial reform, no difference is seen between a government losing power after reforms and before reforms.

However, I should emphasize that only agriculture reform appears to matter for governments, as it is the only one that displays a statistically significant difference between the frequencies.

In order to probe whether the electoral impacts of reforms vary depending on several specific factors, Table 2 shows the mean of the aggregate reform variable one year before election for the cases of the government changing and not changing. The table's first two rows state that in more democratic countries, greater reform is observed before the government is re-elected. In contrast, less reform is associated with the re-election of governments. The same relationship applies to executive constraints. Despite the statistical insignificance, results indicate that more deregulated markets are prone to re-elect the leadership in countries with strong executive constraints. By contrast, the higher the extent of reform, the greater the chance the government will be sent packing in the next election in countries with weak executive constraints.

Regarding macroeconomic conditions, when the economy suffers from high growth volatility, a statistically significant difference turns up between reform before a change in government and when it is effected without a subsequent dismissal at the ballot box. It appears that a larger degree of structural

Table 2. Overall Reform Before Elections

	(1) **Gov'nment changes**	(2) **Gov'nment does not change**	(3) **T test (1) = (2) p-value**
Countries with better democracy	0.59	1.09	0.08
Countries with worse democracy	-0.29	-0.78	0.17
Countries with better executive constraints	0.74	1.09	0.25
Countries with worse executive constraints	-0.22	-0.69	0.13
Countries with higher growth volatility	0.18	-0.51	0.03
Countries with less growth volatility	0.50	0.71	0.66
Countries with higher current-account balance volatility	0.65	-0.71	0.00
Countries with less current-account balance volatility	0.31	0.51	0.48
Countries liberalized-capital-account-first	-0.08	-1.12	0.00
Countries not liberalized-capital-account-first	0.54	0.51	0.90

Notes: Averaged over election term. Source: Author's estimations.

reform is associated with government turnover in the former case, whereas in the latter case, market rigidities help incumbent governments to win elections. If there is less growth volatility, the relationship turns out to be the opposite, as expected, though with an insignificant difference. Similarly, governments undermine their own prospects for longevity by opening up markets if volatility is roiling the current-account balance: they need to keep markets closed in order not to be voted out of office.

Finally, the reform-sequencing issue is spotlighted in the last two rows of Table 2. In line with expectations, more reform is observed before a government falls, while less reform takes place before re-election of the government in countries that opened up the capital account first. In other countries, the opposite correlation is apparent, albeit with a statistically significant difference.

3. Empirical Specifications and Results

An important issue for the empirical analysis is to identify the reforms. One possibility is to use changes in the index, as with Buti et al. (2009), Buti et al. (2010), and Giuliano et al. (2013). However, focusing on these changes might fail to capture government policies, since many of them are only incremental in nature. Moreover, indices very rarely change in developed countries.

This would cause too many zeros in the sample in spite of the considerable degree of openness. A second approach is to create a binary variable when the reform index increases over the previous period, or there is a substantial rise in the index, namely in the median (Buti et al., 2009; Buti et al., 2010) by one (Christiansen et al., 2013) or by two standard deviations (Duval, 2008). This method is far from being efficient, since it neglects the magnitude of reforms. Of greater concern is the fact that the sample period was witness to many reform reversals as well as permanent reforms, so one should not run the risk of missing out on valuable information by disregarding them in the econometric analysis. Therefore, I rely on the levels of reforms proposed by Prati et al. (2013), since I believe they better reflect the actual situation of the economy and governments' policy choices.

To analyze whether and to what extent reforms lead to government changes within countries, I consider the following latent variable formulation:

$$T_{c,t} = \begin{cases} 1, & if\ T^*_{c,t} > 0 \\ 0, & if\ T^*_{c,t} \leq 0 \end{cases}$$

where $T_{c,t}$ is the dichotomous variable representing turnover that takes the value of 1 if there is a change in government in country *c* during year *t*, and $T^*_{c,t}$ is the unobservable (latent) variable. The estimation equation is thus:

$$T_{c,t} = \beta_0 + \beta_1 Reform_{s,c,t-1} + \Sigma_k \beta_k Z^k_{c,t} + u_{c,t} \quad (1)$$

where $Reform_{s,c,t-1}$ indicates reform index s, in country c, and time *t*, $Z^k_{c,t}$ denotes the set of economic and political control variables, and $u_{c,t}$ indicates the error term. I make use of the lagged value of the reform variable, as it takes time for reforms to feed into changes in the economy. In addition, macroeconomic variables will enter into the equation with a one-year lag.

I start by analyzing whether, on average, being reformist causes incumbent governments to help or hurt their own prospects for remaining in power. To this end, Table 3 reports the estimation results for the aggregate reform variable. Column 1 documents the pooled probit regression. Results indicate that aggregate reform is not statistically significant, suggesting that being reformist does not have any influence on the probability of a government being turned out of office. The margin of the majority is the only control variable that is statistically significant. In line with the expectations, governments that hold a majority in the parliament are less likely to have to step down. In column 2, I add year fixed effects to check whether unobserved time-variant country effects bias the estimated coefficients. Neither the significance nor the signs of the coefficients change. The coefficient estimate of aggregate reform remains statistically insignificant.

In columns 3 and 4, I check the sensitivity and robustness of the results with respect to alternative specifications, the probit random effect, and the linear probability model (LPM), respectively. Results do not reveal any difference in the effects of aggregate reform between these two specifications. Aggregate reform is not significantly associated with the probability of government change. However, inflation does appear to have a significant impact in column 4; high inflation elevates the probability of government turnover.[4]

Next, I probe whether results are driven by unobserved country characteristics that are themselves possibly correlated with particular explanatory variables and the likelihood of a change in government. For that purpose, I add country fixed effects to the baseline specification and summarize the results in column 5. The coefficient of aggregate reform is statistically insignificant.

[4] The dependent variable is not limited to lying between 0 and 1 in the LPM. For this reason, as a robustness check, I re-estimate the model by eliminating the values that lie outside the unit interval. The estimation results are robust to this specification.

While inflation is found to be positive and significant, the margin of the majority and the growth rate are borderline significant, with expected signs.

Table 3. Electoral Response to Structural Reform: Baseline Model

Dependent Variable: 1 if government changes	(1) (Probit)	(2) (Probit)	(3) (Probit RE)	(4) (LPM)	(5) (LPM)	Developed Countries (6) (Probit)	Developing Countries (7) (Probit)
Aggregate reform (t-1)	-0.015	-0.020	-0.043	-0.017	-0.017	0.055	-0.036
	(0.019)	(0.026)	(0.065)	(0.019)	(0.029)	(0.052)	(0.027)
Inflation (t-1)	0.002	0.003	0.005	0.001**	0.001*	0.022**	0.001
	(0.002)	(0.002)	(0.005)	(0.000)	(0.001)	(0.011)	(0.001)
Growth (t-1)	-0.007	-0.005	-0.028	-0.008	-0.015	-0.011	-0.003
	(0.010)	(0.010)	(0.027)	(0.010)	(0.010)	(0.024)	(0.011)
Government Share of GDP (t-1)	0.004	0.003	0.001	0.004	-0.011	0.021	-0.009
	(0.006)	(0.007)	(0.020)	(0.006)	(0.015)	(0.015)	(0.008)
Proportional representation	0.078	0.099	0.240	0.081	-0.181	-0.127	0.313***
	(0.075)	(0.079)	(0.274)	(0.074)	(0.201)	(0.147)	(0.112)
Parliamentary System	0.003	0.015	0.135	-0.005	0.043	0.032	0.093
	(0.072)	(0.079)	(0.259)	(0.070)	(0.237)	(0.241)	(0.111)
Coalition	0.072	0.082	0.250	0.061	0.094	0.045	0.076
	(0.070)	(0.076)	(0.219)	(0.069)	(0.082)	(0.116)	(0.098)
Majority in parliament	-0.174**	-0.175**	-0.489*	-0.168**	-0.167	-0.135	-0.290***
	(0.078)	(0.085)	(0.250)	(0.076)	(0.106)	(0.146)	(0.101)
Duration of the cabinet	0.031	0.025	0.102	0.029	0.034	-0.009	0.054*
	(0.023)	(0.026)	(0.066)	(0.022)	(0.025)	(0.036)	(0.030)
Country FE	NO	NO	NO	NO	YES	NO	NO
YEAR FE	NO	YES	NO	NO	NO	NO	NO
Observations	266	261	266	266	266	116	150
Pseudo R-squared *(within R-square for LPM)*	0.06	0.10	0.11	0.07	0.43	0.05	0.15

Notes: (1) For probit estimation, coefficients are marginal probability effects computed at sample mean. (2) Standard errors robust for heteroscedasticity are in brackets. (3) Aggregate reform is first principal component of all reform indicators. (4) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

Finally, I examine whether the association between the probability of government turnover and the existence of economic reforms varies across income groups within countries. My method was to split the countries into the categories of developed and developing according to the World Economic Outlook Database classification. Columns 6 and 7 report results for developed and developing countries, respectively. Results indicate that being reformist

does not have an impact on the probability of government turnover in either developed or developing countries. However, the determinants of government turnover are not the same in the two groups.

For the developed group, voters tend to penalize governments for price instability, as is evident by the positive and statistically significant response of inflation to the probability of government turnover; in the developing world, voters do not react to inflation, confirming the findings of Brender and Drazen (2008). Growth has the expected negative sign, though not statistically significant at conventional levels. Moreover, proportional representation, the margin of the majority, and the duration of the cabinet variables have a statistically significant impact on the likelihood of government change only in developing countries.

Even though the baseline specification finds no indication that governments increase their probability of remaining in power by enacting reforms, the effect is more likely to be different depending on the type of the reform. More importantly, this result might be driven by an individual reform variable. As suggested by Figure 2, different reforms might lead to distinct political outcomes. Therefore, as a next step, I check whether reforms in different sectors are associated with government change. The results, summarized in columns 1-6 of Table 4, are based on the pooled probit specification for each reform separately, with the control variables (column 1 in Table 3).

I find that trade reform is borderline significant with negative sign, whereas other reform variables—the current account, agriculture, networks, the capital account, and domestic finance—are not significantly associated with government change. The developed-country dummy and its interaction with each reform are statistically not different from zero, suggesting that, on average, the relationship between reforms and the probability of government turnover does not differ across different income groups. When it comes to the control variables, estimates reported in Table 4 show that voters are likely to reward governments for economic growth. While the margin in majority significantly decreases the likelihood of government turnover, proportional representation, which is statistically significant in all but five specifications, has positive impact on it.

Until now, we have found no evidence that governments are able to change the probability of turnover by implementing reforms. In the following subsection, I address concerns regarding omitted variable bias and sample selection. Finally, I conduct instrumental variable analysis to probe whether the estimations suffer from the endogeneity issue.

Table 4. Electoral Impact of Reforms in Different Sectors

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Reform (t-1)	-0.248*	0.048	0.088	0.132	-0.074	-0.079
	(0.149)	(0.124)	(0.096)	(0.164)	(0.121)	(0.133)
Developed	-0.496	0.121	-0.176	-0.142	0.012	-0.097
	(0.471)	(0.205)	(0.138)	(0.092)	(0.186)	(0.149)
Developed× Reform (t-1)	0.519	-0.257	0.067	-0.058	-0.100	0.020
	(0.538)	(0.243)	(0.175)	(0.217)	(0.227)	(0.207)
Inflation (t-1)	0.000	0.000	0.001	0.002	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Growth (t-1)	-0.012*	-0.014**	-0.006	-0.009	-0.013**	-0.013*
	(0.007)	(0.006)	(0.008)	(0.008)	(0.006)	(0.007)
Government Share of GDP (t-1)	0.005	0.004	0.002	0.002	0.004	0.007
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Proportional representation	0.136**	0.162**	0.135*	0.128*	0.166**	0.106
	(0.062)	(0.066)	(0.069)	(0.070)	(0.066)	(0.072)
Parliamentary System	-0.058	-0.051	0.105	0.115	-0.062	-0.026
	(0.065)	(0.067)	(0.079)	(0.077)	(0.067)	(0.075)
Coalition	0.038	0.036	-0.009	-0.020	0.035	0.036
	(0.057)	(0.057)	(0.068)	(0.063)	(0.057)	(0.061)
Majority in parliament	-0.120*	-0.134**	-0.129*	-0.141**	-0.137**	-0.166**
	(0.063)	(0.063)	(0.073)	(0.071)	(0.063)	(0.067)
Duration of the cabinet	0.001	0.014	0.018	0.018	0.014	0.023
	(0.018)	(0.018)	(0.021)	(0.020)	(0.018)	(0.020)
Observations	435	427	327	355	427	361
Pseudo R-squared	0.06	0.06	0.04	0.04	0.06	0.06

Notes: Probit estimation, standard errors robust for heteroscedasticity are in brackets. (2) Coefficients are marginal probability effects computed at sample mean. (3) "Developed" is a binary variable that takes a value of 1 for developed countries and 0 otherwise. (4) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

3.1. Robustness

Although unobserved country characteristics were taken into account in Table 3, the specification in column 2 might not be consistent, owing to the incidental parameter problem.[5] Similarly, LPM in column 5 neglects the binary nature of the dependent variable and therefore is not a reliable specifica-

[5] Since the number of unobserved heterogeneities increases with the number of observations, estimating them causes an incidental parameter problem for the other parameters. See Wooldridge (2010, p. 495).

tion. For these reasons, I estimate the logit fixed effect model, yet this results in a reduced sample size, since countries that do not have both turnover and no turnover are automatically dropped. Table 5 presents the estimation results. It shows that reform variables are not statistically significant, implying that governments implementing reforms are on average not affected at the following election. Besides, growth is found to be negative and significant in each specification, while the margin in majority is statically significant in all but one regression.

Government turnover might be brought about by many other factors. Following the previous literature, I take into consideration the macroeconomic indicators deviating from world averages in addition to the standard control variables. The idea is that perhaps voters' assessment of governments is not based on their country's economic conditions, but instead on how the national economy compares with the world economy. Furthermore, world economic growth could matter more than national economic growth to incumbent re-election probabilities. Leigh (2009), for instance, argues that voters are inclined to re-elect incumbent governments when the world economy grows, and that world economic growth is more beneficial to governments than domestic economic growth in less developed countries.

In contrast, Alesina et al. (2012) suggest that the difference between inflation, unemployment, and growth of OECD countries and the weighted average of G7 countries do not play any role in the probability of re-election, whereas Brender and Drazen (2008) find that world economic growth does not have a statistically significant impact on either developed or developing countries.

The results are presented in panel A of Table 6. As before, I do not find evidence of a significant relationship between reforms and government turnover. None of the coefficients of structural reforms is statistically significant. Regarding the control variables, I do not find consistent results for global economic conditions being given more weight than domestic ones.

In panel B of Table 6, I address the question of whether voters attach more importance to overall macroeconomic performance of governments than to the economic track record just before the election year. To this end, I include average inflation, growth, and the government's share of GDP during its tenure, in addition to their one-year lagged values, in the estimation equation. Brender and Drazen (2008) point out that both election-year inflation and inflation during the tenure of the government significantly decreases the probability of re-election in developed countries.

Table 5. Electoral Impact of Reforms in Different Sectors: Logit Fixed-Effects

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Reform (t-1)	1.252	-0.736	-1.701	-0.077	-1.044	0.649
	(1.188)	(0.746)	(1.035)	(0.558)	(0.815)	(0.664)
Inflation (t-1)	0.002	0.000	0.003	0.003	0.000	0.000
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Growth (t-1)	-0.091**	-0.110**	-0.083*	-0.104**	-0.108**	-0.116**
	(0.040)	(0.044)	(0.045)	(0.045)	(0.044)	(0.050)
Government Share of GDP (t-1)	0.000	-0.022	-0.128	-0.073	-0.021	0.037
	(0.050)	(0.060)	(0.081)	(0.083)	(0.059)	(0.066)
Proportional representation	-0.888	-0.635	-0.475	-0.665	-0.589	-1.235
	(1.053)	(1.104)	(1.236)	(1.101)	(1.112)	(1.104)
Parliamentary System	1.259	1.158	0.680	1.560*	1.176	0.980
	(0.798)	(0.814)	(1.123)	(0.931)	(0.817)	(0.817)
Coalition	0.256	0.195	0.477	0.184	0.230	0.275
	(0.348)	(0.348)	(0.411)	(0.384)	(0.352)	(0.373)
Majority in Parliament	-0.281	-0.314	-0.238	-0.572	-0.304	-0.855*
	(0.439)	(0.443)	(0.510)	(0.486)	(0.447)	(0.497)
Duration of the cabinet	0.057	0.106	0.094	0.160	0.113	0.118
	(0.090)	(0.093)	(0.109)	(0.106)	(0.094)	(0.104)
Observations	328	321	237	270	321	279

Notes: (1) The figures in the table are logit coefficients. (2) Standard errors robust for heteroscedasticity are in brackets. (3) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

Estimates reported in Table 6 show that agriculture and networks reforms are borderline significant with positive signs, whereas other reforms are not substantially different from those obtained in the previous set of regressions. The developed-country dummy always has a negative sign and is statistically significant in four out of six regressions, suggesting that governments are less likely to be voted out of office in developed countries. In terms of the macroeconomic control variables, government share of GDP does not have any impact on the probability of government turnover, regardless of whether it is measured as one year before election or during the tenure of the government.

While lagged growth is statistically insignificant, average growth during the tenure of the government is always negatively signed and statistically significant in three out of six specifications. Moreover, its interaction with the developed-country dummy is insignificant. Hence, both in developed and

developing countries, voters are rational, meaning that they attach more value to overall performance of the governments.

Table 6A. Electoral Impact of Reforms in Different Sectors: Other Controls

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Panel A						
Reform (t-1)	-0.238	-0.025	0.095	0.086	-0.254	-0.119
	(0.148)	(0.112)	(0.084)	(0.121)	(0.269)	(0.115)
Developed	0.067	0.003	0.031	-0.027	0.032	-0.031
	(0.092)	(0.091)	(0.114)	(0.099)	(0.228)	(0.098)
Inflation (t-1)	0.005**	0.004	0.004	0.005*	0.009	0.002
	(0.002)	(0.002)	(0.003)	(0.003)	(0.006)	(0.002)
Growth (t-1)	-0.029	-0.034	-0.031	-0.040	-0.081	-0.033
	(0.029)	(0.029)	(0.036)	(0.033)	(0.073)	(0.031)
Government Share of GDP (t-1)	-0.118*	-0.096	-0.072	-0.090	-0.251	-0.103
	(0.062)	(0.062)	(0.070)	(0.071)	(0.155)	(0.068)
(National inflation – world inflation) (t-1)	-0.005**	-0.003	-0.003	-0.004	-0.008	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.002)
(National growth – world growth) (t-1)	0.019	0.021	0.027	0.035	0.050	0.023
	(0.029)	(0.029)	(0.036)	(0.034)	(0.073)	(0.032)
(National government share - world government share)	0.120*	0.098	0.071	0.088	0.258*	0.108
	(0.062)	(0.062)	(0.070)	(0.071)	(0.156)	(0.068)
Developed×(National inflation - world inflation) (t-1)	0.004	0.004	0.004	0.004*	0.008	0.0009
	(0.003)	(0.003)	(0.003)	(0.003)	(0.007)	(0.003)
Developed×(National growth - world growth) (t-1)	-0.006	-0.004	-0.009	-0.024	-0.013	-0.018
	(0.019)	(0.019)	(0.022)	(0.021)	(0.049)	(0.021)
Developed×(government share - world government share) (t-1)	0.120*	0.098	0.071	0.088	0.258*	0.108
	0.014	0.009	0.024*	0.015	0.023	0.008
	(0.011)	(0.012)	(0.014)	(0.012)	(0.030)	(0.012)
Control Variables	YES	YES	YES	YES	YES	YES
Observations	435	427	327	355	427	361

Notes: See end of panel B of Table 6.

In terms of inflation, I obtain similar results to Brender and Drazen (2008). Average inflation during the tenure of the government significantly lifts the probability of government turnover only in developed countries.[6]

[6] There are other important control variables that could affect the relationship between reforms and government turnover. Economic crisis, for instance, is one of the leading determinants of reforms and at the same time could influence electoral outcomes. Besides, reforms might affect elections by altering income inequality. Finally, government change could be more likely in more institutionally developed countries. Empirical results that have not been reported to save space are robust to these alternative sets of control variables. Results are available upon request.

Table 6B. Electoral Impact of Reforms in Different Sectors: Other Controls

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Panel B						
Reform (t-1)	-0.153	0.091	0.142*	0.202*	-0.036	-0.038
	(0.146)	(0.117)	(0.085)	(0.116)	(0.111)	(0.117)
Developed	-0.379*	-0.372*	-0.624**	-0.511**	-0.323	-0.273
	(0.208)	(0.215)	(0.246)	(0.222)	(0.215)	(0.227)
Inflation (t-1)	0.001	0.003**	0.002	0.002	0.003**	0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Growth (t-1)	-0.002	-0.010	0.005	0.001	-0.009	-0.005
	(0.008)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)
Government	0.023	-0.023	0.033	0.028	-0.026	-0.023
Share of GDP (t-1)	(0.024)	(0.032)	(0.027)	(0.028)	(0.032)	(0.042)
Inflation	-0.001	-0.004**	-0.001	-0.001	-0.004**	-0.004**
during tenure	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Growth	-0.021**	-0.019	-0.023*	-0.020	-0.019	-0.024*
during tenure	(0.010)	(0.013)	(0.013)	(0.012)	(0.013)	(0.014)
Government Share	-0.022	0.027	-0.035	-0.031	0.030	0.029
of GDP during tenure	(0.024)	(0.033)	(0.027)	(0.028)	(0.033)	(0.043)
Developed× Inflation	0.013**	0.017***	0.021***	0.016***	0.014**	0.008
during tenure	(0.006)	(0.006)	(0.008)	(0.006)	(0.006)	(0.009)
Developed× Growth	-0.001	0.010	-0.009	-0.012	0.008	0.004
during tenure	(0.025)	(0.025)	(0.028)	(0.026)	(0.026)	(0.028)
Developed× Government Share	0.014	0.008	0.025*	0.016	0.008	0.007
of GDP during tenure	(0.012)	(0.012)	(0.014)	(0.012)	(0.012)	(0.012)
Control Variables	YES	YES	YES	YES	YES	YES
Observations	435	427	327	355	427	361

Notes: (1) Probit estimation, standard errors robust for heteroscedasticity are in brackets. (2) Coefficients are marginal probability effects computed at sample mean. (3) "Developed" is a binary variable that takes a value of 1 for developed countries and 0 otherwise. (4) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

A related concern is whether voters evaluate governments' reform implementation by just looking at one year before the election or by looking further back and taking into consideration the overall reform performance. This question is important for many reasons. Governments might avoid enacting reforms before elections in order not to risk their re-election prospects. Also, for the sake of diminishing the probability of losing elections, governments opportunistically might carry out costly reforms in the very beginning of their terms and realize only the ones that pay off immediately before elections. This will bias the results because the costless reforms will be over-represented in the sample. To test whether the association between reforms and government

turnover differs with respect to the timing of reforms, I add the average reform during the tenure of the current government to the baseline specification.

Results are summarized in Table 7. I find that only agriculture reform is statistically significant, with a p-value of 0.08. It appears that voters punish governments for agriculture reform when it is measured during the tenure of the government. As for other forms, the results do not reveal any difference from the previous ones. The estimated coefficients of trade, the current account, networks, the capital account, and domestic finance are statistically insignificant. To sum up, the idea that governments select certain types of reforms according to their distance from an election is not supported by the results in Table 7.[7]

Thus far, I have reported several robustness checks carried out by taking into account a different empirical specification, a different definition of reform, and different control variables that have been shown to be prime determinants of government turnover in the previous literature. Some aspects of endogeneity are dealt with through estimations. Logit fixed effect specification shows that omission of unobservable country characteristics does not cause bias in the estimations. A variety of control variables are included in the regression analysis in order to check whether omitted variables cause bias in coefficient estimates. I also test whether the timing of the reform changes the results by putting in reform during the tenure of the government instead of reform done one year before the election. Finally, in each regression, I include the macroeconomic indicators and economic reforms with a one-year lag in order to avoid the problems of reverse causality.

However, endogeneity of the reform variables might still bias the results. First, governments might decide to implement or not implement reforms based on their re-election prospects. For instance, if the re-election prospects are low, governments may avoid carrying out reforms and risking their future. In a similar vein, governments would be more inclined to enact reforms if they expect to be re-elected in the following election. Second, governments may choose reforms that will pay off quickly before the elections, and leave the more difficult reforms for the post-election period. Finally, leaving some important variables out of the estimation equation could make reform variables endogeneous.

In order to tackle this issue, I develop an IV strategy. The common method is to employ the weighted average of the variable of interest in the neighbor-

[7] When I consider whether or not the timing of the election matters, I find that baseline results are robust to the exclusion of early elections. To save space, I do not report these results, which are available upon request.

Table 7. Electoral Impact of Reforms in Different Sectors: Reform During the Tenure of the Government

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Reform during Tenure	-0.209	0.048	0.174*	0.178	-0.056	-0.053
	(0.155)	(0.130)	(0.098)	(0.166)	(0.127)	(0.141)
Developed	-0.621	0.095	-0.096	-0.097	0.012	-0.075
	(0.437)	(0.208)	(0.136)	(0.091)	(0.186)	(0.152)
Developed× Reform during tenure	0.672	-0.201	-0.022	-0.154	-0.079	0.002
	(0.500)	(0.248)	(0.172)	(0.210)	(0.230)	(0.213)
Inflation (t-1)	0.000	0.000	0.001	0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Growth (t-1)	-0.013*	-0.014**	-0.007	-0.008	-0.013**	-0.014*
	(0.007)	(0.006)	(0.008)	(0.008)	(0.006)	(0.007)
Government Share of GDP (t-1)	0.005	0.005	0.006	0.005	0.005	0.007
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Proportional Representation	0.116*	0.141**	0.076	0.071	0.144**	0.079
	(0.062)	(0.066)	(0.068)	(0.068)	(0.066)	(0.073)
Parliamentary System	-0.053	-0.053	0.112	0.106	-0.062	-0.020
	(0.065)	(0.067)	(0.079)	(0.076)	(0.067)	(0.076)
Coalition	0.045	0.041	-0.016	-0.019	0.042	0.042
	(0.058)	(0.058)	(0.067)	(0.063)	(0.058)	(0.063)
Majority in parliament	-0.099	-0.121*	-0.128*	-0.138**	-0.122*	-0.152**
	(0.063)	(0.063)	(0.071)	(0.069)	(0.063)	(0.068)
Duration of the cabinet	-0.000	0.013	0.020	0.018	0.012	0.024
	(0.017)	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)
Observations	429	419	337	364	419	351
Pseudo R-squared	0.04	0.05	0.04	0.03	0.05	0.05

Notes: (1) Probit estimation, standard errors robust for heteroscedasticity are in brackets. (2) Coefficients are marginal probability effects computed at sample mean. (3) "Developed" is a binary variable that takes a value of 1 for developed countries and 0 otherwise. (4) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

ing countries, where distance is used as the weight. The distance could be geographical distance, trade distance, or cultural distance. Following Tressel et al. (2009), I define the distance as political distance, as measured by the "entente" variable of the Correlates of War Database.[8]

[8] The entente variable takes a value of 1 if one or both states in the dyad had an understanding that consultations with the other state in the dyad would take place if a crisis occurred and 0 otherwise. There are other types of alliances, such as common pacts, defense pacts, and non-

I employ the weighted average of reform implementations of the allied countries as the instrument.[9] The logic behind the choice of this instrument is based on the assumption that policymakers in the home country are more (or less) likely to carry out reforms when their counterparts in allied countries also enact (do not enact) reforms. Hence, I conjecture that through *learning* and *spillover* channels (Abiad and Mody, 2005; Meseguer, 2006; Fidrmuc and Karaja, 2013), structural reforms diffuse from allied countries to the domestic country.[10] Moreover, I expect the instrument to be related to the dependent variable only through its impact on the reform implementation of the home country.

Panel A and panel B of Table 8 include the probit IV estimation and LPM IV estimation results, respectively, using lagged reform in political neighbors as an instrumental variable. The coefficient of lagged reform in the first stage, provided in Table 9 confirms—with the exception of agriculture reform—the relevance of reforms in the areas of trade, the current account, networks, the capital account, and domestic finance in neighbors to the promotion of parallel reforms in the home country, both with probit and LPM estimations.

Regarding the probit IV estimation in panel A of Table 8, it appears that structural reforms are not significantly associated with government turnover since the estimated coefficients of structural reforms are not significant at conventional levels.

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aggression pacts. As Rajan and Subramanian (2005) point out, the entente definition of an alliance is much more consistent with economic relationships, and therefore I choose to use this definition. However, the number of observations decreases, since some countries do not have any ally, according to the entente definition.

9 See also Giuliano et al. (2013) for a similar approach.

10 This general idea of economic reforms in one country can effect economic policies/reforms in other countries is not new. In fact, there are many studies in the literature which argue that economic policies are contagious. For instance, Meseguer (2006) finds out that learning from the region and from the rest of the world has positive and significant impact on trade liberalization, privatization, and entering into agreements with IMF. Fidrmuc and Karaja (2013) argue that the uncertain outcome of a reform can be mitigated by observing the experience of other countries. Information, which spillovers from other countries gives signal about the outcome of the reform and therefore help reduces the uncertainty. As a result, informational spillovers (depending on geographic, cultural and historical distance) have substantial impacts on fostering reforms. They also provide empirical evidence that spillovers for economic and political liberalization exist between post-communist countries. Gassebner et al. (2011) shows theoretically that reforms are more likely when they are pursued in other economies. In addition, they test the predictions of their model and point out that economic reforms diffuse from neighboring countries through the channels of geographical and cultural proximity. Finally, Abiad and Mody (2006) suggest that learning from the regional reform leaders significantly increases the likelihood of domestic financial reforms.

Furthermore, the Wald test indicates that probit IV results are not statistically different from pooled probit results.[11] The results in panel B of Table 8 are not substantially different from those in panel A. No coefficients of structural-reform variables are statistically significant.

Table 8A. Electoral Impact of Reforms in Different Sectors: IV Estimation Second Stage

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Panel A: IV Probit						
Reform (t-1)	0.160	0.356	-0.400	0.367	0.545	-0.080
	(1.685)	(1.983)	(9.783)	(0.864)	(2.189)	(0.909)
Inflation (t-1)	0.006	0.009	0.006	0.006	0.009	0.006
	(0.005)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)
Growth (t-1)	-0.040	-0.037	-0.023	-0.045	-0.036	-0.038
	(0.025)	(0.033)	(0.066)	(0.027)	(0.027)	(0.028)
Government	0.040**	0.047	0.030	0.033	0.048*	0.056**
Share of GDP (t-1)	(0.018)	(0.032)	(0.219)	(0.023)	(0.028)	(0.025)
Proportional	0.292	0.294	0.276	0.224	0.289	-0.014
Representation	(0.272)	(0.349)	(0.386)	(0.331)	(0.343)	(0.316)
Parliamentary	-0.302	-0.346	-0.022	0.032	-0.325	-0.218
System	(0.243)	(0.265)	(1.612)	(0.252)	(0.233)	(0.260)
Coalition	0.267	0.229	0.258	0.093	0.230	0.250
	(0.186)	(0.186)	(1.716)	(0.195)	(0.184)	(0.216)
Majority	-0.353	-0.461*	-0.187	-0.231	-0.444*	-0.698**
in parliament	(0.280)	(0.255)	(1.560)	(0.261)	(0.268)	(0.300)
Duration	0.035	0.063	0.048	0.105	0.068	0.096
of the cabinet	(0.074)	(0.078)	(0.476)	(0.086)	(0.085)	(0.092)
Observations	243	233	172	186	233	202
Wald test of exogeneity *(p-value)*	0.46	0.94	0.93	0.73	0.87	0.74

Notes: See end of panel B of Table 8.

As is seen in the table, the Durbin-Wu-Hausman test does not reject the null hypothesis, which holds that the reform variables are exogenous, suggesting that the LPMIV estimation results are not significantly different from

[11] The Wald statistic is estimated by the simultaneous-equations system, with a two-step probit regression that was introduced by Rivers and Vuong (1988). The model includes two equations: a reduced-form equation, where the dependent variable is the endogenous variable (first stage), and a structural equation, where the dependent variable is the latent variable (second stage). This method consists of including the residuals of the first-stage equation in the second- stage equation. The Wald statistic simply tests whether the residuals from the reduced-form regression are correlated with those from the structural equation. In other words, the null hypothesis of the Wald test is that the pooled probit and probit IV results are significantly different.

the LPM results. Moreover, the Kleibergen-Paap test rejects the null hypothesis, which assumes that the instrument is weak in all of its estimations, except for column 3.

Table 8B. Electoral Impact of Reforms in Different Sectors: IV Estimation Second Stage (continued)

Dependent Variable: 1 if government changes	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Panel B: LPM IV						
Reform (t-1)	0.160	0.356	-0.400	0.367	0.545	-0.080
	(1.685)	(1.983)	(9.783)	(0.864)	(2.189)	(0.909)
Inflation (t-1)	0.006	0.009	0.006	0.006	0.009	0.006
	(0.005)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)
Growth (t-1)	-0.040	-0.037	-0.023	-0.045	-0.036	-0.038
	(0.025)	(0.033)	(0.066)	(0.027)	(0.027)	(0.028)
Government	0.040**	0.047	0.030	0.033	0.048*	0.056**
Share of GDP (t-1)	(0.018)	(0.032)	(0.219)	(0.023)	(0.028)	(0.025)
Proportional	0.292	0.294	0.276	0.224	0.289	-0.014
Representation	(0.272)	(0.349)	(0.386)	(0.331)	(0.343)	(0.316)
Parliamentary	-0.302	-0.346	-0.022	0.032	-0.325	-0.218
System	(0.243)	(0.265)	(1.612)	(0.252)	(0.233)	(0.260)
Coalition	0.267	0.229	0.258	0.093	0.230	0.250
	(0.186)	(0.186)	(1.716)	(0.195)	(0.184)	(0.216)
Majority	-0.353	-0.461*	-0.187	-0.231	-0.444*	-0.698**
in parliament	(0.280)	(0.255)	(1.560)	(0.261)	(0.268)	(0.300)
Duration	0.035	0.063	0.048	0.105	0.068	0.096
of *the* cabinet	(0.074)	(0.078)	(0.476)	(0.086)	(0.085)	(0.092)
Durbin-Wu-Hausman test of exogeneity *(p-value)*	0.47	0.94	0.92	0.72	0.82	0.80
Kleibergen-Paap weak identification *F* statistic	5.90	12.65	0.114	38.53	7.38	70.07

Notes: (1) Probit estimation results are in Panel A. (2) Standard errors robust for heteroscedasticity are in brackets. (3) Coefficients are marginal probability effects computed at sample mean. (4) LPM estimation results are in Panel B. (5) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

All in all, reforms have been found to be statistically unrelated to the probability of government turnover, as in the baseline estimations. More importantly, both probit IV and LPM IV estimations are found to be statistically no different from pooled probit and LPM estimations.[12] For these reasons, I prefer to conduct the pooled probit estimation in the following sections.

[12] I also employ two other instruments. First, I instrument reforms in a given country with average reforms in the rest of the world. Second, reforms in the rest of the world, weighted by the distance from the country in question, are used as instruments. The results, which are available upon request, are very similar to the ones presented in Table 8.

4. Alternative Explanations

Until now, I have established no evidence for the existence of a credible association between structural reforms and political fortunes. A question that comes to mind is the possible heterogeneity of the relationship between reforms and government turnover. There could be certain factors that increase or decrease the probability of a government being rejected by the voters or that alter the direction of the effect of reform on the change of government. To this end, in this section, I address the question of whether the association between reforms and government turnover differs with respect to particular factors. First, I check whether macroeconomic conditions matter. Second, I examine to what extent the institutional environment is important. Finally, I investigate whether the sequencing of reforms plays a role in the political success or failure of governments.

4.1. The Role of Macroeconomic Conditions

An important issue to be aware of when planning to introduce economic reforms is how to deal with the macroeconomic environment. What should governments do in this situation if economic disequilibrium exists?

Macroeconomic stabilization is considered a sine qua non for successful economic reforms. In the literature, many studies agree that macroeconomic stabilization is the key precondition for bringing in structural reforms and thus should be given priority and taken care of before the reform process is initiated. Since any process of economic liberalization often requires costly adjustments (Edwards, 1984), macroeconomic stability should be maintained in order not to exacerbate adjustment costs. Edwards (1984) also argues that macroeconomic management after structural reforms is much more difficult than had been thought. He attributes some reform failures in Latin American countries in the 1980s to the fact that reforms took place together with macroeconomic stabilization programs that were aimed at reducing inflation, budget deficits, etc.

High volatility or a high propensity for financial crises means greater uncertainty, which eventually may deter investments. More importantly, an unstable macroeconomic environment might cause uneven distribution of costs and benefits following reforms. Furthermore, reform programs put in place within an unsettled macroeconomic environment are likely to be reversed and therefore unlikely to be credible.

Table 9. Electoral Impact of Reforms in Different Sectors: IV Estimation First Stage

Dependent Variable: Reform	(1) Trade	(2) Current A.	(3) Agriculture	(4) Networks	(5) Capital A.	(6) Domestic F.
Panel A: IV Probit						
Reform in political	0.505***	0.374***	-0.066	0.757***	0.330***	0.608***
neighbors (t-1)	(0.205)	(0.103)	(0.191)	(0.117)	(0.119)	(0.071)
Inflation (t-1)	-0.0006***	-0.0005***	0.00001	-0.0005**	-0.0005***	-0.0003
	(0.0020)	(0.0001)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Growth (t-1)	0.007*	0.013***	0.004	-0.004	0.009	0.013**
	(0.004)	(0.005)	(0.008)	(0.005)	(0.006)	(0.005)
Government	-0.005	-0.013***	-0.018**	-0.004	-0.010**	-0.014***
Share of GDP (t-1)	(0.003)	(0.004)	(0.008)	(0.004)	(0.005)	(0.004)
Proportional	-0.014	0.029	-0.001	0.071	0.032	-0.039
Representation	(0.040)	(0.066)	(0.088)	(0.068)	(0.070)	(0.071)
Parliamentary	0.073**	0.072	-0.169	-0.057	0.016	0.123**
System	(0.37)	(0.056)	(0.112)	(0.056)	(0.063)	(0.060)
Coalition	-0.020	-0.031	0.194***	-0.058	-0.025	0.014
	(0.028)	(0.040)	(0.061)	(0.054)	(0.051)	(0.038)
Majority	-0.086***	-0.056	0.138*	-0.001	-0.063	-0.12**
in parliament	(0.034)	(0.056)	(0.08)	(0.066)	(0.064)	(0.05)
Duration	-0.008	-0.010	-0.041**	0.002	-0.018*	0.015*
of the cabinet	(0.007)	(0.010)	(0.018)	(0.008)	(0.010)	(0.008)
Observations	243	233	172	186	233	202
Panel B: LPM IV						
Reform in political	0.505**	0.374***	-0.066	0.757***	0.329***	0.608***
neighbors (t-1)	(0.207)	(0.104)	(0.194)	(0.120)	(0.120)	(0.072)
Inflation (t-1)	-0.0006**	-0.0005***	0.00001	-0.0005**	-0.0005**	-0.0003
	(0.0002)	(0.0001)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Growth (t-1)	0.006*	0.013**	0.004	-0.004	0.009	0.012**
	(0.004)	(0.005)	(0.008)	(0.005)	(0.006)	(0.006)
Government	-0.005	-0.013***	-0.018**	-0.004	-0.010**	-0.014***
Share of GDP (t-1)	(0.003)	(0.004)	(0.008)	(0.004)	(0.005)	(0.004)
Proportional	-0.014	0.029	-0.001	0.071	0.032	-0.039
Representation	(0.041)	(0.067)	(0.090)	(0.070)	(0.071)	(0.072)
Parliamentary	0.073*	0.071	-0.169	-0.0057	0.016	0.123**
System	(0.038)	(0.056)	(0.114)	(0.057)	(0.064)	(0.060)
Coalition	-0.020	-0.031	0.194***	-0.058	-0.025	0.014
	(0.028)	(0.040)	(0.062)	(0.055)	(0.052)	(0.038)
Majority	-0.086**	-0.057	0.138*	-0.001	-0.063	-0.120**
in parliament	(0.034)	(0.057)	(0.082)	(0.067)	(0.064)	(0.051)
Duration	-0.008	-0.010	-0.041**	0.002	-0.018*	0.015*
of the cabinet	(0.007)	(0.010)	(0.018)	(0.008)	(0.010)	(0.008)
Observations	243	233	172	186	233	202

Notes: (1) Standard errors robust for heteroscedasticity are in brackets. (2) Coefficients are marginal probability effects computed at sample mean. (3) *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

If macroeconomic conditions are not stable, the public will expect reform attempts to be discontinued or reversed (Edwards, 1984). Edwards (1989) argues that in the presence of extensive macroeconomic disequilibrium, most countries increase tariffs and impose trade, capital, and exchange controls in order to slow the outflow of their foreign-exchange reserves. For instance, trade liberalization might cause substantial deterioration in the current-account balance in the short run owing to the decrease in tariff revenues. If a government suffers from a fiscal deficit, then it might choose the easy option of reversing reform. The high risk and cost and unequal distribution of reform gains and losses might also galvanize the political opposition against the ruling party. Therefore, governments face the risk of reform failure or being voted out of office, or both.

Loayza et al. (2007) argue that macroeconomic volatility has direct adverse effects on economic outcomes, such as economic growth and future consumption. The welfare cost of volatility works through the channels of economic and political uncertainty as well as tightening constraints on investment. Consequently, I scrutinize the question of whether the political repercussions of structural reforms are related to macroeconomic instability. To this end, I first calculate the standard deviation of real GDP per capita growth, the standard deviation of the current-account balance to GDP, and the standard deviation of the growth rate of gross capital flows to GDP over the sample period. Then I split the countries into two groups according to whether they are above or below the median of each indicator.

The volatility of these macroeconomic indicators is a prime sign of macroeconomic instability. Growth volatility is negatively associated with long-run economic growth (Hnatkovska and Loayza, 2003). Using Turkish data, Berument et al. (2012) show that higher growth volatility reduces total factor productivity and investment and causes exchange-rate depreciation, while Huang et al. (2015) find that across US states, higher growth volatility is significantly related to higher income inequality. In addition, current-account balance volatility as well as volatility in the growth rate of private capital flows might cause real exchange-rate volatility, which ultimately could trigger exchange-rate crises.

Table 10 reports the estimation results for each group of countries. The specification is the baseline pooled probit specification, but control variables are not reported, owing to space limitations. Columns 1 and 2 consider countries with more and less growth volatility, respectively. The results in column 2 indicate that international trade reforms and financial reforms are negatively related to the probability of government turnover if GDP growth volatility is low, whereas agriculture reform, unexpectedly, is statistically significant with

a positive sign. Columns 3 and 4 of Table 10 display the estimation results for more and less current-account balance volatility.

It appears that governments that enact product-market reforms in countries where the current-account balance is highly volatile are punished by voters. Yet there is a negative relationship between the probability of government turnover and trade and financial reforms in countries where the current-account balance is less volatile. Finally, I consider volatility in the growth rate of private capital flows in columns 5 and 6. Similar to the previous results, voters reward governments for financial reforms if macroeconomic stability is achieved. On the other hand, implementing agriculture reforms seems to be electorally detrimental to governments if there exists high volatility.

Overall, the results suggest that implementing structural reforms in the presence of macroeconomic disequilibrium does not benefit the party in party. Voters are inclined to reward governments for introducing financial reforms only if macroeconomic stability has been restored. International trade reform has a similar interpretation when it is measured with the trade variable, since it is significant, with a negative sign in columns 2 and 4, while it is negative but with a p-value of 0.11 in column 6. Finally, product-market reforms are found to be positively associated with government turnover in columns 4 and 6, suggesting that voters choose to penalize governments if product-market reforms are imposed under unsound macroeconomic conditions.

4.2. The Role of the Institutional Environment

Another essential condition for successful, growth-enhancing structural reforms is the institutional environment. The idea is that macroeconomic policies are effective only if a country has already reached a certain level of institutional development. For instance, Prati et al. (2013) argue that institutional underdevelopment prevents countries from taking full advantage of substantial structural reforms. Having completed a cross-country analysis, they find that structural reforms are associated with growth only in countries with a certain level of institutional quality. Conversely, in countries where institutions are not sufficiently developed, reforms do not spark growth. Similarly, Bekaert et al. (2005) assert that growth prospects from liberalization are almost three times higher for countries with a higher than median level of institutional quality. Tressel and Detragiache (2008) analyze the impact of banking reform in 91 countries from 1973 to 2005. Their findings demonstrate that banking-sector reforms promote financial deepening, but only in countries with adequate checks and balances on political power.

Bussiere and Fratzscher (2008) argue that institutional development matters only for the long-run growth potential arising from structural reforms. However, Aksoy (2014) finds that countries with better property rights and superior contracts enforcement are already benefiting from reforms in the short run, since better institutional quality alleviates the short-term negative growth impacts of reforms. More significantly, poor institutional quality exacerbates the adverse aspects of reforms. If we assume that voters are short-sighted, they will take the short-run losses brought by reforms into account rather than the long-term benefits when they get ready to vote. Thus, I expect the probability of government turnover to rise if reforms are attempted in institutionally underdeveloped countries. In contrast, voters would be willing to reward reformist governments if the costs of the reforms are not distributed unevenly and unfairly, or compensation schemes are created to ease the burden borne by reform losers, who are likelier to be found in institutionally developed countries.

To investigate the degree to which institutions mediate or enhance the electoral consequences of structural reforms, I follow an approach similar to the previous section's I compute the median of the institutional indicators for the period 1975-2006 and then split the countries into two groups, according to whether they are above or below the median level. The indicators that I employ are constraints on the executive, the quality of democracy, and the extent of political rights.[13] Table 11 presents the estimation results. As in Table 10, I do not report the coefficients of control variables in order to save space.

According to the results in column 1, implementing international trade reforms as well as domestic financial reforms significantly decreases the probability of government turnover rin more democratic countries. On the other hand, current-account and product-market reforms are statistically significant, with a positive sign in column 2, suggesting that voters opt to punish governments for carrying out these reforms in less democratic countries. In accordance with these findings, international trade reforms and financial reforms are negatively associated with the probability of government turnover when there are sufficient checks and balances on political power (column 3).

[13] Institutional data are taken from the Quality of Government Dataset. They are p_xconst, fh_polity2, and fh_pr, respectively. The constraints on the executive indicator (p_xconst) ranges from 1 to 7, where 1 corresponds to unlimited authority and 7 to the existence of other groups' effective authority equal to or greater than the executive's. The quality of democracy (fh_polity2) ranges from 0 to 10, where 0 is least democratic and 10 most democratic. Finally, political rights (fh_pr) are related to the free participation in the political process, including, among others, the right to vote freely and to join political parties. It is scaled between 1 (most free) and 7 (least free).

In the other case (column 4), only the current-account variable is statistically significant, with an expected positive sign. Finally, in columns 5 and 6, I probe whether results are robust when considering another control variable; political rights. International trade reforms and financial reforms are statistically significant, with a negative sign in column 5, showing that governments decrease their probability of losing power after reforming their economies in countries where property rights are well protected. As for the other group of countries, the results in column 6 indicate that voters penalize their governments for promulgating current-account and agriculture reforms if political rights are not well enforced.

4.3. The Role of Reform Sequencing

Another area that I have wanted to explore is the role of reform sequencing. If all reforms have the potential to promote economic growth, which type of reform should be presented first? Does the ordering of reforms matter for electoral outcomes? The relatively old literature on reform sequencing, in fact, indicates that ordering does matter. This extensive literature mainly deals with the ordering of current-account and capital-account liberalization moves. If the capital account is liberalized first, then the economy becomes more vulnerable to capital inflows. Exchange-rate volatility arising from capital flows may have a significant negative impact on exports and therefore on the current-account balance.

Regarding the relationship between capital-account liberalization and domestic financial liberalization, it is argued that the latter should be enacted first, since it is related to the development of the entire banking sector, the money markets, and the interbank markets as well as to the strengthening of all domestic financial institutions. The logic underlying this statement runs as follows: in a financially repressed economy, the domestic banking system already suffers from heavy regulations. If the capital account is liberalized in such a strait-jacketed environment, where interest rates are artificially pinned down at low levels, heavy capital outflows could take place (Edwards, 1984), and severe domestic regulations could weaken the competitiveness of domestic banks relative to international ones (Nsouli et al., 2002).

Furthermore, Kose et al. (2008) claim that, according to the IMF's sequencing approach to capital-account liberalization, financial-sector reforms that reinforce prudential regulation and supervision, along with financial restructuring, should precede any capital-account liberalization. A sound domestic financial system could also reduce domestic economies' vulnerability to capital-flow volatility.

Table 10. Electoral Impact of Reforms in Different Sectors: The Role of Macroeconomic Conditions

Conditions:	(1) **More Growth Vol.**	(2) **Less Growth Vol.**	(3) **More Current-Account Balance**	(4) **Less Current-Account Balance**	(5) **More Capital Flows Volatility**	(6) **Less Capital Flows Volatility**
Trade (t-1)	0.252	-0.354**	-0.243	-0.335**	-0.075	-0.257
	(0.286)	(0.158)	(0.292)	(0.159)	(0.294)	(0.163)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.11	0.08	0.18	0.04	0.04	0.07
Observations	175	260	140	295	223	212
Current Account (t-1)	0.125	-0.245*	-0.155	0.122	0.035	-0.161
	(0.166)	(0.137)	(0.136)	(0.181)	(0.143)	(0.150)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.14	0.05	0.03	0.05	0.04	0.07
Observations	168	184	289	138	223	204
Agriculture (t-1)	0.080	0.250**	0.293*	0.076	0.231*	-0.037
	(0.140)	(0.118)	(0.177)	(0.095)	(0.134)	(0.108)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.12	0.13	0.20	0.03	0.08	0.04
Observations	130	197	93	234	155	172
Networks (t-1)	0.152	0.178	0.473*	-0.016	0.052	0.154
	(0.206)	(0.140)	(0.288)	(0.119)	(0.159)	(0.147)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.13	0.11	0.20	0.03	0.06	0.04
Observations	131	224	96	259	163	192
Capital Account (t-1)	-0.048	-0.259**	0.170	-0.279**	0.036	-0.350**
	(0.159)	(0.133)	(0.170)	(0.130)	(0.136)	(0.149)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.14	0.07	0.20	0.05	0.04	0.08
Observations	168	259	138	289	223	204
Domestic Finance (t-1)	0.190	-0.287**	0.422	-0.188*	0.071	-0.254*
	(0.200)	(0.137)	(0.276)	(0.117)	(0.160)	(0.138)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.15	0.10	0.35	0.04	0.05	0.08
Observations	128	233	82	279	171	190

Notes: Probit estimation, standard errors robust for heteroscedasticity are in brackets. Coefficients are marginal probability effects computed at sample mean. *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

Table 11. Electoral Impact of Reforms in Different Sectors: The Role of Institutional Environment

Conditions:	(1) **Better Democracy**	(2) **Worse Democracy**	(3) **More Constraints on the Executive Power**	(4) **Less Constraints on the Executive Power**	(5) **Better Protected Property Rights**	(6) **Worse Protected Property Rights**
Trade (t-1)	-0.343**	-0.139	-0.441**	-0.131	-0.335**	-0.046
	(0.179)	(0.259)	(0.189)	(0.245)	(0.171)	(0.284)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.06	0.15	0.05	0.11	0.07	0.17
Observations	310	125	283	152	312	123
Current Account (t-1)	-0.199*	0.380*	-0.234*	0.344*	-0.218*	0.472**
	(0.123)	(0.226)	(0.135)	(0.187)	(0.122)	(0.229)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.06	0.23	0.05	0.18	0.06	0.25
Observations	308	119	272	155	314	113
Agriculture (t-1)	-0.024	0.302**	-0.004	0.133	-0.015	0.291**
	(0.104)	(0.146)	(0.108)	(0.144)	(0.102)	(0.148)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.05	0.18	0.04	0.10	0.04	0.20
Observations	223	104	201	146	232	95
Networks (t-1)	-0.081	0.409*	-0.018	0.220	-0.083	0.309
	(0.119)	(0.228)	(0.128)	(0.214)	(0.116)	(0.229)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.05	0.17	0.04	0.05	0.05	0.18
Observations	250	105	226	129	259	96
Capital Account (t-1)	-0.170	-0.178	-0.272**	0.061	-0.189*	-0.670
	(0.118)	(0.207)	(0.128)	(0.182)	(0.117)	(0.207)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.06	0.22	0.06	0.16	0.06	0.22
Observations	308	119	272	155	314	113
Domestic Finance (t-1)	-0.219*	0.006	-0.388***	0.131	-0.231*	0.095
	(0.126)	(0.215)	(0.141)	(0.183)	(0.125)	(0.221)
Control Variables	YES	YES	YES	YES	YES	YES
Pseudo R-squared	0.07	0.20	0.08	0.14	0.07	0.22
Observations	259	102	233	128	260	101

Notes: Probit estimation, standard errors robust for heteroscedasticity are in brackets. Coefficients are marginal probability effects computed at sample mean.
*** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

Table 12. Electoral Impact of Reforms in Different Sectors: The Role of Reform Sequencing

Reform:	(1) **Current Account**	(2) **Agriculture**	(3) **Network**	(4) **Capital Account**	(5) **Domestic Finance**
Reform (t-1)	-0.249	-0.053	0.070	-0.222	-0.022
	(0.162)	(0.149)	(0.133)	(0.144)	(0.137)
Capital Account	0.139	0.185*	0.281***	0.123**	0.141*
Liberalization First	(0.088)	(0.100)	(0.096)	(0.085)	(0.087)
Domestic Financial	-0.060	0.080	0.001	-0.068	-0.047
Liberalization First	(0.104)	(0.156)	(0.106)	(0.109)	(0.101)
Reform $(t-1) \times$ Capital Account	1.065***	0.296	0.695**	0.785***	0.092
Liberalization First	(0.376)	(0.237)	(0.299)	(0.323)	(0.266)
Reform $(t-1) \times$ Domestic Finance	0.201	0.447	-0.011	-0.034	0.331
Liberalization First	(0.380)	(0.352)	(0.441)	(0.453)	(0.378)
F test of joint significance *(p-value)*	0.03	0.12	0.00	0.06	0.42
Control Variables	YES	YES	YES	YES	YES
Pseudo R-squared	0.08	0.11	0.11	0.08	0.07
Observations	323	243	273	323	329

Notes: Probit estimation, standard errors robust for heteroscedasticity are in brackets. Coeffcients are marginal probability effects computed at sample mean. *** significant at 1%; ** significant at 5%; * significant at 10%. Source: Author's estimations.

Finally, theoretical analysis of the sequencing of liberalization steps in the areas of trade and domestic finance has been relatively scarce with respect to other orderings. Among others, Bhataccarya (1999) argues that trade liberalization should precede domestic financial liberalization, since if the expanded resources thanks to the latter are directed to the importable sector, the importable sector will grow while the exportable sector will contract.

In addition to the above arguments, Aksoy (2014) argues that the pursuit of an optimal reform sequence ameliorates the adjustment costs of structural reforms in developing countries. In particular, the short-run negative growth effects of reforms in domestic finance and the capital account weaken and become positive in certain cases—if the financial reforms follow the trade reforms, for example. That is why I expect that financial reforms are also less costly in terms of political consequences for incumbent governments, provided that the enacting countries are open to trade when they start to restructure their economy.[14]

To test this hypothesis and detect whether alternative sequencing strategies can be advocated for governments, I take the following steps. First, to obtain precise liberalization dates, I set a threshold for the indices, above which a country is considered liberalized. In keeping with previous studies, the reform variable is defined to take the value of 1 when the index is above the median of the index across all countries, and the value of 0 when the index is less than or equal to the median.[15] Then I split the countries into three groups, according to whether they first conducted current-account liberalization, capital-account liberalization, or domestic-financial liberalization.

Finally, instead of running regression analysis for each group separately, I interact each dummy with mean-deviated reform variables and present the results in Table 12. Thus, the coefficient of each dummy indicates the impact of opening up the corresponding sector first, when reform is at its median level.

The results in column 1 show that the capital-account-liberalization-first variable is borderline significant, with a positive sign (p-value of 0.11). Table 12 also reports the p-value for the F-test on the joint significance of dummies and interaction variables, showing that the test passes, with a p-value of 0.09.

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[14] Note that there might be some distributional costs specific to different sectors of the economy, which are not captured by overall economic growth.

[15] The median level of trade index is equal to 0.78, the current-account index is equal to 0.63, the capital-account and domestic-finance indices are equal to 0.50.

Therefore, in countries adhering to a capital-account-liberalization-first strategy, implementing trade reforms significantly increases the probability of government turnover. In columns 2 and 3, the electoral impacts of product-market reforms appear. In both columns, the KA first variable is positive and significant. The F test cannot reject the joint significance of interaction terms in column 3, whereas it is marginally insignificant in column 2. The results indicate that deregulation in product markets is costlier for governments in countries that opened up their capital accounts first, compared with others that opened up their current accounts first.

For capital-account reforms, the capital-account-liberalization-first dummy's interaction with them has a statistically significant positive effect on government turnover. Moreover, the joint significance test results in a p-value of 0.06, meaning that when governments implement capital-account reforms, the resulting electoral impact appears to be significantly negative if the capital account has been liberalized first, compared to countries that acted on the current account first.

Finally, the results in column 5 demonstrate that although the coefficient of the capital- account-liberalization-first variable is statistically significant, with a positive sign, the F test fails to reject the null hypothesis of joint significance. Hence, there is not enough evidence to support the notion that the probability of government turnover goes up after domestic financial reforms have been introduced in countries that first opened up their capital accounts, compared to those that started with their current accounts.[16]

To sum up, the sequencing of reforms leads to political as well as economic changes. An optimal sequence makes voters reward reformist governments, possibly because it shields the economy from the uncertainty and adjustment costs that often appear in tandem with reforms. Taken together, my results lead me to conclude that the optimal sequence of reforms is imperative for electoral success.

[16] In this analysis, I used the current-account index to determine the specific year of international trade liberalization and the ordering between international trade and financial liberalizations. The results, which are available upon request, are virtually identical to the ones yielded when the trade index was used in place of the current-account index. Moreover, when I made the capital-account-liberalization-first variable the base group, I found no indication that the ordering of capital-account and domestic-financial liberalization influences the association between structural reforms and government turnover.

5. Concluding Remarks

In this paper, I have investigated the effects of structural reforms on the probability of government turnover, an issue that has received scant attention in the literature. I have shown considerable evidence that being reformist does not affect election outcomes. The fact that there is no significant correlation—at first glance—between structural reforms and governments' losing power is not driven by the offsetting responses of different reforms. In particular, reform actions directed at international trade, product markets, and financial markets appear to have little impact on the likelihood of government turnover, both in developed and developing countries. Similar results turn up for the political effects of economic reforms executed over the incumbents' term of office.

However, the baseline regressions disguise considerable heterogeneity in terms of a country's macroeconomic structure, institutional quality, and choice of reform sequencing. First, stable economic conditions help governments increase their probability of being re-elected. Voters are more inclined to punish reformist governments if reforms have been installed where growth, the current-account balance, and private capital flows are all highly volatile. On the other hand, eliminating rigidities in their markets exerts a favorable influence over electoral outcomes, provided that macroeconomic stability is achieved. Moreover, voters tend to reward reformist governments in institutionally developed countries, as adequate institutional quality helps cushion the adverse effects of reforms; while they punish governments for introducing reforms where institutional capacities are weak. Finally, I have provided evidence that voters are more likely to accept reforms if an optimal sequence of reforms is considered. In particular, voters reward reformist governments if current- account liberalization precedes capital-account liberalization.

Also, strong macroeconomic performance, low inflation, and high growth rates are shown to be associated with a lower probability of government turnover. While a favorable overall growth performance significantly reduces the probability of a government losing power in all countries, average inflation during a government's tenure has a statistically significant effect only in developed countries. Finally, I found weak indication that voters evaluate governments' performance on the basis of a comparison with global economic conditions.

The political economy of structural reforms is much more complicated than it appears. In terms of policy implications, this paper highlights the specific conditions that affect the electoral consequences of economic structural reforms. A prudent government should take into consideration the role of the institutional environment, macroeconomic conditions, and optimal sequencing

when undertaking such changes. Stabilization programs have to be seen to before structural reforms are launched in order not to jeopardize the adjustment costs. Similarly, lack of institutional quality seems to be another reason for electoral defeats of reformist governments. Hence, political reforms should precede economic ones to boost the chances for future electoral success of reformist governments. Finally, the finding that the correct ordering of structural reforms matters for maximizing the odds of winning upcoming elections suggests that governments would do well to take into consideration the appropriate sequencing of planned reforms.

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A. Appendix: Description of variables

A.1 Appendix: Description of reform indices

Current-Account Index: An indicator of how compliant a government is with its obligations under the IMF's Article VIII to free from government restriction the proceeds from international trade in goods and services. The index represents the sum of two sub-components, dealing with restrictions on trade in visibles, as well as in invisibles (financial and other services). It distinguishes between restrictions on residents (receipts for exports) and on non-residents (payments for imports). Although the index measures restrictions on the proceeds from transactions, rather than on the underlying transactions, many countries in practice use restrictions on trade proceeds as a type of trade restriction. The index is scored between zero and 8 in half-integer units, with 8 indicating full compliance. Source: Quinn (1997), Quinn and Toyoda (2007), and Quinn and Toyoda (2008).

Trade Index: Average tariff rates, with missing values extrapolated using implicit weighted tariff rates. The index is normalized to be between zero and unity: zero means the tariff rates are 60% or higher, while unity means the tariff rates are zero. Source: Various sources, including the IMF, the World Bank, the WTO, the UN, and the academic literature (particularly Clemens and Williamson (2004)).

Agriculture Index: The index captures market interventions on behalf of the main agricultural export commodity in each country. As data limitations preclude coding separate dimensions of intervention, the index provides a summary measure of intervention. Each country-year pair is assigned one of four degrees of intervention: (i) maximum (public monopoly or monopsony in production, transportation, or marketing); (ii) high (administered prices); (iii) moderate (public ownership in relevant producers, concession requirements); and (iv) no intervention. Source: Based on legislation and other official documents of the IMF.

Product-Market Index: A simple average of the sub-indices for the electricity and telecom markets that have been constructed, in turn, from scores along three dimensions. For electricity, they capture: (i) the degree of unbundling of generation, transmission, and distribution; (ii) whether a regulator other than government has been established; and (iii) whether the wholesale market has been liberalized. For telecom, they capture: (i) the degree of competition in local services; (ii) whether a regulator other than government has been established; and (iii) the degree of liberalization of interconnection

charges. Indices are coded with values ranging from zero (not liberalized) to two (completely liberalized). Based on national legislation and other official documents.

Capital-Account Index: Qualitative indicators of restrictions on financial credits and personal capital transactions of residents and financial credits to nonresidents, as well as the use of multiple exchange rates. This index is coded from zero (fully repressed) to three (fully liberalized). Source: Abiad et al. (2009), which follows the methodology in Abiad and Mody (2005). The original sources are mostly various IMF reports and working papers, but also central bank websites, etc. Resident/nonresident-specific indices are based on Quinn (1997), and Quinn and Toyoda (2007).

Domestic-Finance Index: The index of domestic financial liberalization is an average of six sub-indices. Five of them relate to banking: (i) interest-rate controls, such as floors or ceilings; (ii) credit controls, such as directed credit and subsidized lending; (iii) competition restrictions, such as limits on branches and entry barriers in the banking sector, including licensing requirements or limits on foreign banks; (iv) the degree of state ownership; and (v) the quality of banking supervision and regulation, including the power or independence of bank supervisors, adoption of a Basel I capital-adequacy ratio, and a framework for bank inspections. The sixth sub-index refers to the regulation of securities markets, including policies to encourage the development of bond and equity markets, and to permit access to the domestic stock market by foreigners. The sub-indices are aggregated with equal weights. Each sub-index is coded from zero (fully repressed) to three (fully liberalized). Source: Abiad et al. (2009), which follows the methodology in Abiad and Mody (2005). The original sources are mostly various IMF reports and working papers, but also central bank websites, etc. Resident/nonresident-specific indices are based on Quinn (1997), and Quinn and Toyoda (2007).

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REFERENCE GROUPS AND HOUSEHOLD CONSUMPTION: EVIDENCE FROM TURKEY

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Abstract

It is well-known that relative concern influences many economic choices, including consumption decisions. Recently, several studies have linked the gradually falling savings rate in the United States since the 1980s with both relative concern and increased inequality. In this paper, we test for the presence of relative concern (i.e., peer effects) in consumption decisions for Turkey. In particular, we test whether households are affected by the purchases of other households who constitute their reference group. This is one of the few studies that investigate relative concern in a developing-country setting. Drawing on nationally representative data from the Turkish Household Budget Survey for the years 2003-2012, we examine different reference groups comprised of members having the same education level, urban-rural residence status, or age range. We find that the hypothesis is validated and that non-rich households are affected by perceiving the consumption of more prosperous individuals of the same educational background. However, we do not observe any group effects for upper-income households.

JEL Codes: C21, D03, D12

Keywords: Household expenditures, reference group, peer effects, developing country, Turkey

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1. Introduction

The aim of this study is to examine the determinants of household consumption and test for the presence of relative concern in consumption decisions in Turkey. Here, the basic intention is to identify the factors that affect household purchases and, especially, the examination of "group effects" (or peer effects) in such decisions, which is an uninvestigated topic for Turkish households.

Peer effects can be defined as the motive for changing the behavior of oneself in response to the behavior or action of others in one's reference group. The importance of this catching-up behavior has been well documented by theoretical and empirical studies. Hence, the main purpose of our study is to investigate peer effects in household consumption by exploiting a large dataset on the consumption behavior of Turkish households.

In our study, we empirically investigate peer effects, together with other determinants of household consumption, by working with the nationwide representative Turkish Household Budget Survey (HBS) for the years 2003-2012. Especially today, now that Turkey is seeking a way out of its middle-income trap, it is hoped that the findings on household consumption decisions will provide important guidance for Turkish economic policymakers seeking to boost the national savings rate and, in particular, design approaches tailored to various income groups.

Our first goal is to establish whether peer effects exist or not in this area. The question of what constitutes a reference group is somewhat controversial. Survey results have revealed that peer effects are more prominent in those with a similar education level rather than within the same age group. Considering this indeterminacy, we test the existence of group effects for separate reference groups. Specifically, we test peer effects for groups formed on the basis of same educational attainment, age range, and geography. Moreover, we test the impact of household characteristics and group effects separately for various urban-rural settings, income groups, and education levels.

In the first part of this paper, we detail the relationship between households' consumption and characteristics that are expected to influence their decisions to purchase goods, such as total household income, number of children, age, education level of the head of the household, and rural-urban residence status. In the second part, the existence of group effects on household consumption is investigated. We also question whether group effects vary according to the income quartiles. In this respect, the analysis is conducted separately for different income groups. Specifically, the existence and degree of peer effects on

middle- and low-income families are tested separately. Here, our goal is to distinguish the income group where relative concerns (i.e., peer effects) are more apparent. Additionally, we examine households as defined by their residence status. Particularly, we question whether consumption determinants and peer effects vary depending on the rural-urban residential setting. Seeking another valuable insight, we test whether relative concerns are upward-looking, such that non-rich households are affected by the consumption of rich ones.

The rest of the paper is organized as follows. After summarizing papers related to our study in the literature review in Section 2, we introduce the main data source and the empirical methodology applied in our study in Sections 3 and 4, respectively. Following the presentation and discussion of the results in Section 5, the paper concludes in Section 6.

2. Literature Review

2.1. Literature on Peer Effects

Evidence from social psychology, neuroscience, econometrics, and experimental economics indicates that humans usually compare themselves with others who occupy their reference group, and that the outcome of that engagement reflects on their sense of well-being. Individuals may feel degrees of satisfaction and experience a wide range of reactions, depending on whether they experience a negative feeling from being relatively deprived or a positive feeling from being better off, and they can change their behavior in response to that emotion.

Relative concern is especially central to feelings of happiness. An individual who earns a lower income compared to others in a certain group will feel happier if he/she earns the same amount when in a group of individuals who earn less.[1] In his seminal study, Easterlin(1974) documents that relative position could explain the observation that the self-reported happiness of individuals varies directly with income at a given point in time, but that the average level of happiness tends to be highly stable over time despite tremendous income growth, referred to as the Easterlin paradox. Easterlin also shows that the ratio of one's own income to the reference group's average income is more important for an individual's happiness than is the absolute value of one's own income. There are many studies on this so-called "relative income hypothesis"

[1] Duesenberry (1949) and Leibenstein (1950) can be considered the initial studies that document the importance of group effects on individual well-being and effect of relative concern in consumption decisions.

and its effect on happiness (for a summary of these studies, refer to Frey and Stutzer (2002) and Layard (2009)).

The concept of "conspicuous consumption," introduced to the literature by Veblen (1899), is based on the thesis that besides consumption, individuals also gain a certain utility from their status in society. Hence, to create a perception of higher status, they may increase their consumption of certain products considered symbols of high status, or imitate the consumption patterns of those in higher income classes. Basically, peer effects are what lie at the root of this conspicuous consumption behavior. When these effects are present, people start comparing their own consumption with that of others. Thus, in addition to the utility gained by consuming a specific good, the change in status (or relative ranking) in the social hierarchy gained through consuming that good also becomes important in individuals' consumption decisions. In such a situation, an individual will engage in consuming more than he/she otherwise would.

Moreover, there are studies that analyze the impact of group effects on other areas, such as work motivation, education, and real-estate acquisition. Theoretical studies investigate what possible consequences the degree of relative concern can have on economic outcomes, such as total consumption, investment, growth, and wealth accumulation. For example, an individual may exert extra effort to not fall behind his/her comparison group, referred to as the motive of "catching up with the Joneses" in the economics literature. This "falling behind" may be applicable across situations, such as wealth, income, possession of tangible assets, feeling of happiness, hours worked, marriage, home-ownership decisions, and health.

Conspicuous consumption arising from relative concern may lead an individual to consume more than he/she would in the absence of this motive. Consequently, different macro-economic effects are expected to occur, such as waste of productive resources in the economy, overconsumption, and high debt ratios. Relative concern may also force an individual to engage in unexpected activities, like working more to obtain better relative income or migrating elsewhere to secure a better position in life (Fan and Stark, 2011).

Recently, several studies have linked the excessive credit growth and high consumption in the period preceding the latest global crisis with conspicuous consumption and group effects. Frank et al. (2014) explain how an increase in consumption starting from the top income group in society has spread to the lower income groups; they argue that this peer-effect motive lies at the heart of the domino effect, which they refer to as "expenditure cascades," eventually sparking the dire sequence culminating in the worldwide crisis. The

gradually sinking savings rate in the United States since the 1980s has also been ascribed to this effect—as well as greater inequality.[2]

This thesis, which has also gained attention in the print media, has led to a revival of work on conspicuous consumption by economics researchers. Kumhof et al. (2015) and Ravenna and Vincent (2014) theoretically demonstrate how the growing income inequality and associated conspicuous consumption can ultimately cause excessive credit expansion, which later triggers such a crisis. Milanovic (2009), Stiglitz (2009), Fitoussi and Saraceno (2010), and Rajan (2010) are examples of studies that provide similar arguments and relate such groups' effects in various countries to global crises.

2.2. Literature on Peer Effects in Different Countries

With the growing interest in peer effects in consumption, new empirical studies have emerged to report on the consumption of non-rich households vis-à-vis that of rich households. The US is famous for its dramatic jump in real income over the last three decades for those at the top of the income-distribution melee.This has happened in tandem with an almost dormant median household income and higher inequality within the states of the country (Autor et al., 2008; Goldin and Katz, 2007). Based on these observations, Bertrand and Morse (2013), using the household consumption data from the Consumer Expenditure Survey, show that the rising consumption of the rich in the US has induced non-rich households to consume a greater share of their income. Drechsel-Grau and Schmid (2014) have also found support for the "keeping up with the Joneses" behavior in Germany. In contrast, Quintana-Domeque and Wohlfart (2016), using food-consumption data from Britain, find no effect of the elevated consumption of the rich on that of non-rich households. However, their finding is not surprising, as it is in line with that of Alessie and Kapteyn (1991), who report that food consumption is rather immutable, whereas other consumption categories are influenced by the consumption of the reference group.

The recently growing literature on peer effects in consumption is mostly derived from studies of developed countries. However, it is known that behavioral decisions, like those governing consumption, are influenced by culture and, hence, studies of consumption yield widely disparate results for different cultures. Redding (1990) and Wang and Ahuva (1998) show that models based on consumers in Western countries are inadequate for a full description of consumption behavior in Eastern countries. Moreover, they also demonstrate

[2] See Chrystia Freeland's article, "Keeping Up with the Slightly Richer Neighbors," in the *New York Times*, June 22, 2012.

that conspicuous consumption is more widespread in interdependent and hierarchical cultures, such as Asian ones, than in individualistic cultures like Europe and America, and that consumers in Eastern countries buy more goods that symbolize a desired position in their socio-economic hierarchy than do those in the West. Accordingly, the importance of status and, therefore, group effects in consumption (i.e., relative consumption concern) is higher in cultures that value group norms and are more socially connected than in independent cultures.

As shown by empirical studies, the existence and strength of peer effects may vary from country to country based on a number of factors, such as the political regime (see Friehe and Mechtel, 2014),[3] degree of corruption in the economy (Gokcekus and Suzuki, 2014),[4] religion (Khamis et al., 2012),[5] and ethnicity (Charles et al., 2009; Kaus, 2013).[6]

When these findings on the importance of group effects and their varying strength by culture and country are considered, it can be noted that the literature on developing countries, which are rapidly advancing and becoming more active players in the world economy, is quite limited compared to that on the developed economies. For this reason, as a country straddling Asia and Europe and representing a transition point between different cultures, Turkey is a uniquely appropriate setting for investigation of group effects in consumption.

In Turkey, the role of relative concerns in the consumption decisions of households may differ from that in other countries due to its cultural, religious, or other social features. Therefore, for several reasons, when examining the impact of group effects for Turkey, we expect spending patterns there to be unlike those in developed countries, as well as those in other emerging economies. First, Turkey is the only Muslim country among the G-20 member countries, which produce around 85% of the world's GDP. Compared to most of the other OECD nations, it is still considered a developing economy. Moreover, given the close social relationships in Turkish society, group ef-

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[3] Friehe and Mechtel (2014), in their study of the effect of the political regime on conspicuous consumption, showed that this effect was more prevalent in East Germany than in West Germany, and that this difference persisted even after the merging of the two countries.

[4] Gokcekus and Suzuki (2014) find a positive relationship between conspicuous consumption and corruption among OECD countries.

[5] Khamis et al. (2012) find differences in status-signaling motive across groups with distinctive social identities in India, some of which may be related to religion.

[6] Charles et al. (2009) find that group effects differ between African-Americans and Caucasians in the United States, while Kaus (2013) shows differences in group effects among black and white South Africans.

fects are expected to be stronger than in Western countries, where individualism is common. However, Turkey is also seen as separate from other emerging economies thanks to its own unique geography, culture, religion, and history, all of which affect social interactions and economic decisions. Furthermore, Turkey has been an independent nation and one with a liberalized economy for much longer than many others in the emerging-economy category. That being the case, its exposure to Western cultures and foreign products has a longer history than do the others.

After liberalizing its economy in the 1980s, Turkey experienced a period of rapid transformation. Not only have its consumers gained access to foreign goods and lifestyles, but the country has also experienced one of the fastest rates of urbanization of any country worldwide. Since the 1980s, its urban population has increased by 34.3 million. Moreover, the share of Turkey's middle class has grown, from 18% of the population in 1993 to 41% in 2010 (World Bank, 2014). While Turkey suffered a decline in its Gini coefficient, from 0.48 in 1994 to 0.41 in 2007, it still has one of the highest levels of income inequality of all the OECD countries.[7] However, there has been an upward trend in recent years, and both regional and inter-regional imbalances have been on a reverse track in the last four years (Filiztekin, 2015). At the same time, the rise of the urban middle class has influenced the national lifestyle, raising the level of families' exposure to other social classes and to various means of consumption. With the changing income distribution, relative concerns may have become more dominant in spending decisions in this emerging economy, and a race may have begun toward consumption in order to signal status.

2.3. Literature on Consumption Behavior in Turkey

Studies of the determinants of consumption related to Turkey can be divided into two groups. The first group looks into the determinants of aggregate consumption using time-series data at the aggregate level, referring to the total consumption expenditure component of GDP from national accounts. These studies analyze the effects on consumption of macroeconomic variables, such as interest rates, growth, and consumer confidence (e.g., Akkoyunlu, 2002; Aydede, 2008; Özcan et al., 2003).

The second group consists of studies that take a micro approach and seek the determinants of consumption at the household level. These studies generally

[7] The decline in inequality in the period from 1994 to 2003 is attributed mostly to the fall in within-group inequality, whereas in the first half of the 2000s, it was basically due to convergence between groups.

focus on a particular consumption subcategory (such as household goods) or specific product group (such as furniture). Some studies investigate consumption at a more micro level and focus on lower consumption categories (such as furniture) or single consumption items (tables). Many of these studies concentrate on food products and, especially, on items like milk or meat, while others are based on survey data conducted in Turkey in a particular region or province (e.g., Akpınar et al., 2009; Uzunöz and Karakaş, 2014).

The few studies that investigate total overall consumption for Turkey using household data either concern themselves only with a certain time period, such as a crisis or Ramadan, or are confined to a particular year.[8] There are also studies that use the HBS data to learn about the consumption of a particular group of products throughout Turkey.[9] These studies mainly focus on estimating the price and income elasticity of various consumption groups, and they differ considerably from our study in terms of scope and structure.[10] To the best of our knowledge, no previous study has researched total household consumption using the representative nationwide survey for Turkey from a similar perspective, for an extended period of time, and, especially, by incorporating the peer-effects motive for Turkish households.

The lack of panel data on household consumption for Turkey, where the same households are examined over years, may explain the lack of research in the field. However, through the surveys conducted by the Turkish Statistics Institute (TurkStat) since 2002, enough data have now been collected to work with. Although the data are cross-sectional, the HBS is still a valuable data source that can shed light on important questions. Our goal is to identify the factors affecting consumption behavior and, in particular, to detect peer effects by exploiting this large dataset on the consumption behavior of Turkish households.

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[8] Çelen (2015) investigates alcohol consumption during Ramadan; Duygan-Bump (2005) examines the effects of the 1994 financial crisis on durable goods consumption; Çağlayan and Astar (2012) address the urban and rural divide in household-consumption determinants; and Şahinli and Özçelik (2009) studies 12 product groups for the year 2003.

[9] Şahinli (2013) reports on food and non-alcoholic beverages; Şahinli and Özçelik (2015) deal with beer, milk, and cigarettes; and Şahinli and Fidan (2012) specialize in food expenditures.

[10] For that purpose, these studies apply methods such as ideal demand systems. However, the effect of household characteristics, such as demographic variables, on household consumption has not been investigated in these studies.

3. Data Description

The data in this study are acquired from the Turkish HBS, a nationally representative household survey, conducted since 2002 by the TurkStat.[11] In the survey, the final sampling unit is defined as the household, and a two-stage stratified cluster methodology has been used.

The households covered in our study are based on the definition by the TurkStat: a household is "*a community consisting of one or more than one person, living in the same house, housing, or part of the housing, who do not separate their income and expenses, who participate in household services and management, regardless of whether they have kinship or not*." In the survey, all residential areas within Turkish borders are included and are classified into two categories: rural and urban settlements. Urban settlements are places with populations greater than or equal to 20,001, while rural settlements are defined as areas with populations of less than 20,000. Only the population in retirement homes, nursing homes, prisons, military barracks, private qualified hospitals, and hotels (defined as corporate population), as well as immigrants, are kept outside the scope of study.

The HBS data consist of survey information obtained from a varying number of sample households per month between January 1st and December 31st of that year. The HBS asks detailed questions on consumption expenditures, income, employment status, and demographic characteristics. The consumption data, collected according to international standards, is a major source of information on patterns of consumption expenditure by socio-economic groups and rural versus urban settlements, and they also play a part in the construction of the Turkish consumer price index.

Consumption expenditures encompass market purchases as well as the use of the stocks of one's own production, consumption of goods and services brought home from work, cash and non-cash gifts received from organizations or other households, and voluntary contributions to insurance (e.g., health, life, motor vehicle, and other types of insurance). They exclude transfers to organizations or other households (e.g., cash contributions and gifts), expenditures for saving purposes, and debt repayments. The reference period is the survey month for non-durable consumption and the previous year for durable consumption. As the survey is conducted throughout the year, the value of consumption is adjusted using a monthly price index to account for price changes during the year.

[11] The dynamic database for HBS data is provided online by the TurkStat (http://www.tuik.gov.tr). The microdata can be obtained in CD-ROM form from the TurkStat upon official request.

We pool cross-sectional data from the 2003-2012 waves of the survey, which are collected independently in each wave. Moreover, in each wave, more than 8,000 households were interviewed. Each year, the number of household samples varies. Due to the differences in the coding of the datasets between years, special attention was paid to ensure consistency under a common code. Any discrepancies in survey data between years are identified and the required extraction and encoding are performed accordingly.[12] In addition, considering the possibility of incorrect coding in this type of survey data, we give particular attention to data cleaning. Households with zero or negative disposable income (nine households) and those with missing consumption data (ten households) are excluded from the study.[13] These reports are assumed to be the result of incorrect coding. However, it is also possible, though rare, that an income for that year was not obtained. Irrespective of the cause, these outliers are not part of our study. Others that are sidelined are some households without valid information on educational attainment. Information on the number of households included in our study after the exclusion is given in Table 1. Year 2003 households are used only to form the reference values for the 2004 wave and are not included in the estimations.

Table 1. Sample Sizes in Different Waves of Turkish Household Budget Surveys (HBS)

Year	Number of Households From Survey	Percent
2003	25,764	-
2004	8,544	10.42
2005	8,551	10.69
2006	8,556	10.78
2007	8,543	10.56
2008	8,549	10.85
2009	10,046	11.23
2010	10,082	11.47
2011	9,918	11.77
2012	9,987	12.22
Total	108,540	100

Source: Authors' calculations using HBS data.

[12] As an example, while for the survey years 2003, 2004, and 2005, an age range is provided, for the year 2006 and afterward, the exact age of the household is specified.

[13] A total of 19 excluded households are dispersed quite evenly across survey years: two in 2003, eight in 2005, two in 2006, five in 2007, one in 2008, and one in 2011.

4. Empirical Method and Identification Issues Related to Peer Effects

Our main purpose is to test whether the consumption decisions of households are influenced by the consumption of the rich households in their reference group. We estimate the regression equations in the following form.

$$\boldsymbol{C_{it} = b_0 + b_1 Y_{it} + b_2 Y_{it}^2 + b_3 C_{it}^R + B_4 X_{it} + B_5 T_t + \epsilon_{it}} \quad (1)$$

In Equation (1), total consumption (C_{it}) for household I in year t is expressed as a function of household disposable income (Y_{it}) and its square (Y_{it}^2), consumption of the reference group C_{it}^R, and a wide set of variables to control for household characteristics (summarized in the X_{it} matrix) that are theoretically expected to influence the level of consumption.

Household disposable income is the sum of the disposable incomes of individuals in a household, less the taxes and fees paid by the household and unilateral transfers to other households within the last year; it includes imputed rent. The disposable income of an individual is the sum of the actual payments made to the factors of production (wage, interest, profit, and rent) and unilateral transfers from public and private enterprises as well as from abroad, less the indirect taxes and unilateral transfers of the household to the government (such as deductions for social security); both cash and non-cash income are included. The square of household disposable income is included to account for non-linearity.

Urban versus rural residence, which is the only available variable related to geography, is included among the household characteristics as a dummy variable. Moreover, calendar-year effects are controlled by the T_t matrix, which includes time dummies.

To identify the coefficients in Equation (1), we assume that the error term ϵ_{it} is uncorrelated with the explanatory variables. We cluster standard errors by the education group of the household head.[14]

Finally, HBS assigns each household a weight to make the survey samples representative of the country populations. In all estimations, we weight observations with those population weights.

Based on the observation that zero expenditure rarely occurs, we decide that estimation by Tobit is not needed, and, thus, we use ordinary least squares (OLS) for our estimations.

[14] The overall model specification is tested using linktest and by plotting residuals against the predicted values. We also test for multicollinearity of the variables.

To determine the factors that influence household consumption, first, we estimate Equation (1) without taking reference-group consumption C_{it}^{R} into account. Hence, we estimate the following equation, which is the benchmark estimate without peer effects.

$$\boldsymbol{C_{it} = b_0 + b_1 Y_{it} + b_2 Y_{it}^2 + B_4 X_{it} + B_5 T_t + \epsilon_{it}.} \quad (2)$$

In the second part of our estimation, which addresses the main question of identifying the importance of peer effects, we determine the reference group to which the household compares itself, as explained in detail in Section 4.1. The average consumption level C_{it}^{R} of this group constitutes a reference value to which the household compares itself, and adjusts its consumption accordingly. Therefore, we estimate Equation (1), where the coefficient on reference-group consumption tells us the strength of the peer effect.

In our estimates, (C_{it}) is taken as the average total consumption of the non-rich households, defined according to their rank in the income distribution. Here, our aim is to test whether non-rich households follow the consumption of rich households. However, it is also possible that the existence of peer effects may not be uniform across income distribution. To test for this, we experiment with alternate definitions of non-rich, depending on the percentiles of household disposable income. First, we drop the richest and poorest 10th percentiles of the households in the income distribution, as they may display different behavior than that of the majority. In other words, in our first set of estimates, we restrict attention to households in the 10-90th percentiles. Then, in order to study the behavior of the households in the upper echelons of the income distribution, we restrict the sample to those in the 70-90th percentiles, and later to those in the 50-90th percentiles. Finally, to study the behavior of the households in the lower half of the income distribution, we restrict the sample to those in the 10-50th percentiles.

4.1. Selection of Reference Groups

There is a consensus in the literature on the notion that well-being depends on one's relative position (Clark and Oswald, 1996; Kingdon and Knight, 2007; Luttmer, 2005). Typically, a modified utility function in which one's utility depends on the gap between actual income and reference-group income has been used to model relative concerns. The main question that arises is how to define the reference group. Some studies rely on the controlled environment of the laboratory to do so (Clark et al., 2010; Falk and Ichino, 2006; McBride, 2010), while other studies define the reference group empirically, relying on whatever information is available in the data.

Reference-group theory argues that individuals compare themselves not to just anyone, but to people who are similar in many respects, for example, those who come from the same social group and have similar beliefs, values, income, and/or aspirations. Basically, the reference group is used as a standard to evaluate oneself. Models of social preferences (i.e., inequality aversion; see, e.g., Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Fehr and Schmidt, 1999; Mui, 1995) predict that the poor envy the rich, and reference-group theory predicts that the poor (rich) envy others from the same social group or class.

Although there is no standard in reference-group determination, two main approaches stand out in the empirical literature. The first approach, which can be called "proximity," relies on the assumption that comparisons are made with people nearby. Thus, in this approach, group interaction is based on physical proximity, where groups are formed by all individuals living in the same neighborhood (Luttmer, 2005), village (Knight et al., 2009), city or region (Persky and Tam, 1990), or country (Easterlin, 1995).

The second approach, which can be called "similarity," relies on the assumption that one compares oneself to those who have similar socio-demographic characteristics, such as being the same age, education level, race, and/or gender. In most empirical studies, data availability guides the choice of similarity characteristics that define the reference group. For example, Bygren (2004) considers those with the same education and work experience in the same occupation and in the entire labor market as the reference group.

It is also common to take a mixed approach and define reference groups based on both demographics and proximity.We follow this comprehensive approach and define the reference groups based on both geography (rural-urban setting) and similar demographic characteristics, and we test peer effects based on the similarity of the following demographic characteristics:

- Education level

- Age group

- Geography (urban-rural)

In other words, households form a reference group of people with the same demographic characteristics and belonging to the same urban-rural residence classification. Initially, we test peer effects when the reference group consists of those households with heads of household from the same education level. This approach is similar to that of Woittiez and Kapteyn (1998), who assume that people primarily meet people of about the same age and education. We

also experiment with reference groups based on age and only geography, which allows us to test the presence of peer effects for consumption decisions and which types of similarities help form the reference group.

In our analysis, regional proximity is inevitably measured only at the rural-urban level, since the HBS does not provide a finer geographical classification than the dichotomous rural-urban classification. People should relate themselves to the people they most frequently see, and regional proximity is a measure to capture the probability of relating oneself. However, with increased communication, lifestyles have converged, and the differences in living standards within cities have decreased. In that regard, a rural-urban divide will serve as a better proxy measure for similar lifestyles than would geographic proximity. Hence, although a finer geographic proximity measure could allow us to capture more dimensions, we believe that a rural-urban classification is a valid definition for the selection of reference groups. Regardless, we believe that even the rough rural-urban division reveals important differences in consumption patterns between the two groups. Information on the percentage of households in the survey by age and education level for each year is provided in Tables 2.a and 2.b, respectively.

Table 2.a. Age Group of Survey Sample by Year (%)

Age group	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
3	0.12	0.07	0.11	0.06	0.07	0.06	0.16	0.07	0.07	0.05	0.09
4	1.37	1.11	1.12	1.10	1.43	1.08	1.39	1.12	1.02	1.20	1.22
5	6.90	6.26	6.70	6.91	7.08	6.12	6.26	6.12	6.13	5.23	6.43
6	11.65	11.69	11.30	11.90	11.49	10.98	10.67	10.60	10.93	10.76	11.25
7	13.93	14.07	13.45	13.22	12.60	13.90	13.05	12.77	13.05	12.66	13.35
8	14.71	14.55	14.10	14.75	13.22	12.97	12.77	12.05	12.47	12.29	13.54
9	12.24	12.99	13.43	13.25	13.31	13.19	12.63	13.91	12.69	12.15	12.86
10	11.32	12.09	11.62	11.52	12.57	11.73	10.80	11.24	11.22	11.56	11.51
11	7.76	8.08	8.70	8.49	8.71	9.03	9.33	9.60	9.56	10.61	8.83
12	6.58	6.05	6.34	6.44	6.95	7.02	7.41	7.12	7.36	7.83	6.88
13	13.42	13.04	13.13	12.37	12.57	13.92	15.53	15.40	15.50	15.67	14.03
Total	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' calculations using HBS data.

Table 2.b. Education Group of Survey Sample by Year (%)

	Illiterate	literate but no completed education	elementary school graduate (5 years)	junior high school graduate (8 years)	high school graduate	vocational college graduate	college graduate	more than college education	
Year	0	1	5	8	11	13	15	18	Total
2004	7.03	5.01	51.02	10.38	16.81	2.63	6.73	0.38	100
2005	6.82	5.51	52.04	10.59	16.19	2.18	6.22	0.45	100
2006	6.68	5.03	52.91	10.96	15.72	2.51	5.76	0.43	100
2007	6.59	5.37	51.01	10.13	17.37	2.82	6.27	0.44	100
2008	6.19	5.00	46.16	11.32	19.05	3.61	8.04	0.64	100
2009	7.66	6.17	47.56	10.50	16.86	3.33	7.02	0.90	100
2010	7.60	5.42	46.74	10.70	17.08	3.57	7.90	1.00	100
2011	7.31	5.43	45.90	10.40	17.30	4.25	8.20	1.22	100
2012	7.13	5.18	42.96	11.65	18.07	4.43	9.06	1.52	100
Total	7.01	5.35	48.34	10.75	17.18	3.29	7.29	0.79	100

Source: Authors' calculations using HBS data.

4.2. Direction of Comparison

Psychological research and behavioral studies have shown that people display asymmetry in comparisons and that the disutility of a loss is weighted larger than is the utility of a gain (i.e., loss aversion). The literature refers to Duesenberry (1949), who is known to have assumed that people are upward-looking in making social comparisons because their perceived needs and aspirations are typically above what they have (Ferrer-i-Carbonell, 2005). Moreover, in happiness studies, it is found that poorer individuals are negatively influenced by the income of their richer peers, but the opposite is not true. In other words, richer individuals do not get happier from knowing that their income is above that of their co-citizens.

The direction of comparison is also a question raised in the literature. In upward comparisons, an individual compares himself with those who are higher in the hierarchy, such as those who are richer or happier. In downward comparisons, the reference group consists of those who are in lower positions in the rank hierarchy. Upward comparison is called "self-enhancement," since it leads the individual to increase his/her effort to reach the level of those above himself/herself. Downward comparisons, on the other hand, are based on "self-motivation," since people generally intend to improve utility and well-being by comparing themselves with others who are inferior or less for-

tunate (Wills, 1981). Affleck and Tennen (1991) show that people who suffer from major medical problems use downward comparison as a coping mechanism, while Brown and Dutton (1995) and Taylor et al. (1983) present empirical evidence in which individuals enhance their mood and subjective well-being through downward comparison. Hence, the direction of comparison can be regarded as context-specific.

Summarizing the empirical evidence, Wood and Taylor (1991) conclude that "when one has an unfavorable characteristic, one may self-enhance by reminding oneself of others who are similarly flawed. Even better is a downward comparison with someone who possesses even more of the undesirable characteristic" (p. 31). Considering the possibility that comparisons can be both upward and downward, Falk and Knell (2004) build a model in which individuals endogenously choose with whom they compare themselves to increase their utility. They show that people with higher ability have "upward comparisons" (for self-enhancement purposes), while those with lower ability choose a reference group from people below them; thus, reference standards are positively correlated with ability. Further, their model provides a theoretical rationale for the frequently used assumption that people compare themselves with others who are similar.

4.3. Reference-Group Consumption

In our study, we take the asymmetry in comparison into account and question whether comparisons are made with those below or above in the income distribution. First, we define the reference group as the "richest" households among those whose heads of household have similar characteristics. We define the "rich" households in a reference group as those in the top 10^{th} percentile of the income distribution of the previous year; this percentile is chosen because it is commonly used in the extant literature (e.g., Bertrand and Morse, 2013). The average consumption of the richest 10% of households in the same reference group will be used as reference-consumption value.

Our expectation is that peer effects in consumption decisions should be directed upward, where the reference should constitute those above, with the motive being conspicuous consumption. If people want to signal higher status, they should relate their consumption to those who are perceived as rich or high class. Hence, to form reference groups based on educational attainment and rural-urban status, we divide the sample into 16 groups by education category (eight categories) and rural-urban status (two categories). Then, we rank the households within each group by their household disposable income. The average total consumption of the households in the top 10^{th}percentile

within the corresponding reference group constitutes the reference consumption value for that group. To build reference groups according to age and rural-urban status, we similarly divide the sample into 20 distinct groups by age category (10 categories) and rural-urban status (two categories). Further, we follow the same methodology, calculating the reference consumption value using the average consumption of the households in the top 10^{th}percentile of that reference group.

As mentioned above, in some contexts, lower levels in the hierarchy can be taken as a reference due to the "self-motivation" motive. With regard to robustness, we test for downward comparison, including the consumption of the "poorest" households among those that have similar characteristics as a reference. Consequently, the analysis is repeated when the reference consumption value is calculated as the average consumption of the households in the bottom 10^{th} percentile of income.

4.4. Concerns for Possible Endogeneity

For each household, the reference group is constituted from the richest (or poorest) households with the same level of education and rural-urban location as the head of household (i.e., same education category). A well-known problem in the literature occurs when one studies a single cross-section and tries to explain the behavior of a household using the average behavior in the group to which the household belongs (the "reflection problem" in Manski;1993). Thus, we define reference groups so as to avoid this problem.

To eliminate the concerns for possible endogeneity between household *i*'s total consumption (C_{it}) and its reference-group consumption C_{it}^{R}, we make use of multiple cross-sections. In each survey year, we select the reference group as the richest households in the previous survey year. For a household in the current year, the reference-group consumption in the previous survey year is predetermined and is in the information set of the household when the household is making consumption decisions. Our identification assumption is that the consumption of rich households in the previous year is uncorrelated with the unobserved characteristics of the non-rich households (which are left to the error term in Equation (1)), which might influence their consumption decision. We think that this assumption is a plausible one. Any population-level shocks to consumption are already accounted for via year fixed effects. Even after defining reference-group consumption based on the previous year's consumption, the endogeneity problem may still be present if the consumption shocks to different income groups are correlated and persistent over time. For example, a preference shock that promotes dining at fancy restaurants may

raise restaurant consumption in all income groups, and the shock may persist for several years. However, if this were the case, reference consumption would be significant in all of our estimates (for all income percentiles as well as when the consumption of the poorest households was taken as a reference value). The results prove that this effect is not driving the results, as will be further explained below.

4.5. Control Variables

The household characteristics summarized in matrix X_{it} include variables often used in the literature for the determination of consumption, which are related to the demographics of the reference person (head of household) in the household, such as gender, age, marital status, education, and labor-market status, and the family structure, such as the number of children and elderly individuals in the household.

We include age to control for the lifecycle factors that are known to influence consumption decisions. Modigliani and Brumberg's (1954) life-cycle model of behavior assumes that current consumption is proportional to average lifetime resources. Moreover, empirical studies point to a hump-shaped relationship between consumption and age, where individuals tend to consume more when young and less as they become older (Jappelli and Modigliani, 1998). Hence, to account for the effect of household demographics, we include dummy variables that indicate the age group of the head of household.

In addition, it is supposed that families take into account their wealth and expected lifetime earnings when they smooth consumption by saving and dissaving. Friedman's (1957) permanent income hypothesis suggests that current income is comprised of a permanent component and transitory component. As indicators of the permanent income of the household, we include the education and labor-market status of the head of household in our regressions. While the lifecycle theory of income postulates that current income is irrelevant for consumption decisions and that only permanent changes in income affect the path of consumption, liquidity constraints, myopia, or savings for precautionary motives support the relevance of current income in consumption decisions (see Browning and Lusardi (1996) for a survey of the relevant motives). Therefore, we also include current disposable income and its square as control variables, which is consistent with the Keynesian framework, where savings and consumption decisions depend on current income.

The X_{it} matrix also includes dummy variables to indicate the marital status and occupation of the household head, homeownership status, and several family structure characteristics. Such characteristics are included to control

for their possible influence on some types of expenditures, such as housing, food consumption at home, and food consumption in restaurants. More information on the variables used in the study and the dataset is provided in the Data Appendix.

To exclude inflationary effects, real values for household consumption expenditures and disposable income are included in the empirical model estimates. Further, price adjustment is conducted using each year's December consumer price index, obtained from the Turkish Central Bank.

5. Estimation Results

5.1. Findings on Consumption Determinants

First, without taking peer effects into account, we estimate Equation (2). This provides the benchmark model without peer effects and is the standard model used in the literature to determine the factors that influence household consumption. The estimation results of the model without peer effects are provided in Table 3.a for the whole population, including both rural and urban settlements. We report some of the coefficients of the results of the estimated model for the other household characteristics in the X_{it} matrix.[15]

The significant determinants of household consumption of the empirical model in our study are similar to those in previous studies. In all regressions, household income stands out as the most significant variable, with 1% significance. Income squared is also significant for the 50-90th and 70-90th income percentiles, but the coefficient is close to zero.

In addition, as the number of children increases, household consumption is also rising. Being an extended family in general does not seem to be a significant determinant of total consumption. However, in the estimations conducted separately for different income groups, being a large family tends to lead to a significant rise in the total consumption for the bottom 10-50% and 20-50% income groups (i.e., for below middle-income groups). The same estimations are repeated for the urban and rural residences separately and are provided in Table 3.b and Table 3.c, respectively. The findings on household characteristics do not change for estimations conducted on urban–rural settings separately.

[15] We do not provide the coefficients on the other control variables for brevity, but the results can be obtained from the author upon request.

Table 3.a. Estimation Results without Peer Effects (Whole Population)

	(1) 10-90% Full Sample	(2) 10-50% Full Sample	(3) 50-90% Full Sample	(4) 70-90% Full Sample
Dependent Variables				
Real household income	0.699***	0.775***	0.568***	0.500***
	(0.0231)	(0.0589)	(0.0338)	(0.0733)
Real household income squared	-8.80e-08	1.34e-06	2.68e-06**	3.80e-06**
	(8.41e-07)	(3.14e-06)	(9.20e-07)	(1.44e-06)
Suburban	640.6***	338.2***	898.5***	1,004***
	(61.13)	(67.69)	(74.51)	(119.3)
1. child	396.3***	321.0***	455.1**	180.9
	(86.82)	(80.40)	(190.8)	(204.4)
2. children	628.3***	442.4**	785.6***	600.5***
	(51.86)	(126.6)	(80.07)	(105.8)
3. children	773.5***	618.6***	928.7***	856.5***
	(66.00)	(101.1)	(144.7)	(105.4)
Extended family	145.6	469.2**	-51.15	176.6
	(94.35)	(176.5)	(125.6)	(99.23)
Single adult	-249.6***	-200.1	-271.4	1.217
	(59.44)	(150.8)	(193.9)	(296.0)
Renter	-150.8*	27.90	-309.8*	-597.0**
	(68.67)	(31.40)	(145.7)	(222.5)
Public housing or employer-provided housing	-1,023***	-817.7***	-1,240***	-2,219***
	(160.5)	(222.6)	(295.2)	(457.9)
Other (housing provided by parents, relatives, etc.)	162.8	125.3	284.6	631.7*
	(115.6)	(69.64)	(181.2)	(292.3)
Student	2,048***	1,991***	2,025***	1,840***
	(171.2)	(254.6)	(285.2)	(373.1)
Housewife	280.1	224.8**	304.9	-50.48
	(162.6)	(89.46)	(392.9)	(681.9)
Retired	517.7**	637.7***	296.0	-122.9
	(204.5)	(162.7)	(340.2)	(609.8)
Elderly	-16.43	63.95	-102.5	-787.1
	(183.0)	(215.2)	(337.2)	(498.3)
Disabled	-149.1	-223.4*	-39.22	-174.6
	(237.3)	(109.4)	(559.9)	(1,076)
Working (no profession specified)	2,021***	471.9	2,962*	3,647*
	(452.2)	(1,493)	(1,496)	(1,913)
Legislators , senior officials, and managers	279.6	522.4**	-6.711	-229.7
	(172.3)	(205.0)	(282.1)	(570.8)
Professional professionals	-13.48	389.1*	-514.9	-958.3
	(272.7)	(200.3)	(608.2)	(978.7)
Auxiliary professionals	650.1***	768.8***	392.4	-3.245
	(120.3)	(153.1)	(317.3)	(588.5)
Employees who work in offices and customer service	-3.477	340.1	-455.5	-951.2
	(259.9)	(248.1)	(422.8)	(801.2)
Service and sales workers	16.61	93.68	-182.9	-649.9
	(132.7)	(104.0)	(255.8)	(532.7)
Skilled agricultural, hunting, forestry , fishery workers	-302.5	16.06	-715.7**	-1,229**
	(170.2)	(196.7)	(253.6)	(499.0)
Craft and related trades workers	103.6	209.3	-106.4	-90.21
	(101.6)	(120.2)	(235.2)	(442.7)
Plant and machine operators and assemblers	11.30	83.54	-183.5	-581.9
	(91.92)	(143.5)	(250.4)	(407.6)
Workers in jobs requiring no qualifications	-221.8**	-95.10	-403.2	-554.3
	(85.26)	(137.0)	(284.9)	(517.2)
Number of observations	66,419	34,338	32,081	15,791
R-squared	0.456	0.385	0.383	0.358

Notes: Total consumption includes consumption for the "whole population." Ordinary least-squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories of the heads of household are included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

Table 3.b. Estimation Results without Peer Effects (Urban Settlements)

	(1) 10-90% urban settlements	(2) 10-50% urban settlements	(3) 50-90% urban settlements	(4) 70-90% urban settlements
Dependent Variables				
Real household income	0.735***	0.826***	0.600***	0.533***
	(0.0321)	(0.0825)	(0.0424)	(0.0735)
Real household income squared	-8.12e-07	-1.45e-06	2.16e-06	3.92e-06**
	(1.09e-06)	(4.13e-06)	(1.19e-06)	(1.41e-06)
1 child	367.7**	310.5**	405.1	76.95
	(133.3)	(127.3)	(279.2)	(301.0)
2 children	600.4***	431.8**	730.4***	600.0**
	(111.3)	(143.9)	(143.4)	(175.3)
3 children	690.9***	513.7***	854.1***	837.5***
	(101.5)	(136.1)	(239.8)	(175.0)
Extended family	-30.44	307.1*	-239.2*	-30.09
	(78.65)	(146.6)	(120.4)	(114.8)
Single adult	-195.5	-164.8	-260.0	97.48
	(103.4)	(181.5)	(219.3)	(423.2)
Renter	-187.6**	5.213	-375.7*	-813.0**
	(76.08)	(48.86)	(161.7)	(275.7)
Public housing or employer-provided housing	-1,186***	-673.1***	-1,619***	-2,865***
	(165.6)	(113.0)	(289.0)	(597.9)
Other (housing provided by parents, relatives, etc.)	149.8	162.7	213.2	565.2
	(172.1)	(120.1)	(269.2)	(512.1)
Student	1,823***	2,023***	1,397**	1,112**
	(213.7)	(294.1)	(400.5)	(392.9)
Housewife	332.5	247.7*	401.9	44.06
	(200.3)	(117.2)	(445.2)	(719.3)
Retired	485.1*	507.4**	378.5	-32.77
	(212.5)	(197.3)	(370.3)	(610.2)
Elderly	289.5	135.0	484.9	26.01
	(247.3)	(213.4)	(590.9)	(752.6)
Disabled	-233.1	-307.1	-93.55	-448.9
	(269.3)	(165.2)	(701.8)	(1,100)
Working (no profession specified)	1,656***	509.4	2,503*	3,139*
	(327.7)	(1,307)	(1,135)	(1,552)
Legislators , senior officials, and managers	225.6	435.0*	-13.91	-338.5
	(194.0)	(184.7)	(364.0)	(649.6)
Professional professionals	-47.35	507.9*	-607.0	-942.1
	(304.8)	(238.3)	(652.9)	(991.2)
Auxiliary professionals	532.2***	698.7**	286.3	-201.7
	(141.5)	(201.3)	(327.7)	(630.5)
Employees who work in office and customer service	-127.3	251.8	-555.4	-1,014
	(295.8)	(295.3)	(490.5)	(946.6)
Service and sales workers	-192.4	-116.8	-339.4	-931.0
	(185.3)	(189.1)	(332.1)	(626.6)
Skilled agricultural, hunting, forestry , fishery workers	105.4	477.4	-349.4	-594.3
	(209.0)	(284.0)	(350.6)	(648.3)
Craft and related trades workers	-47.78	54.03	-223.0	-362.0
	(147.0)	(188.1)	(307.7)	(549.8)
Plant and machine operators and assemblers	-42.42	2.121	-173.2	-582.6
	(133.8)	(195.9)	(303.2)	(420.1)
Workers in jobs requiring no qualifications	-345.4**	-245.9	-457.6	-589.8
	(135.5)	(212.6)	(423.2)	(560.9)
Number of observations	45,930	23,998	21,932	10,740
R-squared	0.441	0.350	0.353	0.329

Notes: Total consumption includes consumption for the households living in the "urban settlements." Ordinary least squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories of the heads of household are included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

Table 3.c. Estimation Results without Peer Effects (Rural Settlements)

	(1) 10-90% rural settlements	(2) 10-50% rural settlements	(3) 50-90% rural settlements	(4) 70-90% rural settlements
Dependent Variables				
Real household income	0.678***	0.459***	0.530***	0.460*
	(0.0339)	(0.0485)	(0.0663)	(0.212)
Real household income squared	-1.40e-06	2.59e-05***	2.64e-06	1.86e-06
	(1.91e-06)	(3.73e-06)	(2.81e-06)	(5.86e-06)
1 child	443.9***	309.1*	535.2***	496.8**
	(119.2)	(142.6)	(113.2)	(179.1)
2 children	666.5***	429.0**	847.1**	564.1
	(129.3)	(127.7)	(340.6)	(360.5)
3 children	987.4***	834.3***	1,120***	989.3***
	(159.4)	(111.8)	(228.4)	(261.4)
Extended family	479.1**	737.0**	318.2	627.2**
	(143.8)	(270.2)	(266.0)	(254.4)
Single adult	-333.2*	-263.3	-361.4	-231.0
	(141.2)	(207.0)	(269.7)	(420.3)
Renter	130.3	264.4**	-28.65	287.8
	(146.1)	(110.4)	(184.2)	(354.2)
Public housing or employer-provided housing	-460.9*	-726.6*	-321.3	-559.9
	(242.0)	(356.8)	(391.1)	(532.2)
Other (housing provided by parents, relatives, etc.)	208.8*	50.37	449.9	738.6
	(93.51)	(96.49)	(316.8)	(547.8)
Student	2,920***	1,719***	2,891	
	(685.4)	(344.9)	(2,069)	
Housewife	237.6	191.5	173.6	-171.9
	(152.2)	(230.2)	(218.4)	(560.2)
Retired	864.2**	1,147***	372.6	248.3
	(263.5)	(193.5)	(351.9)	(791.7)
Elderly	-237.3	141.2	-850.0*	-1,565
	(276.8)	(280.5)	(386.4)	(850.4)
Disabled	85.83	39.51	37.26	237.5
	(229.7)	(130.5)	(414.0)	(1,254)
Working (no profession specified)	6,978***	-5,369***	11,405**	10,552**
	(1,089)	(410.3)	(4,198)	(4,105)
Legislators , senior officials, and managers	387.7	753.4*	-104.8	13.91
	(247.9)	(371.8)	(217.4)	(617.2)
Professional professionals	-158.8	-218.2	-281.2	-1,327
	(287.6)	(123.1)	(525.9)	(1,885)
Auxiliary professionals	860.9*	783.9**	632.9	599.5
	(403.6)	(225.5)	(699.8)	(761.6)
Employees who work in office and customer service	284.7	388.0*	-141.3	-907.7
	(212.5)	(178.3)	(331.8)	(883.0)
Service and sales workers	719.6**	859.0	287.0	326.5
	(217.4)	(509.5)	(206.4)	(689.0)
Skilled agricultural, hunting, forestry , fishery workers	-181.8	213.6	-796.8***	-1,025
	(142.0)	(207.4)	(103.8)	(561.7)
Craft and related trades workers	573.2***	742.7***	179.6*	730.6
	(62.06)	(130.1)	(77.11)	(394.4)
Plant and machine operators and assemblers	115.1	235.9	-275.2**	-518.2
	(76.61)	(136.7)	(100.7)	(499.5)
Workers in jobs requiring no qualifications	146.5*	291.3**	-201.7	-204.2
	(62.94)	(108.4)	(161.5)	(541.7)
Number of observations	20,489	10,340	10,149	5,051
R-squared	0.327	0.279	0.241	0.211

Notes: Total consumption includes consumption for the households living in the "rural settlements." Ordinary least squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories of the heads of household are included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

5.2. Findings on Reference Group Effect

Our thesis is that households, when forming their consumption decisions, are affected by the consumption of their reference group, and change their consumption in a similar direction as that of the reference group. To test this hypothesis, we estimate our empirical model in Equation (1) for different reference-group definitions. This way, we intend to find the existence of peer effects and, if they exist, to find what constitutes a valid reference value for households. In this respect, the main question of the empirical model is whether the coefficient of reference-group consumption C_{it}^{R} is significant.

Table 4.a presents the OLS coefficient estimates of the variables Y_{it}, Y_{it}^{2}, and C_{it}^{R} for the estimations when peer effects occur by educational attainment. Therefore, the peer group is formed by the households who live in the same rural-urban setting and have the same educational attainment level. The results of four different regressions with different measures of reference values are shown in different columns. In the regression results in columns 1 and 4, the average consumption of the richest households (the top 10%) in the peer group is considered as the reference value. In columns 2 and 4, the average consumption of the poorest households (the bottom 10%) in the peer group is taken as the reference value. We experiment with the income of the richest households (the top 10%) in the same education and rural-urban group in column 3.

The results in the upper left quadrant of Table 4.a show that when the reference group is formed by the same educational attainment, the total consumption of non-rich households in the 20-90th percentile is positively correlated with the average consumption in the reference group (richest 10% in the same education and rural-urban group) at the 5% significance level. One problem that casts doubt on the observed positive correlation between the consumption of the rich and non-rich households is that the consumption of households in different income percentiles moves together. However, this is not a credible explanation. As can be seen from the results in column 2, there is no correlation between the consumption of the non-rich and that of the poorest 10%.

Another explanation for the finding of a positive correlation is a possible income shock that simultaneously affects the consumption of all income groups. To address this concern, we estimate regressions where the average income of the rich is used instead of C_{it}^{R}, and the results are presented in column 3. If a simultaneous increase in consumption is driving the results, we would expect the income of the rich to be significant; however, it turns out to be statistically insignificant in the regressions.

Table 4.a. Estimation Results with Peer Effects (Whole Population)

	20th-90th percentiles				**70th-90th percentiles**			
Dependent Variables								
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Real household income	0.676***	0.673***	0.673***	0.675***	0.513***	0.486***	0.497***	0.498***
	(0.0272)	(0.0287)	(0.0284)	(0.0277)	(0.0690)	(0.0781)	(0.0759)	(0.0743)
Real household income squared	2.76e-07	3.85e-07	3.73e-07	2.95e-07	3.42e-06**	4.11e-06**	3.76e-06**	3.72e-06**
	(8.78e-07)	(9.28e-07)	(9.15e-07)	(8.91e-07)	(1.24e-06)	(1.51e-06)	(1.47e-06)	(1.33e-06)
Consumption of the richest 10%	0.0322**			0.0334*	0.0488			0.0545
	(0.0135)			(0.0146)	(0.0406)			(0.0414)
Consumption of the poorest 10%		-0.0399		-0.0588		-0.263*		-0.290*
		(0.0620)		(0.0701)		(0.116)		(0.140)
Income of the richest 10%			0.0103				0.0418	
			(0.0124)				(0.0288)	
Number of observations	57,553	57,553	57,553	57,553	15,791	15,791	15,791	15,791
R-squared	0.432	0.434	0.434	0.434	0.358	0.358	0.358	0.358

	50th-90th percentiles				**10th-50th percentiles**			
Dependent Variables								
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Real household income	0.572***	0.566***	0.567***	0.570***	0.786***	0.774***	0.775***	0.784***
	(0.0318)	(0.0349)	(0.0343)	(0.0330)	(0.0647)	(0.0564)	(0.0570)	(0.0620)
Real household income squared	2.52e-06**	2.74e-06**	2.69e-06**	2.58e-06**	6.72e-07	1.43e-06	1.33e-06	7.96e-07
	(8.58e-07)	(9.49e-07)	(9.26e-07)	(8.87e-07)	(3.48e-06)	(2.99e-06)	(3.04e-06)	(3.32e-06)
Consumption of the richest 10%	0.0377			0.0398	0.0231			0.0238
	(0.0200)			(0.0211)	(0.0123)			(0.0131)
Consumption of the poorest 10%		-0.0784		-0.0996		-0.0206		-0.0327
		(0.0717)		(0.0830)		(0.0595)		(0.0645)
Income of the richest 10%			0.0230*				-0.000479	
			(0.0118)				(0.00927)	
Number of observations	32,081	32,081	32,081	32,081	34,338	34,338	34,338	34,338
R-squared	0.383	0.383	0.383	0.383	0.385	0.385	0.385	0.385

Notes: Total consumption includes consumption for the “whole population.” Ordinary least squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories, as well as the marital and labor-market status, of the heads of household are included. Dummy variables for rural versus urban residence and homeownership status are also included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

5.3. Reference Group Effect by Different Income Percentiles

In this part of the analysis, we test the generality of the results. We ask whether the results change when we estimate Equation (1) for different income percentiles separately. Our hypothesis is that the consumption of the reference group will affect that of poorer households, based on the conspicuous consumption motive, as they try to emulate the consumption of the rich. Hence, higher consumption by rich households should induce non-rich households to up their consumption in the following year, in order to signal status. Therefore, we expect that the correlation between the consumption of the non-rich households and that of the reference group will be stronger for lower income percentiles. However, we also know that the lowest income percentiles are usually income constrained and spend almost all of their income. As such, the results should reflect the binding of income for lower income percentiles.

We estimate the same regression equation, this time restricting the sample to different percentiles of the household income distribution. We find that the result is not robust to changes in the sample, and it disappears when the sample is restricted to either the top (70-90th or 50-90th) or the bottom (20-50th) percentiles. Considering this mixed evidence, we have weak grounds for positing a positive correlation between the total consumption of non-rich households and the average consumption of the reference group. This is unlike the pattern in the United States data, reported by Bertrand and Morse (2013) and Drechsel-Grau and Schmid (2014), who discover a positive association between the total consumption of the rich and that of the non-rich. Thus, to test the significance of the results, we investigate further and separately conduct an analysis by dividing the sample by rural-urban residential settlements.

5.4. Reference Group Effect by Different Residential Settlements

The results of the estimations carried out separately for the urban and residential settlements are reported in Tables 4.b and 4.c, respectively. We see that there is a significant difference for peer effects in household consumption behavior between the two types of settlement. The results for urban settlements indicate that the total consumption of the households in the 20-90th, 10-50th, and 50-90th percentiles are positively correlated with the consumption of the richest 10% of households. The significance is highest for the 10-50th percentile. Moreover, we do not observe any significance for the 70-90th percentile of income (upper right quadrant). Hence, with the exception of the households in the upper income distribution (70-90th percentile), in urban settlements, non-rich households raise their spending in response to an increase in

Table 4.b. Estimation Results with Peer Effects (Urban Settlements)

	20th-90th percentiles				**70th-90th percentiles**			
Dependent Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Real household income	0.706***	0.707***	0.705***	0.706***	0.528***	0.523***	0.498***	0.522***
	(0.0385)	(0.0384)	(0.0405)	(0.0387)	(0.0746)	(0.0776)	(0.0836)	(0.0777)
Real household income squared	-2.46e-07	-2.68e-07	-2.05e-07	-2.42e-07	3.98e-06**	4.06e-06**	4.54e-06**	4.07e-06**
	(1.17e-06)	(1.17e-06)	(1.22e-06)	(1.17e-06)	(1.45e-06)	(1.49e-06)	(1.72e-06)	(1.50e-06)
Consumption of the richest 10%	0.0664*			0.0650*	0.110			0.105
	(0.0299)			(0.0288)	(0.0662)			(0.0630)
Consumption of the poorest 10%		-0.0935		-0.0445		-0.239		-0.160
		(0.0896)		(0.0612)		(0.174)		(0.107)
Income of the richest 10%			0.0189				0.0619	
			(0.0164)				(0.0354)	
Number of observations	39,689	39,689	39,689	39,689	10,740	10,740	10,740	10,740
R-squared	0.414	0.414	0.414	0.414	0.330	0.330	0.330	0.330

Dependent Variables	**50th-90th percentiles**				**10th-50th percentiles**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Real household income	0.597***	0.598***	0.592***	0.596***	0.819***	0.824***	0.812***	0.818***
	(0.0429)	(0.0441)	(0.0468)	(0.0439)	(0.0790)	(0.0822)	(0.0729)	(0.0800)
Real household income squared	2.21e-06	2.19e-06	2.34e-06	2.23e-06	-1.13e-06	-1.33e-06	-7.95e-07	-1.11e-06
	(1.20e-06)	(1.22e-06)	(1.29e-06)	(1.22e-06)	(4.04e-06)	(4.12e-06)	(3.70e-06)	(4.08e-06)
Consumption of the richest 10%	0.0780*			0.0765*	0.0531**			0.0528**
	(0.0365)			(0.0339)	(0.0211)			(0.0213)
Consumption of the poorest 10%		-0.108		-0.0501		-0.0494		-0.00998
		(0.134)		(0.0758)		(0.0736)		(0.0782)
Income of the richest 10%			0.0282				0.0114	
			(0.0173)				(0.00912)	
Number of observations	21,932	21,932	21,932	21,932	23,998	23,998	23,998	23,998
R-squared	0.353	0.353	0.353	0.353	0.351	0.350	0.351	0.351

Notes: Total consumption includes consumption for the households living in "urban settlements." Ordinary least squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories, as well as the marital and labor-market status, of the heads of household are included. Dummy variables for rural versus urban residence and homeownership status are also included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

Table 4.c. Estimation Results with Peer Effects (Rural Settlements)

Dependent Variables	**20th-90th percentiles**				**70th-90th percentiles**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Real household income	0.664***	0.666***	0.674***	0.664***	0.465*	0.450*	0.477*	0.456*
	(0.0406)	(0.0411)	(0.0419)	(0.0416)	(0.212)	(0.207)	(0.234)	(0.207)
Real household income squared	-1.28e-06	-1.36e-06	-1.80e-06	-1.26e-06	1.71e-06	2.22e-06	1.13e-06	2.02e-06
	(2.04e-06)	(2.07e-06)	(2.08e-06)	(2.09e-06)	(5.85e-06)	(5.63e-06)	(6.88e-06)	(5.60e-06)
Consumption of the richest 10%	-0.0240			-0.0252	0.0322			0.0229
	(0.0202)			(0.0212)	(0.0420)			(0.0552)
Consumption of the poorest 10%		-0.0311		0.0216		0.208		0.161
		(0.0943)		(0.105)		(0.250)		(0.314)
Income of the richest 10%			-0.0611*				-0.0437	
			(0.0287)				(0.0704)	
Number of observations	17,864	17,864	17,864	17,864	5,051	5,051	5,051	5,051
R-squared	0.301	0.301	0.301	0.301	0.211	0.211	0.211	0.211

Dependent Variables	**50th-90th percentiles**				**10th-50th percentiles**				
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)
Real household income	0.529***	0.528***	0.532***	0.524***	0.444***	0.467***	0.513***	0.455***	
	(0.0660)	(0.0651)	(0.0701)	(0.0653)	(0.0469)	(0.0537)	(0.0471)	(0.0550)	
Real household income squared	2.69e-06	2.76e-06	2.56e-06	2.90e-06	2.72e-05***	2.54e-05***	2.12e-05***	2.64e-05***	
	(2.79e-06)	(2.80e-06)	(3.04e-06)	(2.80e-06)	(3.73e-06)	(4.09e-06)	(3.60e-06)	(4.36e-06)	
Consumption of the richest 10%	-0.0214			-0.0311	-0.0252**			-0.0180**	
	(0.0341)			(0.0384)	(0.00991)			(0.00755)	
Consumption of the poorest 10%		0.103		0.167		-0.160		-0.122	
		(0.192)		(0.226)		(0.141)		(0.145)	
Income of the richest 10%			-0.00681				-0.0754**		
			(0.0357)				(0.0245)		
Number of observations	10,149	10,149		10,149	10,340	10,340	10,340	10,340	
R-squared	0.241	0.241		0.241	0.279	0.279	0.280	0.279	

Notes: Total consumption includes consumption for the households living in "rural settlements." Ordinary least squares estimates are reported. All regressions include a constant, survey-year fixed effects, the number of children, and dummy variables for large families and single-adult families. In addition, dummy variables for the age and education categories, as well as the marital and labor-market status, of the heads of household are included. Dummy variables for rural versus urban residence and homeownership status are also included. ***, **, and * = 1%, 5%, and 10% statistical significance, respectively.

the consumption expenditures of the richest households in the previous year. We can be assured that the result is not generated by an upward shift of the entire distribution, since the consumption of the poorest 10% is not positively significant in the regressions, nor is the coefficient on the income of the richest (reported in column 3). In summary, our findings show that the majority of non-rich households, and, more so, the households below the mean income living in urban settlements care about the consumption of the richest households in the same education group, except for the ones in the upper income distribution.

Table 4.c shows no evidence for peer effects in rural settlements. The coefficient on reference consumption C_{it}^{R} is insignificant for all income percentiles. Contrary to urban areas, households in rural settlements are not affected by the consumption of the rich households in their reference group. As a result, we can conclude that non-rich households in rural areas are not influenced by the consumption of the richest households in the same education category in their consumption decisions. This can be an explanation for the weak evidence of peer effects observed when using the whole population, as reported in Table 4.a.

5.5. Reference-Group Effect by Age Group

As a final robustness check, the analysis is repeated using peer groups defined by the same age group living in the same urban-rural setting,[16] and the observed correlation between the consumption of rich and non-rich households disappears when peer groups are defined based on these categories. Moreover, the results provide initial evidence that educational similarity is a valid reference group in consumption comparisons; however, we do not find evidence for peer effects based on age group. The general result is that non-rich households in urban settlements care about the consumption of the richest households in the same education category, who are also living in the same residential settlement. Specifically, households are affected by the consumption of the richest 10^{th} percentile in the previous year. Yet, there is no evidence of peer effects for upper-income percentiles (70-90%) or for rural settlements.

[16] The results of these regressions, when the reference group is constructed based on the same age and rural-urban group, are not provided for brevity, but can be obtained from the author upon request.

6. Conclusion and Discussion

The importance of peer effects in consumption decisions has been documented for many years since Veblen (1899). Especially, recently, there has been an increasing amount of literature on the role of peer effects and interpersonal comparisons in individual decision-making, which are seen as being at the root of global financial crises. Peer effects in consumption decisions have been researched in several theoretical studies, and a number of empirical studies have found supporting evidence. Since peer effects on consumption are influenced by a quest for status, cultural factors play an important role in the presence and strength of this peer-effect motive.

However, to our knowledge, there have been no previous attempts to analyze peer effects in Turkey, a country located between the Eastern and Western worlds and at the crossroads of different civilizations. As an emerging economy, with a large population that has close social ties and can be regarded as a hierarchical culture, we expect to observe strong peer effects. Our paper fills the abovementioned gap by exploiting a large dataset on the consumption behavior of Turkish households.

Using nationwide representative data from the Turkish HBS on household expenditures for the years 2003-2012, we have documented the presence of peer effects on consumption decisions. Specifically, we find that the consumption decisions of the non-rich households in urban settlements are affected by the consumption of the rich. The effect is most significant for urban residents in the bottom half of the income percentiles. However, we do not observe any peer effects for upper-income households or for rural settlements. We experiment with different reference groups based on the same education level, age, and geography, finding that households are swayed by other households with the same educational attainment and rural-urban geographic setting. This proves both the proximity and similarity assumption as well as the upward direction of the comparisons, supporting the self-enhancement motive.

The motive to signal higher status in society can induce individuals to spend more, which can have important macroeconomic consequences, such as higher credit growth and lower savings, diverting resources away from spending on productive capital, possibly leading to less growth. Moreover, this motive is also important in the design of policies, such as welfare programs, where there is the risk that some monetary transfers may be spent on items for conspicuous consumption, rather than on necessities, such as food and education. However, to tackle these policy issues, further research is needed in this area. Yet, as an initial attempt, we have documented the pres-

ence of peer effects, and we note that it is an important motive in individual decisions and, hence, economic outcomes.

Our study can be regarded as an initial attempt to uncover the role of peer effects in consumption decisions for Turkish households. These findings suggest that peer effects matter, so policymakers also need to consider the peer-effect motive and how that might impact savings and consumption behavior of households. There are many more directions that can be followed to understand the peer-effect behavior and its consequences. One future direction of research would be to investigate how spending on different consumption categories or individual consumption items is affected by peer effects, specifically, to analyze peer effects under a finer classification of consumption categories. Another important area is to investigate the implications of the peer-effect motive in consumption decisions. One question is on the financing of consumption that results from the peer-effect motive. Specifically, what are the major responses of the households to this motive, i.e., do the households increase their income, does it result in lower saving or higher borrowing? These are key questions, with several economy-wide implications, that need to be addressed in further research.

Other venues of research could be to test the effect of interpersonal comparisons in consumption decisions across various sets of countries. Testing the presence and strength of peer effects across several countries is essential for the design of macroeconomic policy and prediction of the results of policy alternatives. By studying an unexplored question for Turkey, we believe that our study will be a valuable guide for future ones in the field and hope that it will raise questions for further research on Turkey.

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DATA APPENDIX

A1. Description of the variables used in the study

For categorical variables, dummy variables are created for each category, as described below:

Age categories: Ages 20-24; 25-29; 30-34; 35-39; 40-44; 45-49; 50-54; 55-59; 60-64; 65+.

Education categories: Illiterate; literate but no completed education; elementary school graduate (5 years); junior high school graduate (8 years); high school graduate; vocational college graduate; college graduate; more than college education.

Marital status: Never married; Married; Widow/widower; Divorced.

Labor-market status: Employed; Student; Housewife; Retired; Elderly; Disabled.

Homeownership status: Homeowner; Renter; Public housing or employer-provided housing; Other (housing provided by parents, relatives, etc.).

Rural versus urban residence: Determined according to population (Settlement areas with a population of 20,001 or more are urban, others are rural).

Household type: single nuclear family with one child, nuclear family with two children, three or more nuclear families with children, couples without children, the patriarchal or extended family, single-adult family, people living together.

From the coding of the household type, we extract information on the number of children, whether it is an extended family or not, and whether there is a single adult in the household.

Occupation: legislators, senior officials and managers, professional professionals, auxiliary professionals, employees who work in office and customer service, service and sales workers, skilled agricultural , hunting, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, workers in jobs requiring no qualifications.