

**Competition and Credit and Debit Card Interchange Fees:**  
**A Cross-Country Analysis**

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First draft: September 20, 2005

This version: November 30, 2005

**Preliminary: Please do not cite or quote without authors' permission.**

Payments System Research Department  
Federal Reserve Bank of Kansas City  
Working Paper 05-03

Abstract

This paper seeks to provide a bridge between the theoretical and empirical literatures on interchange fees. Specifically, the paper confronts theory with practice by asking, to what extent do existing models of interchange fees match up with actual interchange fee practices in various countries? For each of four countries—Australia, the Netherlands, the United Kingdom, and the United States—models that “best” fit the competitive and institutional features of that country’s payment card market are identified, and the implications of those models are compared to actual practices. Along what competitive dimensions is there alignment? Along what competitive dimensions is there not alignment? What country-specific factors appear to be important in explaining deviations from theoretical predictions? The results suggest that a theory applicable in one country may not be applicable in another, and that similar interchange fee arrangements and regulations may well have different implications in different countries.

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## **1. Introduction**

Interchange fees are an integral part of the pricing structure of credit and debit card industries. While in recent years the theoretical literature on interchange fees, and payment cards in general, has grown rapidly, the empirical literature has not. There are several reasons for this. First, comprehensive data are hard to obtain. Second, the industries are very complicated, and empirical models need to incorporate many industry-specific features, such as payment-card network rules and government regulations. And third, empirical studies may require a generalized empirical model since, typically, only a few payment card networks exist in a given country. However, because of the first and second reasons, generalizing empirical models may prove problematic.

This paper seeks to provide a bridge between the theoretical and empirical literatures on interchange fees. Specifically, the paper confronts theory with practice by asking, to what extent do existing models of interchange fees match up with actual interchange fee practices in various countries? For each of four countries—Australia, the Netherlands, the UK, and the United States—models that “best” fit the competitive and institutional features of that country’s payment card market are identified, and the implications of those model are compared to actual practices. Along what competitive dimensions is there alignment? Along what competitive dimensions is there not alignment? What country-specific factors appear to be important in explaining deviations from theoretical predictions? The results suggest that a theory applicable in one country may not be applicable in another, and that similar interchange fee arrangements and regulations may well have different implications in different countries.

The paper is organized as follows. Section 2, which draws extensively from Weiner and Wright (2005), provides an overview of interchange fee developments and issues in ten key

countries and areas: Australia, Canada, Denmark, EU cross-border, Mexico, the Netherlands, Spain, Sweden, the UK, and the United States. Credit card, signature-based debit card, and PIN-based debit card markets are addressed separately. Topics covered include interchange fee arrangements and regulations, network rules, recent and current controversies, and the role of public authorities. Section 3 of the paper surveys existing theories of interchange fees. The discussion is focused on assumptions regarding the degree of network competition, the degree of intra-network (issuing and acquiring) competition, and the behavior of consumers and merchants. Section 4 of the paper then attempts to match the reality of Section 2 with the theory of Section 3 by examining in some detail interchange fee developments in four particularly interesting markets: Australia, the Netherlands, the UK, and the United States. These case studies provide useful insight into interchange fee competition issues. Finally, Section 5 offers a summary.

## **2. Interchange Fee Arrangements**

Credit and debit card industries are examples of two-sided markets. The distinguishing feature of two-sided markets is they contain two sets of end users, each of whom needs the other in order for the market to operate. In the case of credit and debit cards, the two end-user groups are cardholders and merchants.

Payment card systems take one of two principal forms. They may be three-party systems: cardholders, merchants, and a single financial institution that offers proprietary network services, for example, American Express. Alternatively, they may be four-party systems: cardholders, merchants, card-issuing banks, and merchant acquiring banks, using the services of a multi-party network such as MasterCard, Visa, or a domestic debit card network. In four-party systems, the interchange fee is an instrument that networks can use to achieve a desired balance of cardholder

usage versus merchant acceptance across the two sides of the market, in the same way that proprietary systems can do so directly. In other words, interchange fees are a mechanism that can be used to transfer revenues from one side of the market to the other in order to generate the desired level of card activity.

Interchange fee arrangements vary considerably across countries. This section of the paper documents these arrangements, as well as related developments and issues, in the following countries: Australia, Canada, Denmark, EU cross-border, Mexico, the Netherlands, Spain, Sweden, the UK, and the United States. These countries share some common features but also exhibit many differences in how interchange and related fees and rules operate in their respective markets. In all of these countries, however, interchange fees currently are, to varying degrees, the focus of pointed industry and public-authority debate.<sup>1</sup>

The section is organized as follows. The first three subsections discuss developments and issues in the credit, signature-based debit, and PIN-based debit card markets separately. The discussion is guided by information presented in Tables 1, 2, and 3, respectively. In these tables, the ten individual countries and areas are listed as rows and, for each, key interchange-related information is provided in the columns: instrument market share (column 3); networks operating in that country (column 4); what bodies set interchange fees for those networks (column 5); recent movements in interchange fees (column 6); recent movements in merchant service charges (column 7); recent movements in cardholder fees (column 8); whether no-surcharge (column 9), honor-all-cards (column 10), net-issuer (column 11), and duality/exclusion rules (column 12) are in force in various networks; and finally, interchange-related issues and controversies recently or currently under debate (column 13). The closing subsection delves more deeply into public

authority involvement in interchange discussions, documenting, with the aid of Table 4, actions and rulings taken by or pending before competition authorities and central banks in these ten countries.

## **2.1 Credit cards**

Credit cards are an important payment instrument in many of the countries under review.<sup>2</sup> As noted in column 3 of Table 1, they are most prominent, in terms of share of overall noncash transactions volume, in Canada, the United States, Australia, the UK, and Spain.<sup>3</sup> Column 4 shows the credit card networks operating in the ten countries and areas. Four-party networks are listed above the dotted line while three-party networks are listed below the dotted line. Networks with an asterisk behind them are networks available for international use only, that is, networks that issue cards to that country's residents for international use and are available for foreigner's use within the country. Another convention followed in Tables 1 through 3 relates to missing information. When a statement or attribute is not attached to a specific network, it can be taken to hold for all networks in that country. When a statement or attribute is attached to a specific network, it applies only to that network, and comparable information not shown for other networks means that such information is not available. Finally, in the tables, "nap" denotes not applicable, and "neg" denotes negligible.

Interchange fees are set under a variety of arrangements (column 5). In some countries they are collectively set by members of the network, sometimes subject to regulatory limits; in others they are set by network management; in one country, Mexico, they are set by members of the Mexican Bankers Association; and in another, Sweden, they are set bilaterally. In Denmark,

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<sup>1</sup>For institutional background on the payments card industry in various countries, see Bank for International Settlements (2003), European Central Bank (2001), Evans and Schmalensee (2005a), and Hayashi, Sullivan, and Weiner (2003).

<sup>2</sup>"Credit cards" includes charge cards as well as deferred debit transactions.

interchange fees are aligned with merchant service charges, which are subject to a regulatory cap.<sup>4</sup>

In most countries interchange fees have declined or are declining (column 6). In some countries, this is due to recent regulation or regulatory threat: Australia, Mexico, and EU cross-border. In Spain, interchange fees have been declining as a result of a 1999 agreement among banks, networks, merchants, and the Ministry of the Economy.<sup>5</sup> A notable outlier is the United States, where interchange fees on credit cards have been rising in recent years.

Although difficult to document, merchant service charge movements appear to have tracked interchange fee movements to some extent (column 7). Cardholder fee movements have also tended to move in the expected direction (column 8). In countries where interchange fees have declined, for example, Australia and Spain, annual fees have increased and, in the case of Australia, interest-free periods have shortened and rewards programs have become less generous. In the United States, where interchange fees have risen, annual fees have declined, reward programs have become more generous, and zero introductory interest rates have become prevalent. Here the UK appears to be something of an outlier, with interchange fees falling but annual-fee and introductory-rate provisions remaining relatively generous.

The ten countries/areas exhibit considerable variation across the principal categories of network rules: no-surcharge rules, honor-all-cards (HAC) rules, net issuer rules, and duality/exclusion rules. No-surcharge rules prevent merchants from charging customers for the use of a particular payment mechanism, in this case, a credit card. Honor-all-card rules, as defined here, require merchants that accept a network's credit card to also accept that network's

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<sup>3</sup>In Spain, charge card transactions are predominant.

<sup>4</sup>In addition, in many countries, MasterCard members are permitted to negotiate interchange fees bilaterally.

<sup>5</sup>A further lowering of fees may result from an April 2005 ruling by the Tribunal de Defensa de la Competencia.

signature-based debit card, if the latter exists in a given country.<sup>6</sup> Net issuer rules require acquiring banks to issue a minimum level of cards in order to participate on the acquiring side of the market. Duality rules allow a bank that issues MasterCard credit cards to also issue Visa credit cards. Finally, exclusion rules prevent a bank that issues MasterCard or Visa credit cards from issuing other credit cards, for example, American Express and Discover.

No-surcharge rules are presently in effect in Canada, Mexico, the United States, and Sweden (column 9). They also are in effect—for Visa—for EU cross-border and Spanish transactions. On the other hand, surcharging is permitted in Australia, the Netherlands, and the UK and, for MasterCard, also in Spain and EU cross-border.<sup>7</sup>

Honor-all-card rules have a particularly interesting history in the United States (column 10). The so-called Wal-Mart case, brought by several merchants and trade associations against Visa and MasterCard in the mid-1990s and finally settled in 2003, eliminated Visa and MasterCard HAC rules. Net issuer rules are in place in roughly half of the countries under review (column 11). Duality is allowed in all countries but Canada; exclusion rules vary (column 12).

Turning to the last column of Table 1, industry participants and public authorities in virtually all of the countries have dealt with or are currently discussing issues and controversies surrounding credit card interchange fees and related matters. These range from regulations or agreements lowering interchange fees (Australia, Mexico, EU cross-border) or capping merchant service charges (Denmark), to regulations eliminating or permitting no-surcharge rules

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<sup>6</sup>In Europe, the term “honor-all-cards rule” is typically defined differently, namely, if a merchant accepts a MasterCard\Visa-branded credit card issued by Bank A, the merchant must also accept a MasterCard\Visa-branded credit card issued by Bank B and, similarly, if a merchant accepts a MasterCard\Visa-branded PIN debit card issued by Bank A, the merchant must also accept a MasterCard/Visa-branded PIN debit card issued by Bank B. Thus, in Europe, honor-all-cards rules typically do not tie debit cards to credit cards.

<sup>7</sup>Although MasterCard allows surcharging in Spain, the three domestic card networks do not.

(Australia, EU cross-border), to merchant dissatisfaction with interchange levels (United States, Spain, EU cross-border, UK), to complaints or concerns over three-party network schemes (Australia, United States), transparency (Spain, EU cross-border, Australia), and duality (Canada). Thus, there is no shortage of challenging issues confronting the industry.

## **2.2 Signature-based debit cards**

Table 2 presents information on signature-based debit cards. Signature-based cards have an important presence in a few countries, for example, the United States and Spain, and in other countries, Canada, Denmark, and the Netherlands, they are essentially nonexistent (column 3). As the name suggests, they are debit cards that require a signature, not a PIN, for authorization. MasterCard and Visa signature debit transactions run over MasterCard's and Visa's respective credit card networks. The three Spanish signature debit card networks, Euro 6000, ServiRed, and Sistema 4B, are stand-alone proprietary systems.<sup>8</sup>

In this subsection and the next, to keep things a little simpler, the general terms "MasterCard" and "Visa" are used to denote the various MasterCard and Visa signature and PIN-based debit products. Thus, Visa CheckCard (United States signature), Visa Debit (Australian signature), Visa Electron (European PIN), and Visa Interlink (United States PIN) are all referred to as Visa, while MasterCard MasterMoney (United States signature) and MasterCard Maestro (worldwide PIN) are all referred to as MasterCard.

As is the case with credit cards, interchange fees on signature debit have tended to decline in recent years (column 6), often attributable to regulatory action (EU cross-border), regulatory threat (Mexico), or government-led industry agreement (Spain). Interchange fees on U.S. signature debit, in contrast, have taken a different route. As part of the Wal-Mart settlement,

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<sup>8</sup>These networks also process MasterCard and Visa credit card and debit card transactions.

they were reduced by roughly a third over the period August to December 2003, but since that time they have risen to some extent.<sup>9</sup> Merchant service charges appear, for the most part, to have moved in the same direction as interchange fees, although, like cardholder fee movements, complete data are hard to obtain (columns 7, 8).

Typically, signature-based debit transactions are subject to the same no-surcharge rules as credit cards in the various countries, and by definition, all honor-all-cards rules are also the same (columns 9, 10). Net issuer and duality rules also coincide (columns 11, 12).

A number of signature debit issues are currently under discussion (column 13). In Australia, the Reserve Bank of Australia has proposed lowering interchange fees and eliminating the no-surcharge and HAC rules on the Visa signature card. In the United States, there is widespread merchant dissatisfaction with the level of interchange fees, and in Spain some merchants reportedly believe merchant service charges remain too high. The EC, meanwhile, has MasterCard's fee policy under review, having reached an earlier agreement with Visa for Visa to lower its cross-border fees.

### **2.3 PIN-based debit cards**

Table 3 presents information on PIN-based debit cards. PIN-based cards have a large presence in many European countries as well as in Canada, Australia, and the United States (column 4). MasterCard and Visa operate PIN-based systems in several of these countries; in addition, domestic systems are especially prominent in Australia, Canada, the United States, Denmark, and the Netherlands (column 4).<sup>10</sup>

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<sup>9</sup>After rising in 2004, some signature-based debit interchange fees were lowered in April 2005. Most remain above post-settlement levels, however.

<sup>10</sup>In many cases, MasterCard and Visa PIN-based debit cards are co-branded with domestic schemes, and routing priority is given to the latter.

PIN-based networks display a variety of institutional features and practices across countries. In Australia, for example, EFTPOS PIN debit interchange fees are set bilaterally and, notably, are paid by the issuer to the acquirer. In Canada and the Netherlands, interchange fees are set at zero by Interac and Interpay, respectively. Swedish PIN interchange fees are negotiated bilaterally. And in the United States, PIN debit interchange fees are often a competitive tool for attracting issuers—the United States is characterized by a large number of good-sized domestic networks, the largest of which (Star, NYCE, and Pulse) compete vigorously with Visa (columns 4, 5).

Interchange fee movements have shown varying patterns in recent years (column 6). They have remained at zero in Canada and the Netherlands and have been stable in Australia. In Denmark, MasterCard and Visa fees have declined, while positive fees for Dankort transactions (the domestic network) were introduced at the beginning of this year but have since been eliminated again, all due to regulatory actions.<sup>11</sup> In the United States, PIN debit interchange fees have been drifting up.

As with credit cards and signature debit, a number of PIN debit issues are currently under discussion (column 13). The Reserve Bank of Australia has proposed lowering EFTPOS interchange fees. The EC is reviewing MasterCard's cross-border interchange fees. In Canada, cards from participating issuers can now be used at U.S. merchants who belong to the NYCE network. In the United States, merchants are dissatisfied with rising interchange fees; the United States has seen a striking consolidation of domestic networks in recent years, the outcome of which is still unclear. In the Netherlands, the Competition Authority recently fined Interpay for its pricing policies, although the objection process is still underway. And in Denmark, since March 1 of this year, surcharging has been eliminated on Dankort transactions.

## 2.4 Public authority involvement

Virtually all central banks have general oversight responsibility for the payments systems of their respective countries and areas. Explicitly or implicitly, most have a mandate to ensure that payments systems operate safely and efficiently. As retail payments systems around the globe migrate from paper to electronics—and, in particular, as credit and especially debit card transactions become a dominant form of payment—central banks are paying increasing attention to credit and debit card industries.

In most countries, however, specific interchange fee and other payment competition issues fall under the jurisdiction of competition (regulatory and antitrust) authorities. There are exceptions, of course: the Reserve Bank of Australia and Banco de Mexico have been very visible in interchange matters. And the Banco de Espana plays an important monitoring role. But for the most part, it is the competition authorities that have taken the lead in evaluating and, at times, bringing about change, in credit and debit card markets. For the set of countries under review in this paper, this is true of Canada, the United States, EU cross-border, Denmark, the Netherlands, Spain, Sweden, and the UK.

Turning to specifics, Table 4 documents various actions taken by and pending before public authorities on interchange and related issues. Beginning with Australia, in early 2003, the Reserve Bank of Australia (RBA) eliminated credit card no-surcharge rules, and later that year mandated that credit card interchange fees be lowered. Early this year, it ruled that payments between American Express and Diners Club and their bank partners will not be regulated but that the two companies will reword certain restrictive clauses in their merchant agreements. American Express and Diners Club are now publishing their average merchant service fees; Bankcard, MasterCard, and Visa have been required to publish interchange fees since 2003.

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<sup>11</sup>A further review of Dankort fees is possible by summer 2005.

Pending issues include RBA proposals to lower EFTPOS PIN debit interchange fees and Visa signature debit interchange fees. The RBA also has proposed eliminating the honor-all-cards rule (HAC) linking Visa's credit and signature debit cards. The Bank will review existing regulations for credit card schemes in 2007.

The Banco de Mexico is the other central bank that has taken a prominent role in addressing credit and debit card issues. It has been working with the Mexican Bankers Association to lower interchange fees and make the HAC rule more flexible.

Among competition authorities, the European Commission in 2001 came to an agreement with Visa whereby Visa agreed to gradually reduce its cross-border interchange fees on credit cards and signature and PIN debit cards by December 2007. At the same time, Visa was permitted to keep its no-surcharge, HAC, and net issuer rules. Currently pending are EC investigations of MasterCard cross-border interchange fees and exclusion provisions in Visa membership rules.

In the UK, the Office of Fair Trading (OFT) ruled in September 2005 that the 2000-2004 MasterCard multilateral credit card interchange fee agreements were anti-competitive; MasterCard is currently appealing this decision. In October 2005, the OFT issued a statement of objections against Visa's domestic multilateral interchange fee agreements for its credit, deferred debit, and charge card transactions. A period of discussion is currently underway.

Competition authorities have been active elsewhere as well. Last year, the Netherlands Competition Authority (NMa) fined Interpay and its member banks for charging "excessive" merchant service charges, although the objection process is still underway. Also last year, the United States Supreme Court upheld the U.S. Department of Justice's successful 2001 court case eliminating MasterCard and Visa exclusion rules that prohibited member banks from issuing

American Express and Discover credit cards. Earlier actions or agreements in other countries include: (i) the Danish Competition Authority's administration of the 2003 Amendment to the Danish Act on Certain Payments, whereby MasterCard and Visa PIN debit merchant service charges were reduced and a positive (non-zero) interchange fee was introduced on Dankort chip PIN debit card transactions; (ii) the Canadian Competition Authority's mid-90's Consent Agreement with the principal member of Interac, which resulted in expanded representation on the Board, liberalization of network access rules, and removal of constraints on product innovation and price competition, including the removal of the prohibition against surcharging; and (iii) the Spanish Ministry of the Economy's 1999 agreement with banks, networks, and merchants to lower credit card and signature debit card interchange fees, and the Tribunal's 2005 request to the networks for new interchange fee setting procedures.

Interaction among competition authorities and central banks on credit and debit card issues varies across countries (column 9). In some countries, there is some degree of consultation and occasional representation on joint task forces—this is, or has been, true in Spain, the EC, the UK, and Australia, for example. In other countries, the degree of interaction between competition authority and central bank appears limited, at least formally. Whether closer ties will be forged in light of the issues facing the card industry bears watching.

### **3. Interchange Fee Theories**

Interchange fees and related payment card issues have been the subject of a growing body of theoretical work in recent years.<sup>12</sup> This section of the paper surveys a portion of this work, focusing on models that examine various factors potentially affecting interchange fees. In order

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<sup>12</sup>Other surveys are provided by Schmalensee (2003), Evans and Schmalensee (2005b), Roson (2005), and Weiner and Wright (2005).

to review this literature somewhat systematically, we group possible factors into four categories: assumptions regarding networks, assumptions regarding issuers and acquirers, assumptions regarding end-users (consumers and merchants), and assumptions regarding other possible factors. A single factor, by itself, is highly unlikely to determine the level of interchange fees. Rather, interaction among factors, in some or all of these four categories, typically proves critical.

### **3.1 Assumptions**

Table 5 presents a summary of many of the key theoretical articles on interchange fees written over the last several years. The papers, organized by the assumed level of network and intra-network (issuer and acquirer) competition, are listed in the third column of the table. As will be discussed in Section 4 below, use of these two categories proves to be a useful “first-step” sorting mechanism when comparing model assumptions and predictions with actual interchange fee arrangements.

The first organizational division, reflected in the first column of Table 5, is the assumption regarding network competition. Many models assume there is no competition among card networks, either explicitly, by assuming a monopolistic network, or implicitly, by not considering network competition in the setup. Other models assume there is competition among networks. In some cases, these networks are defined as identical, competing within the same payment instrument (for example, credit vs. credit or debit vs. debit). In other cases, these networks are defined as asymmetric, competing across different payment instruments (for example, credit vs. debit or PIN debit vs. signature debit), across different network schemes (three-party vs. four-party), or within the same payment instrument but facing different cost structures.

The second organizational division, shown in the second column of Table 5, is the assumption regarding intra-network competition. A key feature of most models is the assumed degree of competition among card-issuing banks and among merchant acquiring banks. This degree of competition is typically modeled with reference to the price-cost margins of issuers and acquirers. A zero margin is taken to imply perfect competition. A positive margin is taken to imply some market power. As seen in Table 5, some models assume both issuers and acquirers operate in perfectly competitive markets, some assume both issuers and acquirers have some market power, and still others assume only issuers have market power.

The remaining “Assumption” columns in Table 5 list other important factors assumed or incorporated in the respective models. Column 4 focuses on network attributes. In addition to the assumed degree of network competition, three additional network attributes are considered: whether the model in question assumes a three-party or four-party scheme; what the network(s)’ objectives are; and whether there is a single or multiple interchange fee structure. Possible network objectives include maximizing the number of transactions or market share; maximizing network profits (in a three-party scheme); and maximizing members’ joint profits (in a four-party scheme), perhaps weighted more on the issuer or acquirer side. In addition, networks may seek to address any imbalances between the costs and revenues of issuers and acquirers, and between the demand of consumers and merchants. Finally, models may incorporate either a single interchange fee or, alternatively, multiple interchange fees that vary according to type of industry or transaction volume.

Column 5 in Table 5 focuses on intra-network attributes. In addition to the assumed degree of competition on the issuing and acquiring sides of the market, three additional attributes are considered: the degree of pass-through of interchange fees from issuers and acquirers to

cardholders and merchants, respectively; the relative cost structures facing issuers and acquirers; and whether issuers and acquirers are the same or different entities.

The next two columns turn to assumptions regarding the end users in payment card models. Consumer characteristics (column 6) include the demand for products (elastic or inelastic); the demand for cards (exogenous or endogenous; singlehoming or multihoming); and the demand for specific card transactions (homogeneous or heterogeneous transactional benefits). The types of fees and rewards that consumers face also vary by model.

Merchant characteristics are listed in column 7. Some models assume that merchants are strategic in their card-acceptance behavior, that is, they are competitive. Others assume that merchants are monopolistic. Models also differ according to whether merchants are assumed to derive homogeneous or heterogeneous transactional benefits, and whether they pay per-transaction fees and/or fixed fees. Finally, column 8 shows other factors that are built into various models. Chief among them are the presence or absence of assorted network rules and bylaws. These include no-surcharge and non-discrimination rules, honor all cards rules, and net issuer rules.

## **3.2 Results**

It is probably fair to say that the results of the papers summarized in Table 5 vary as much or more as the underlying assumptions in these papers. Key results are listed in column 9.

Perhaps the most important general result involves network competition. The effect of network competition on interchange fees is not uniform but varies widely depending on other factors. Some key factors include consumer and merchant demand characteristics, and the nature of intra-system competition.

To the extent consumers are singlehoming, that is, use only one payment card, networks can act as monopolies, so interchange fees are not reduced by network competition (Rochet and Tirole, 2002). However, as consumers become multihoming, merchant resistance to interchange fees increases, and network competition lowers interchange fees (Rochet and Tirole, 2002, 2003; Guthrie and Wright, 2003).

To the extent that merchants are homogeneous, with an inelastic demand for transactions, network competition leads to a lower (or equal) interchange fee than non-competition. However, if merchants are heterogeneous (elastic demand), the competitive interchange fee can be higher than the monopolistic interchange fee (Guthrie and Wright, 2005). Network competition lowers interchange fees for both strategic (competitive) and monopolistic merchants. However, interchange fees for monopolistic merchants are lower than those for strategic merchants whether the network is competitive or not (Guthrie and Wright, 2003).

Intra-system competition is similarly influential. Several models show that differences in issuers' and acquirers' margins affect equilibrium interchange fees (Maneti and Somma, 2002; Rochet and Tirole, 2002; and Guthrie and Wright, 2005). Differences in these margins also affect competing networks' profits (Maneti and Somma, 2002).

A number of other interesting results involving network competition fall out of these models as well. These include: (1) network competition lowers the total fees charged across the issuing and acquiring sides of the market (Rochet and Tirole, 2003; and Chakravorti and Roson, 2004); (2) network competition may raise interchange fees if consumers hold a single card and merchant demand for transactions is elastic (Guthrie and Wright, 2003, 2005); and (3) if the network is a monopoly, interchange fees can vary depending on the interaction of network

objectives and issuer and acquirer margins (Gans and King, 2002; Schmalensee, 2002; Wright, 2003, 2004; and Schwartz and Vincent, 2004).

Clearly, the nature of network competition is central to many of the results of the models in Table 5. Another important role is played by the various network rules and bylaws. Most of the models, for example, explicitly assume a no-surcharge rule and implicitly assume an honor all cards rule. Relaxing these assumptions can lead to differing results. If merchants are allowed to surcharge, for example, interchange fee levels may change depending on any number of additional factors, including the effective cost of surcharging to merchants, merchant competitiveness, and the price elasticity of consumer demand for goods (Gans and King, 2002; Katz, 2001; Wright, 2003; and Schwartz and Vincent, 2004).

What one comes away with after surveying this rich theoretical literature is an appreciation for the many factors that may affect interchange fees. Even a single factor may impact interchange fees differently depending on other factors. Determining the actual impact of such variables is, in the end, an empirical question. We attempt to take a step in this direction in the next section.

#### **4. Country Case Studies**

The previous section surveyed some of the important contributions in the theoretical literature on payment card interchange fees. This section details actual market conditions in four countries—the United States, Australia, the UK, and the Netherlands—and compares these conditions with theory. The key question asked is, to what extent do actual interchange fee practices “line up” with model assumptions and predictions? For each country, we first characterize the credit and debit card industries by the level of network and intra-network

competition. We then try to match up a country's experience with existing theory, suggesting additional assumptions and institutional features that may help explain that country's situation.

## **4.1 United States**

### **4.1.1 Network competition**

Network competition exists in the United States, both within and across payment card instruments.

The United States has six credit card networks. The three largest—Visa, MasterCard, and American Express—compete aggressively with one another. Visa has the largest market share, followed by MasterCard and American Express. Visa's market share has declined somewhat in recent years, as measured by purchase value, number of transactions, and number of cards (Chart 1). The remaining three credit card networks—Discover, Diners Club, and JCB, have relatively small market shares (Chart 1).

The United States has two signature-based debit card networks (Visa Check Card and MasterCard MasterMoney) and thirteen PIN-based debit card networks. Competition has been especially pronounced in the PIN debit market, and especially among the four largest networks. The market share of Visa's Interlink network has trended up in recent years while those for Star, NYCE, and Pulse have fluctuated (Chart 2). These large PIN-based networks also compete vigorously with the two signature-based networks.<sup>13</sup>

It is unclear to what extent credit cards and debit cards compete. Overall debit card market share (signature plus PIN) has been rising in recent years, and in 2003, the number of debit card transactions exceeded the number of credit card transactions for the first time (Chart 3). However, in terms of purchase value, the difference between credit cards and debit cards has

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<sup>13</sup>For discussion of PIN vs signature debit competition, see Hayashi et.al (2003).

been stable over the last five years, suggesting perhaps that debit card transactions are largely substituting for paper-based (check and cash) transactions and not for credit card transactions (Chart 3). One can safely say, however, that there is competition within the credit card industry, within the PIN debit card industry, and across the PIN and signature debit card industries.

#### **4.1.2 Intra-network competition**

Both the acquiring and issuing sides of the card market appear to be competitive in the United States.

With regard to the acquiring market, although the largest acquirers' market share has increased slightly in the last ten years, acquirers' margins per transaction reportedly have been declining (Chart 4).<sup>14</sup>

On the issuing side, top credit card issuers' market shares have increased significantly in the last ten years (Chart 5). Nevertheless, this market appears to be quite competitive. No annual fees, generous reward programs, and free or low introductory interest rates are typical in the industry, as issuers compete aggressively for customers. The story is somewhat different with respect to debit cards. Here, market shares of top issuers are much smaller than in the credit card market (Chart 6, 7), but the degree of competition is hard to gauge. Because debit cards are tied to demand deposit accounts, it is costly for consumers to switch issuers. At the same time, however, many banks use their debit products as a strategic tool, providing rewards for signature card transactions and charging so-called PIN fees for PIN card transactions. On net, it is probably fair to view card issuing—both credit and debit—as a competitive environment.

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<sup>14</sup>According to the Star's fee structure, a processing fee is around 3 cents per transaction and according to the FMI, the acquirer's processing charge is between 2.5 cents to 6.5 cents per transactions, these fees have declined slightly in the last several years.

### 4.1.3 Matching theory and practice

As noted above, both network and intra-network payment card competition exists in the United States. In terms of network competition, competition between Visa and MasterCard in the credit card market, and among the top networks in the PIN debit market, fit well with the identical four-party network schemes assumed in Guthrie and Wright(2003, 2005) and Rochet and Tirole (2002, 2003). Competition between Visa/MasterCard and American Express, on the other hand, fits well with Maneti and Somma (2002).

In terms of intra-network competition, although both the acquiring and issuing sides of market are competitive, it is difficult to judge which side is more competitive or which side experiences lower margins per transaction. Revenues (not margins) are much higher for issuers than acquirers, but their costs per transaction are unknown. It does appear that pass-through of interchange fees is 100 percent on the acquiring side, while on the issuing side it is less than 100 percent.<sup>15, 16</sup>

On balance, network objectives are likely to be weighted more heavily toward issuers than acquirers in the U.S. One reason is that even the largest nonbank acquirers do not have voting power in association networks and market share of nonbank acquirers is fairly large (Chart 8). A second reason is that large bank acquirers are typically large issuers as well (Table 6). Therefore, maximization of issuer profits, number of transactions, or the weighted sum of end-user surplus (with a high weight on consumers) appears to be plausible assumptions in the U.S. case. These assumptions are made by Guthrie and Wright (2003, 2005) and Rochet and Tirole (2002, 2003).

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<sup>15</sup>A typical merchant fee consists of three components, an interchange fee (to the issuer), a processing fee (to the acquirer), and a switch fee (to the network).

Other important factors in the United States are merchant demand for card transactions and consumer cardholding behavior. Most industries in the United States are quite competitive. As a result, merchants clearly have a strategic motive to accept cards. In addition, unlike in most other countries, interchange fees in the United States are set in a very detailed manner according to industry category (Table 7). Thus, a single interchange fee applies to a relatively homogeneous set of merchants, and this industry-specific fee less likely impacts consumer cardholding behavior, which is consistent with Rochet and Tirole (2002). U.S. households typically hold multiple credit and debit cards, that is, they are multihoming.<sup>17</sup> However, also consistent with Rochet and Tirole (2002), these multihoming cardholders often appear to prefer a particular card over the others.<sup>18</sup>

Taken in sum, the assumptions in Rochet and Tirole (2002) fit the U.S. payment card market well. However, the model does not predict that network competition raises interchange fees, which, arguably, is what is being observed in the United States. The model also predicts that competition among issuers lowers interchange fees, which also seems to contradict the U.S. case (Chart 9). The only model that predicts that network competition may raise interchange fees is Guthrie and Wright (2003, 2005). However, to generate this result, the model assumes that heterogeneous merchants face a single interchange fee, which is not the case in the United States.

Can theory and fact be reconciled? Additional considerations may help explain the U.S. situation. For example, modeling issuers' behavior may prove critical. Oligopolistic issuers may alter their card portfolio, if not change networks, according to profitability. Network competition,

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<sup>16</sup>According to a large credit card issuer's annual report, the average growth rate of interchange fee income (after deducted the costs of reward program) exceeds the average growth rate of transaction value. This suggests that interchange fee does not pass-through 100 percent on issuing side.

<sup>17</sup>According to the BIS, the number of debit cards and credit cards issued in the U.S. in 2002 were 260.4 million and 709 million, respectively. The U.S. population in the same year was 288.2 million.

<sup>18</sup>Some studies pointed out this. For example, the 2004 Preferred Card Study by Edgar, Dunn, and Company concluded that "rewards dominate the reasons to use a specific credit card for 6 in 10 Americans."

therefore, gives networks a strong incentive to try to attract issuers as much as possible. One of the strategies for doing so is to provide issuers with higher interchange fees. Per-transaction costs for issuers may not be fixed, as many papers assume, but rather be endogenous with respect to interchange fees. Higher interchange fees allow issuers to provide more generous reward programs to cardholders, but of course reward programs are costly.

As noted, U.S. interchange fees are set by industry. As a result, modeling consumer cardholding and merchant card acceptance under a single interchange fee does not fit the U.S. case. In a given industry, perhaps the merchant's card acceptance does not influence their customers' cardholding behavior.

## **4.2 Australia**

### **4.2.1 Network competition**

Network competition likely exists in Australia.

There are six credit card networks in the country. The three largest—Visa, MasterCard, and Bankcard—have a combined market share in excess of 80 percent. The remaining market is divided among American Express, Diners Club, and JCB. Individual network share data are not available for recent years, but in 2001-2002, shares in terms of number of credit cards were 53.4 percent for Visa, 22.7 percent for MasterCard, 15.4 percent for Bankcard, 6.5 percent for American Express, 1.9 percent for Diners, and essentially negligible for JCB. Over the 2002 to 2005 period, the combined American Express/Diners share has increased slightly (Chart 10).

There are two debit card networks in Australia, EFTPOS and Visa Debit. EFTPOS is PIN-based, while Visa Debit is signature-based. Based on statistics furnished by the Building Society to the Reserve Bank of Australia, EFTPOS's share of the overall debit network is

roughly 90 percent while Visa Debit's is roughly 10 percent.<sup>19</sup> Visa Debit cards are primarily issued by credit unions and building societies that were precluded from issuing credit cards. EFTPOS cards, in contrast, are issued by all types of financial institutions.

Credit card and EFTPOS debit card transactions have exhibited an interesting growth pattern in recent ten years (Chart 11). In 1995, credit and EFTPOS debit transaction volume were about the same. From 1996 to 1998, debit volume exceeded credit volume, but from 1999 to 2004, credit volume exceeded debit volume. In 2005, volume for the two instruments has essentially been the same again. This may imply that, in Australia, credit and EFTPOS debit are relatively close substitutes and, hence, credit card networks and the EFTPOS network see each other as competitors.

#### **4.2.2 Intra-network competition**

Both the acquiring and issuing sides of the card market appear to be competitive in Australia.

While the acquiring market is highly concentrated, a large portion of recent interchange fee reductions has been passed through to lower merchant service charges (MSC). The four largest banks in Australia acquire about 95 percent of transaction volume and 85 percent of transaction value.<sup>20</sup> However, according to the Reserve Bank of Australia, the average MSC for four-party networks in Australia has declined from 1.46 percent prior to regulation to 0.97 percent since regulation. This roughly 50 basis point decline is in line with the decline in interchange fees pre- and post-regulation.

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<sup>19</sup>*Building Society Comments on RBA Draft Standards for Visa Debit and EFTPOS* (April 29, 2005).

<sup>20</sup>Reserve Bank of Australia and Australian Competition and Consumer Commission (2000)

Regarding credit card issuing, the four largest banks have a 55 percent market share in terms of number of cards and a 70 percent share in terms of transaction volume.<sup>21</sup> Although many banks reportedly have cut reward-program benefits as a response to lower regulated interchange fees, they still provide rewards to their cardholders. This may imply that a portion of interchange fee revenue remains passed through to cardholders, and that credit card issuing is competitive. Also indicative of competition is the fact that two of the four largest banks now issue and promote American Express cards as well as Visa and MasterCard cards.

Regarding EFTPOS debit card issuing, the combined market share of the four largest banks is large. Issuers typically charge per-transaction fees to their cardholders after a certain number of free transactions. Issuers seem to compete by using the per-transaction fees and/or free-transactions as their strategic tools.

#### **4.2.3 Matching theory and practice**

As suggested above, the Australian payment card market probably can be characterized as exhibiting both network and intra-network competition. In light of this, which theoretical model(s) best “line up” with Australian interchange fee practices?

None of the models appear to closely fit the Australian market over a large number of parameters. For example, competition between Visa and MasterCard, between Visa/MasterCard and Bankcard, and between credit cards and EFTPOS can all be characterized as four-party scheme network competition. Although the competition between Visa and MasterCard can be regarded as identical, the other two competitive relationships cannot. A number of important papers adopt four-party schemes, but all of them assume identical networks (Guthrie and Wright 2003, 2005; Rochet and Tirole 2002, 2003). Chakravorti and Roson (2004) assume asymmetric network competition, but adopt either a three-party scheme or an issuer-controlled four-party

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<sup>21</sup>Author’s calculation from Nilson Report.

scheme. EFTPOS cannot be regarded as issuer-controlled because interchange fees flow from issuers to acquirers in this market. (Note: On the other hand, competition between four-party scheme and three-party scheme may fit well with Maneti and Somma 2002.) And most importantly, of course, interchange fees are now regulated in Australia, which likely has fundamentally changed pricing dynamics. This “new regime” must be taken into account in analyzing current Australian conditions.

Other factors to consider in addressing the Australian situation include differences in acquirer and issuer margins, merchant strategy, consumer cardholding, and surcharging. Acquirers appear to maintain a constant margin regardless of interchange fee levels, while issuers’ margins appear to be influenced by the level of interchange fees. Most models assume constant margins on both sides of the market; only Wright (2004) considers interchange fee pass-through.

Regarding merchant strategy, it is generally believed that the Australian retail industry is more concentrated than that in the United States. It is unclear, however, how competitive Australian merchants are in practice. Merchants likely have a strategic motive to accept cards. Unlike in the United States, each network sets a single interchange fee for a typical point-of-sale transaction, that is, interchange fees do not vary by industry. This implies that heterogeneous merchants face a single interchange fee, consistent with Guthrie and Wright (2003, 2005); Rochet and Tirole (2003); Chakravorti and Roson (2004), Schmalensee (2002); and Wright (2004). Regarding consumers, consumers typically pay an annual fee for credit cards with an interest-free period. To join a reward program, an additional annual fee is charged. Such endogenous cardholding with a fixed cost is assumed by Chakravorti and Roson (2004), Katz (2001), and Wright (2003).

Merchants were not allowed to surcharge prior to credit card reform. Since reform, surcharging has been permitted, but few merchants reportedly have elected to do so. According to a recent survey, however, nearly half of Australia's merchants plan to apply surcharges to credit card transactions in 2006.<sup>22</sup> To sufficiently capture developments in the Australian payment card market, future models will probably need to explicitly assume the option of merchant surcharging as well as interchange caps for four-party schemes.

## **4.3 United Kingdom**

### **4.3.1 Network competition**

It is unclear to what extent network competition exists in the UK. Whether the two dominant networks, Visa and MasterCard, compete against each other in both credit and debit markets, in just one market (likely debit), or whether Visa focuses on credit and MasterCard focuses on debit, is an open question.

There are five credit card networks in the country. The two largest, Visa and MasterCard, together have a more than 90 percent market share.<sup>23</sup> In addition, the number of Visa and MasterCard credit/charge cards has been increasing in recent years, while the sum of those of other networks (American Express, Diners, and JCB) has not. Purchase values show the same trend (Chart 12).

In the debit card market, the two networks, Visa and MasterCard, have essentially equal (50-50) market shares (Chart 13). A typical UK bank is a member of both the Visa and MasterCard networks, but in issuing debit cards banks choose one brand or the other. According to Cruickshank (2000), Switch's (now MasterCard) interchange fee was considerably lower than Visa's in 2000, suggesting that, on revenue grounds, Visa would be more attractive. However,

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<sup>22</sup>See, for example, *American Banker* vol. 170, No. 148.

potentially offsetting this is the fact that MasterCard's debit card, Maestro, is more popular throughout Europe.

Two other facts make the UK card market interesting. First, unlike in most other European countries, debit cards have not markedly outstripped credit cards in terms of usage (Chart 14). Second, unlike in Australia, credit card-debit card network competition is subtle, if it exists at all, because there is no third network equivalent to EFTPOS.

#### **4.3.2 Intra-network competition**

Both the acquiring and issuing sides of the card market are competitive in the UK.

The acquiring market is relatively concentrated: in 2002, the top two acquirers had 40 percent and 30 percent market shares, respectively. However, it is likely that the market share of the top three acquirers has declined recently, and the difference between merchant service charges (MSCs) and interchange fees in the UK is comparable to the average difference in the United States.<sup>24</sup>

The issuing market is clearly competitive. With respect to credit cards, no annual fees, free or low introductory interest periods, and cash rebates are broadly used. In addition, several U.S. issuers, including Capital One, Citibank, and MBNA, have entered the UK market in recent years, and their combined market share now accounts for 20 percent of credit cards issued. Smaller UK banks have also entered the market (Table 8). With respect to debit cards, banks' debit card market shares correspond closely with the current account market shares.

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<sup>23</sup>*European Payment Cards Yearbook* (2004-5).

<sup>24</sup>According to the 2002 MSC Survey by Payment Systems Europe Ltd, average credit card MSC in UK has been stable around 1.5-1.6% from 1995 to 2002. According to Cruickshank (2000), average credit card interchange fee was 1-1.1%. In the United States, reportedly average MasterCard and Visa credit card MSC is around 2% and average interchange fees is around 1.5%.

### 4.3.3 Matching theory and practice

As noted above, the degree of network competition in the UK is difficult to gauge. Intra-network competition, on the other hand, exists.

To the extent Visa and MasterCard compete in the credit card market, it can be characterized as an identical four-party scheme (Guthrie and Wright, 2003, 2005; Rochet and Tirole, 2002, 2003). To the extent Visa and MasterCard compete in the debit card market, competition is again four-party, but it may or may not be identical network competition. According to Cruickshank (2000), Visa debit and Switch (MasterCard) interchange fees were quite different in 1998: the Visa debit interchange fee was at least twice as much as the Switch interchange fee. However, the more recent European Payment Cards Yearbook (2004-5) reports that the average interchange fee on Visa debit is thought to have fallen sharply from the figure reported in Cruickshank (2000). Depending on how close the two networks' interchange fees now are, they may be regarded as almost identical. If they are not identical, Chakravorti and Roson's (2004) asymmetric network competition model may fit well. Although their model assumes a three-party scheme, it can also accommodate an issuer-controlled four-party network. Since Visa debit issuers typically are not Switch issuers, an issuer-controlled four-party assumption may be valid.

In terms of intra-network competition, it is hard to judge which side is more competitive or which side receives higher margins. However, in the UK, all networks are still subject to so-called "net issuer rules"—only issuers can be acquirers. In addition, many aspects of merchant acquiring, such as transaction processing and recruitment of retailers, are outsourced to third-party service providers who do not have voting power. Therefore, a network's objective is likely to be weighted more on the issuer side. As a result, maximizing issuers' profits, maximizing the

number of transactions, or maximizing a weighted sum of end-user surplus (with a higher weight on the consumer side) are plausible assumptions. These assumptions are made in Guthrie and Wright (2003, 2005) and Rochet and Tirole (2002, 2003), with network competition; and in Wright (2003), Schwartz and Vincent (2004), and Schmalensee (2002), without network competition.

There are additional factors to consider as well. One, although the degree of competition among merchants is unknown, merchants likely have a strategic motive to accept cards. If they did not, they may not have complained about credit card interchange fees to the Office of Fair Trading in the early 1990s. Two, credit and debit card interchange fee schedules are not publicly available. However, according to Cruickshank (2000), credit card interchange fees vary according to a number of factors, including whether a transaction is domestic or cross-border, whether it is a face-to-face or a mail order transaction, and on the level of information about the transaction that is provided to the issuer. Visa's pricing in the UK may, therefore, be somewhat similar to Visa's pricing for EU cross-border transactions and, unlike in the US, a single rate may typically apply to retail POS transactions in the UK. This implies that heterogeneous merchants largely face a single interchange fee, as assumed by Guthrie and Wright (2003, 2005), Rochet and Tirole (2003), Chakravorti and Roson (2004), Schmalensee (2002), and Wright (2004).

Consumer factors to consider: Consumers can hold credit cards with no annual fees, so endogenous cardholding with no fixed fees might be an apt description in the UK credit card market (Guthrie and Wright, 2003, 2005; Gans and King, 2002). On the other hand, since the debit card is a demand deposit account product, debit card holding might be exogenous.

Other factors to consider: UK merchants are prohibited from surcharging debit card transactions, but they are permitted to surcharge credit card transactions. However, most

merchants choose not to surcharge for credit card transactions; surcharging may require some costs to merchants. Thus, interchange fees are not neutral, unlike the Gans and King (2002) prediction.

On balance, the assumptions in Guthrie and Wright (2003, 2005) appear to fit UK payment markets well if Visa and MasterCard compete against one another. The model predicts that under network competition and merchant competition, merchant heterogeneity may raise interchange fees if networks place more weight on consumer surplus than on merchant surplus. Since credit card reward programs are very popular in the UK, consumer surplus is likely weighted more heavily than merchant surplus. However, unlike the model's prediction, UK credit card interchange fees have been declining. The decline in interchange fees may not be a result of market equilibrium but may be due instead to regulatory pressure from the Office of Fair Trading.

If, on the other hand, Visa and MasterCard do not compete in the UK, none of the models closely match the UK market. However, one of Schmalensee's (2002) key results—that under bilateral monopoly, the more weight the issuer has in the network's objective function, the higher the interchange fee—may describe differences between credit and debit card interchange fees. In the UK, credit card interchange fees are higher than debit card interchange fees, and they are considered to be anticompetitive. The Schmalensee result may fit if credit card network members are close to a bilateral monopoly and debit card network members are more competitive.

## **4.4 Netherlands**

### **4.4.1 Network competition**

Network competition appears to be limited in the Netherlands. The country has two credit card networks (Visa and MasterCard) and one debit card network (Interpay).

With respect to credit cards, MasterCard has a larger market share than Visa. This is true for both number of cards and overall (domestic plus foreign) transaction volume (Chart 15). Credit card usage in the Netherlands is quite low compared with debit card usage, however.

Interpay is the sole debit card network. It is PIN-based. Its share in the total Dutch payment card network (credit plus debit) is 74 percent in terms of number of cards, 90 percent in transaction value, and 95 percent in transaction volume. In contrast with credit cards, Interpay's transaction volume and value have been increasing in recent years (Chart 16).

#### **4.4.2 Intra-network competition**

It is difficult to gauge the degree of intra-network competition in the Netherlands.

On the acquiring side, the Interpay network itself used to be the sole acquirer of PIN debit. However, acquiring contracts have recently been transferred to individual banks. Data are not available to determine whether merchant service charges have since declined.

On the issuing side, until a few years ago, only one Dutch bank (Fortis) issued Visa credit cards, while the other major Dutch banks (as well as Interpay) issued only MasterCard credit cards. Today, several banks issue both brands, but credit card volume and value continue to be dwarfed by debit. Retail banking is highly concentrated in the Netherlands, with the top four banks accounting for 85 percent of Dutch current account market. As a result, concentration of debit card issuing is probably similarly high.

#### **4.4.3 Matching theory and practice**

Overall, the Schmalensee (2002), Wright (2004), and Gans and King (2002) models appear to best fit the Dutch card environment. All three are consistent with the lack of network competition. All three are also consistent with acquirers and issuers having some degree of market power. Although surcharging is allowed in the Netherlands, only a small fraction of

merchants actually surcharge. In addition, although the Dutch debit card market does not have explicit interchange fees, it had implicit ones at the time Interpay was the sole acquirer—Interpay paid dividends to its owner financial institutions who were PIN card issuers. Today, acquiring contracts are made with individual acquirers and, thus, implicit interchange fees have disappeared. Introducing a positive interchange fee is currently being discussed in the Netherlands.

## **5. Summary**

This paper has sought to provide a bridge between the theoretical and empirical literatures on interchange fees. Specifically, the paper confronts theory with practice by asking, to what extent do existing models of interchange fees match up with actual interchange fee practices in various countries? For each of four countries—Australia, the Netherlands, the UK, and the United States—models that “best” fit the competitive and institutional features of that country’s payment card market are identified, and the implications of those model are compared to actual practices.

Not surprisingly, the models examined—while certainly yielding insight into developments in these countries—are limited in their applicability and predictive power. This reflects the fact that country-specific factors are typically very important. The next step, of course, is to try to gather comprehensive data that capture these institutional features as well as interchange structures and prices, so that rigorous econometric analysis can be conducted.

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## Appendix

### Table 1: Credit Card

Region	Country	Market Information		Interchange Fees		Other Fees	
		Share	Networks	Set by Whom	Recent Movements	Recent MSC Movements	Recent Cardholder Fee Movements
1	2	3	4	5	6	7	8
Asia Pacific	Australia	22%	Bankcard MC Visa Amex Diners JCB	Bankcard/MC/Visa: collectively set by members of the networks subject to regulatory limits	Declined	Declined	Annual Fees: Increasing Interest-Free Period: Declining Rewards: Declining
North America	Canada	23%	MC Visa Amex Diners	MC/Visa: collectively set by members of the networks	MC: Increased	MC: Increased	
	Mexico	10%	MC Visa Amex	MC/Visa: collectively set by members of the Mexican Bankers' Association (MC and Visa have the same rates)	Declining		
	USA	23%	MC Visa Amex Diners Discover JCB	MC: set by management Visa: collectively set by members of the network	Increasing	Increasing	Annual Fees: Declining Interest Rates: Zero introductory interest rates prevalent Rewards: Increasing
Europe	EU cross-border	nap	MC Visa	MC: collectively set by members of the network Visa: collectively set by members of the network subject to regulatory agreement	Declining	nap	nap
	Denmark	1%	MC Visa* Amex Diners	MC/Visa: aligned with MSCs, which are subject to regulatory cap	Stable	Stable	
	Netherlands	1%	MC Visa Amex Diners JCB	MC: collectively set by members of the network	Declining	Declining	
	Spain	14%	MC Visa Amex Diners JCB		Declining	Declining	Annual Fees: Increasing
	Sweden	7%	MC Visa Amex Diners	MC/Visa: negotiated bilaterally	Declining		
	UK	15%	MC Visa Amex Diners JCB	MC: set by management Visa: collectively set by members of the network	Declining	Stable	Annual Fees: Zero fees prevalent Interest Rates: Zero introductory interest rates prevalent Rewards: Available

Notes: 1. In column (4), four-party networks are listed above the line while three-party networks are listed below; \* denotes networks that issue cards to that country's residents for international use and are available for foreigner's use within the country  
2. "nap" denotes not applicable

**Table 1: Credit Card (cont.)**

Region	Country	Network Rules				Issues
		No-Surcharge	HAC	Net Issuer	Duality/Exclusion	
1	2	9	10	11	12	13
Asia Pacific	Australia	Bankcard: No MC: No Visa: No	Yes	Bankcard: Yes MC: Yes Visa: Yes	Yes/No	1. Reserve Bank of Australia regulations lowering credit card interchange fees and eliminating credit card no-surcharge rules. 2. In light of regulation of four-party schemes, potential shift in transactions volume to nonregulated three-party schemes.
North America	Canada	MC/Visa: Yes	nap	MC: Yes	No/	"Synthetic duality" for MC and Visa.
	Mexico	MC/Visa: Yes	Yes	MC: Yes	Yes/	1. Interchange fees have been reduced due to a concerted effort between Banco de Mexico and the Mexican Bankers Association. 2. Banco de Mexico has made the HAC rule more flexible: merchants are allowed to accept only debit, credit, or both cards. 3. The no-surcharge rule was left intact because discounts are already allowed.
	USA	MC/Visa: Yes	No	MC: No	Yes/No	1. Wal-Mart HAC case. 2. Merchant dissatisfaction with interchange fee levels. 3. DOJ-led court case eliminating MC and Visa exclusion rules that prohibited member banks from issuing American Express and Discover credit cards. 4. Appearance of volume-based interchange fee tiers.
Europe	EU cross-border	MC: No Visa: Yes		MC: No Visa: Yes	Visa: /Yes	1. Visa agreement to reduce cross-border interchange fees. 2. Visa's no-surcharge and net issuer rules left intact by EC. 3. MasterCard's interchange fees under EC review. 4. Exclusion provisions in Visa's membership rules under EC review. 5. MC eliminated its no-surcharge rule.
	Denmark		nap	MC: No	Yes/No	Debate over surcharging.
	Netherlands	No	nap	MC: No	Yes/	
	Spain	Visa: Yes		MC: No	Yes/No	1. Agreements among banks, networks, merchants, and government agencies have led to reduction in interchange fees since 1999. A further lowering of fees may result from an April 2005 ruling by the Tribunal de Defensa de la Competencia. 2. There is some dissatisfaction with lack of transparency in fee setting.
	Sweden	Visa: Yes		MC: No	Yes/No	
	UK	No		MC/Visa: Yes	Yes/	1. OFT has ruled that the 2000-2004 MC multilateral interchange fee agreements were anti-competitive and is now investigating MC's current arrangements. 2. OFT has issued a statement of objections against Visa's domestic multilateral interchange fee agreement.

**Table 2: Signature-Based Debit Card**

Region	Country	Market Information		Interchange Fees		Other Fees	
		Share	Networks	Set by Whom	Recent Movements	Recent MSC Movements	Recent Cardholder Fee Movements
1	2	3	4	5	6	7	8
Asia Pacific	Australia	21% <sup>+</sup>	Visa	Visa: collectively set by members of the network	Declined	Declined	
North America	Canada	neg	nap	nap	nap	nap	nap
	Mexico	51% <sup>#</sup>	MC Visa	MC/Visa: collectively set by members of the Mexican Bankers' Association (MC and Visa have the same rates)	Declining		
	USA	13%	MC Visa	MC: set by management Visa: collectively set by members of the network	Net decline	Net decline	
Europe	EU cross-border	nap	MC Visa	MC: collectively set by members of the network Visa: collectively set by members of the network subject to regulatory agreement	Declining	nap	nap
	Denmark	neg	nap	nap	nap	nap	nap
	Netherlands	neg	nap	nap	nap	nap	nap
	Spain	21%	Euro 6000 MC* ServiRed Sistema 4B Visa*	Euro6000/ServiRed/Sistema4B: set their own levels subject to regulatory agreement	Declining	Declining	
	Sweden	51% <sup>+</sup>	MC Visa	MC/Visa: negotiated bilaterally			
	UK	28% <sup>+</sup>	MC Visa	MC: set by S2 Card Services Visa: collectively set by members of the network		Stable	

Notes: 1. "\*" denotes networks that issue cards to that country's residents for international use and are available for foreigner's use within the country  
2. "+" indicates share includes PIN-based transactions  
3. "#" denotes share includes ATM transactions  
4. "nap" denotes not applicable  
5. "neg" denotes negligible

**Table 2: Signature-Based Debit Card (cont.)**

		Network Rules				
Region 1	Country 2	No-Surcharge 9	HAC 10	Net Issuer 11	Duality 12	Issues 13
Asia Pacific	Australia	Visa: Yes	Yes	Visa: Yes	nap	Reserve Bank of Australia proposal to lower interchange fees and eliminate no-surcharge and HAC rules on Visa signature debit card.
North America	Canada	nap	nap	nap	nap	nap
	Mexico	MC/Visa: Yes	Yes	MC: Yes	Yes	1. Interchange fees have been reduced due to a concerted effort between Banco de Mexico and the Mexican Bankers Association. 2. Banco de Mexico has made the HAC rule more flexible: merchants are allowed to accept only debit, credit, or both cards. 3. The no-surcharge rule was left intact because discounts are already allowed.
	USA	MC/Visa: Yes	No	MC: No	Yes	1. Wal-Mart HAC case. 2. Merchant dissatisfaction with interchange fee levels. 3. Appearance of volume-based interchange fee tiers.
Europe	EU cross-border	MC: No Visa: Yes		MC: No Visa: Yes		1. Visa agreement to reduce cross-border interchange fees. 2. Visa's no-surcharge and net issuer rules left intact by EC. 3. MasterCard's interchange fees under EC review. 4. Exclusion provisions in Visa's membership rules under EC review. 5. MC eliminated its no-surcharge rule.
	Denmark	nap	nap	nap	nap	nap
	Netherlands	nap	nap	nap	nap	nap
	Spain	Euro6000: Yes ServiRed: Yes Sistema4B: Yes Visa: Yes		MC: No	Yes	1. Agreements among banks, networks, merchants, and government agencies have led to reduction in interchange fees since 1999. A further lowering of fees may result from an April 2005 ruling by the Tribunal de Defensa de la Competencia. 2. There is some dissatisfaction with lack of transparency in fee setting.
	Sweden	Visa: Yes		MC: No	Yes	
	UK	Yes		MC/Visa: Yes	Yes	

**Table 3: PIN-Based Debit Card**

Region	Country	Market Information		Interchange Fees		Other Fees	
		Share	Networks	Set by Whom	Recent Movements	Recent MSC Movements	Recent Cardholder Fee Movements
1	2	3	4	5	6	7	8
Asia Pacific	Australia	21% <sup>+</sup>	EFTPOS MC* Visa*	EFTPOS: bilaterally set; paid by issuer to acquirer	EFTPOS: Stable		Per-transaction fees typical
North America	Canada	36%	Interac MC*	Interac: sets it at zero	Interac: Zero		Per-transaction fees typical
	Mexico	nap	nap	nap	nap	nap	nap
	USA	7%	Accel AFFN Alaska CU24 Jeanie MAI NYCE Presto Pulse Shazam Star MC Visa	Domestic/MC: set by network management Visa: collectively set by members of the network	Increasing	Increasing	Some banks charge per-transaction fees
Europe	EU cross-border	nap	MC Visa	MC: collectively set by members of the network Visa: collectively set by members of the network subject to regulatory agreement	Visa: Declined	nap	nap
	Denmark	53%	Dankort MC Visa	Dankort: set by regulation MC/Visa: aligned with MSCs, which are subject to regulatory cap	Dankort: Zero to positive to zero MC: Declined Visa: Declined	Dankort: Zero to positive to zero MC: Declined Visa: Declined	
	Netherlands	31%	Interpay MC*	Interpay: sets it at zero	Interpay: Zero	Declining	
	Spain	neg	nap	nap	nap	nap	nap
	Sweden	51% <sup>+</sup>	MC Visa	MC/Visa: negotiated bilaterally			
	UK	28% <sup>+</sup>	MC Visa	MC: set by S2 Card Services Visa: collectively set by members of the network			

Notes: 1. "\*" denotes networks that issue cards to that country's residents for international use and are available for foreigner's use within the country  
2. "+" indicates share includes Signature-based transactions  
3. "nap" denotes not applicable  
4. "neg" denotes negligible

**Table 3: PIN-Based Debit Card (cont.)**

		Network Rules				
Region 1	Country 2	No-Surcharge 9	HAC 10	Net Issuer 11	Duality 12	Issues 13
Asia Pacific	Australia	Visa: Yes	nap		Yes	Reserve Bank of Australia proposal to lower EFTPOS interchange fees.
North America	Canada	Interac: No	nap	MC: Yes	No	Some discussions over efficacy of zero interchange system.
	Mexico	nap	nap	nap	nap	nap
	USA	MC/Visa: Yes	nap	MC: No	Yes	1. Consolidation of PIN networks. 2. Interchange fees rising in apparent competitive response to high and rising signature-debit interchange fees. 3. Appearance of "PIN" (per-transaction user) fees. 4. Appearance of volume-based interchange fee tiers.
Europe	EU cross-border	MC: No Visa: Yes	nap	MC: No Visa: Yes	nap	1. Visa agreement to reduce cross-border interchange fees. 2. Visa's no-surcharge and net issuer rules left intact by EC. 3. MasterCard's interchange fees under EC review. 4. Exclusion provisions in Visa's membership rules under EC review. 5. MC eliminated its no-surcharge rule.
	Denmark	Dankort: Yes	nap	MC: No	Yes	1. The 2003 amendment to the Payments Act introduced positive interchange fees on Dankort chip PIN debit transactions from January 2005. Beginning March 2005, banks are prohibited from charging merchants interchange fees/MSCs for Dankort transactions; instead, banks are allowed to charge annual fees. Surcharging for Dankort transactions has also been prohibited since March 2005. 2. The amendment reduced MSCs for MC and Visa PIN transactions.
	Netherlands	No	nap	MC: No	nap	1. NMa fined Interpay and member banks for "charging excessive rates"; objection process still underway. 2. Issuers discussing possibility of charging positive interchange fees for Interpay transactions.
	Spain	nap	nap	nap	nap	nap
	Sweden	Visa: Yes	nap	MC: No	Yes	
	UK	Yes	nap	Yes	Yes	Switch and Solo consolidated into MasterCard (Maestro).

**Table 4: Public Authority Involvement**

Region	Country	Competition Authority		
		Agency	Actions/Rulings	
			Actions/Rulings Taken	Actions/Rulings Pending
1	2	3	4	5
Asia-Pacific	Australia	Australian Competition and Consumer Commission (ACCC)		
North America	Canada	Competition Bureau	Reached a Consent Agreement with the principal members of Interac, which resulted in expanded representation on the Board, liberalization of network access rules, and removal of constraints on product innovation and price competition, including the removal of the prohibition against surcharging.	
	Mexico	Comision Federal de Competencia (Federal Competition Commission)		
	USA	Department of Justice	Won court case eliminating MC and Visa exclusion rules that prohibited member banks from issuing American Express and Discover credit cards (10/04).	
Europe	EU cross-border	European Commission	In "Case No COMP/29.373, Visa International- Multilateral Interchange Fee," (i) Visa agreed to gradually reduce cross-border interchange fees on credit card, signature debit, and PIN debit transactions by December 2007 and to publish these fees, and (ii) the EC stated that it had no grounds for prohibiting Visa's no-surcharge and net issuer rules (08/01).	1. MC interchange fees under investigation (10/03). 2. Exclusion provisions in Visa membership rules under investigation (08/04).
	Denmark	Konkurrencestyrelsen (Danish Competition Authority)	Helps administer the Danish Act on Certain Payments (2000) and the amendment to the Act (2003). The Act (2000) regulates MSCs, and allows for merchant surcharging. The amendment (2003) mandated the introduction of a positive interchange fee on Dankort chip PIN debit transactions, and a reduction in MC and Visa PIN debit MSCs.	
	Netherlands	Netherlands Competition Authority (NMa)	NMa fined Interpay and member banks for "charging excessive rates,;" objection process still underway (2004).	
	Spain	Servicio de Defensa de la Competencia (SDC), Tribunal de Defensa de la Competencia (TDC), both under Ministry of the Economy Ministry of Industry	Agreements among banks, networks, merchants, and Ministry of the Economy have led to reduction in credit card and signature debit card interchange fees since 1999.	A further lowering of fees may result from an April 2005 ruling by the Tribunal de Defensa de la Competencia.
	Sweden	Swedish Competition Authority		
	UK	Office of Fair Trading (OFT)		1. Following multiyear investigation, OFT issued a decision that MC's 2000-2004 interchange fee agreements restricted competition and infringed on competition law (9/05). 2. OFT issues a statement of objections against Visa's interchange fees including credit cards, deferred debit, and charge card transactions (10/05).

**Table 4: Public Authority Involvement (cont.)**

Region	Country	Agency	Central Bank		Competition Authority Central Bank Interaction
			Actions/Rulings		
			Actions/Rulings Taken	Actions/Rulings Pending	
1	2	6	7	8	9
Asia-Pacific	Australia	Reserve Bank of Australia Payments System Board (established by Parliament July 1998)	<ol style="list-style-type: none"> <li>1. MC, Visa, American Express, and Diners Club credit card no-surcharge rules eliminated (01/03).</li> <li>2. Bankcard, MC, and Visa lowered credit card interchange fees and began publishing interchange fee levels (10/03).</li> <li>3. Payments between American Express and Diners Club and their bank partners will not be regulated; however, American Express and Diners Club will reword clauses in their merchant agreements and publish average merchant service fees (02/05).</li> </ol>	<ol style="list-style-type: none"> <li>1. Proposed lowering EFTPOS PIN debit interchange fees (02/05).</li> <li>2. Proposed lowering Visa signature debit interchange fees (02/05).</li> <li>3. Proposed eliminating Visa credit card-signature debit card HAC rule (02/05).</li> <li>4. Bank will review the standards for credit card schemes in 2007 (02/05).</li> </ol>	Conducted joint study, "Debit and credit card schemes in Australia, a study of interchange fees and access," October 2000.
North America	Canada	Bank of Canada			Limited interaction.
	Mexico	Banco de Mexico		<ol style="list-style-type: none"> <li>1. Interchange fees have been reduced due to a concerted effort between Banco de Mexico and the Mexican Bankers Association.</li> <li>2. Banco de Mexico has made the HAC rule more flexible: merchants are allowed to accept only debit, credit, or both cards.</li> <li>3. The no-surcharge rule was left intact because discounts are already allowed.</li> </ol>	Limited interaction.
	USA	Federal Reserve			Limited interaction.
Europe	EU cross-border	European Central Bank			Some interaction; ECB can play advisory role.
	Denmark	Danmarks Nationalbank			Limited interaction.
	Netherlands	De Nederlandsche Bank			Limited interaction.
	Spain	Banco de Espana		Banco de Espana monitoring credit card market; first public report due shortly.	TDC and Banca de Espana work together on occasion.
	Sweden	Riksbank			Limited interaction.
	UK	Bank of England			Limited interaction; Bank of England sits as an observer on joint OFT/industry task force.

**Table 5: Key Assumptions and Results in Previous Literature**

Assumptions		Paper	Assumptions				Results	
Network Competition	Intra-Network Competition		Network	Intra-Network	End-Users			Others
			Competition, Scheme, Objectives, IFs	Competition, Pass-through, Costs, Entities	Consumers	Merchants		
1	2	3	4	5	6	7	8	9
No Network Competition	Both issuers and acquirers are perfectly competitive	Katz (2001)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•No assumption on the network objectives</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Issuers and acquirers are perfectly competitive</li> <li>•100% pass-through IF</li> <li>•Fixed costs for card issuing and per transaction cost for both issuing and acquiring sides</li> <li>•No assumption on entities</li> </ul>	<ul style="list-style-type: none"> <li>•Endogenous cardholding and a fixed card fee is charged</li> <li>•The card provides no transactional benefits but it makes some transactions possible</li> <li>•Receive per transaction rebate</li> <li>•Elastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Monopolistic merchants</li> <li>•Homogeneous in card benefits</li> <li>•Pay per transaction fee</li> </ul>	<ul style="list-style-type: none"> <li>•Effects of NSR is considered</li> </ul>	<ul style="list-style-type: none"> <li>•Under NSR, card is likely overused if rebate is provided to card users.</li> </ul>
	Acquirers are perfectly competitive & issuers involve some market power	Wright (2003)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•Maximize issuers' profits</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Acquiring is perfectly competitive and issuers can be monopoly or symmetric Cournot oligopoly</li> <li>•100% pass-through IF on acquiring side</li> <li>•Fixed costs for card issuing and per transaction cost for both issuing and acquiring sides</li> </ul>	<ul style="list-style-type: none"> <li>•Endogenous cardholding and a fixed card fee is charged</li> <li>•Heterogeneous in card benefits</li> <li>•Pay per transaction fee</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Monopolistic merchants and competing merchants according to Bertrand are considered</li> <li>•Homogeneous in card benefits</li> <li>•Pay per transaction fee</li> </ul>	<ul style="list-style-type: none"> <li>•Effects of NSR is considered</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Without fixed card costs and fees, if merchants are monopolistic, NSR increases card demand; if merchants are competitive, both network and regulator is indifferent between surcharge and no-surcharge.</li> <li>•With fixed card costs, if merchants are monopolistic, surcharging makes no consumers hold cards.</li> </ul>
		Schwartz & Vincent (2004)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•Maximize issuers' profits</li> <li>•(Multiple IFs are possible)</li> </ul>	<ul style="list-style-type: none"> <li>•Acquirers are identical and perfectly competitive and issuers are identical and collude in pricing to card users (competitive card issuers are considered in section 6)</li> <li>•100% pass-through IF on acquiring side</li> </ul>	<ul style="list-style-type: none"> <li>•Exogenous cardholding (some fraction of consumers hold a card)</li> <li>•Cardholders use only cards and pay/receive per transaction fee/rebate</li> <li>•Elastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Monopolistic merchants</li> <li>•Homogeneous in card benefits</li> <li>•Pay per transaction fee</li> </ul>	<ul style="list-style-type: none"> <li>•Effects of NSR is considered</li> <li>•(HAC)</li> </ul>	<ul style="list-style-type: none"> <li>•If rebates to card users are not feasible, NSR reduces total consumer surplus.</li> <li>•Card user rebates raise IF and total consumer surplus, but reduce cash users' surplus.</li> </ul>
	Both issuers and acquirers involve some market power	Gans & King (2002)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•Maximize members' joint profits</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Issuers and acquirers are competing perfectly or imperfectly (two-part pricing and linear pricing)</li> <li>•Per transaction cost is fixed and no fixed costs exist</li> </ul>	<ul style="list-style-type: none"> <li>•Exogenous cardholding (possibly pay a fixed card fee)</li> <li>•Homogeneous in card benefits</li> <li>•Transactional benefits decrease as more transactions made by the card</li> <li>•Pay per transaction fees</li> <li>•Elastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Monopolistic merchants</li> <li>•Homogeneous in card benefits</li> <li>•Transactional benefits decrease as more transactions made by cards</li> <li>•Pay per transaction fee and fixed fee</li> </ul>	<ul style="list-style-type: none"> <li>•Effects of NSR is considered</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Under NSR and linear pricing, the profit-maximizing IF increases as acquirer competition increases and issuer competition decreases.</li> <li>•Under the same condition, the cost-minimizing IF is independent of acquirer competition but decreases as issuer competition increases.</li> </ul>

**Table 5: Key Assumptions and Results in Previous Literature (cont.)**

Assumptions		Paper	Assumptions				Results	
Network Competition	Intra-Network Competition		Network	Intra-Network	End-Users			Others
			Competition, Scheme, Objectives, IFs	Competition, Pass-through, Costs, Entities	Consumers	Merchants		
1	2	3	4	5	6	7	8	9
No Network Competition (cont.)	Both issuers and acquirers involve some market power (cont.)	Schmalensee (2002)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•Maximize members' weighted joint profits (issuers likely hold more voting power than acquirers)</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Both bilateral monopoly and multiple issuers &amp; acquirers are considered</li> <li>•Per transaction cost is fixed and no fixed costs exist</li> <li>•Different entities in the case of bilateral monopoly and no assumption in the case of multiple issuers and acquirers</li> </ul>	<ul style="list-style-type: none"> <li>•Cardholding and card usage are not distinguished (exogenous cardholding)</li> <li>•Consumer's (partial) demand for transaction is decreasing in cardholder per transaction fee</li> <li>•No assumption on consumer demand for products</li> </ul>	<ul style="list-style-type: none"> <li>•No strategic motive to accept cards</li> <li>•Merchant's (partial) demand for transaction is decreasing in merchant fee</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Under bilateral monopoly, the more weight the issuer has in the network's objective function, the higher the interchange fees.</li> <li>•Under bilateral monopoly, when consumer's and merchant's demands are identical, the necessary condition for profit maximization is satisfied when interchange fee is set to equalize issuer and acquirer unit costs.</li> <li>•If consumer's and merchant's partial demand for transactions are linear and have the same slope, and if acquiring side competes more intense than issuing side, it is profit maximizing to raise interchange fee above the output-maximizing level.</li> </ul>
		Wright (2004)	<ul style="list-style-type: none"> <li>•Competition is not considered</li> <li>•4-party scheme</li> <li>•Maximize members' joint profits</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Multiple symmetric issuers and symmetric acquirers</li> <li>•Pass-through IF is considered</li> <li>•Per transaction cost is fixed and no fixed costs exist</li> </ul>	<ul style="list-style-type: none"> <li>•Exogenous cardholding with no costs (all consumers hold a card)</li> <li>•Card benefits are drawn from density function h</li> <li>•Per transaction fee (rebate) is charged (received)</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Both strategic merchants and monopolistic merchants are considered</li> <li>•Merchants in a given industry are homogeneous in card benefits but each industry has different card benefits, which is drawn from density function g</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•If higher interchange fees increase per-transaction profits to issuers more than they decrease per-transaction profits to acquirers, (pass-through costs to user fees is higher on the acquiring side than the issuing side), profit-maximizing IF is higher than out-put maximizing IF.</li> <li>•When merchants compete according to Hotelling model, and issuers and acquirers pass through costs at the same rate, profit-max IF will be higher than welfare-max IF iff the average transactional benefit over all those merchants who accept cards is lower than the fee they pay at the profit-max IF.</li> </ul>

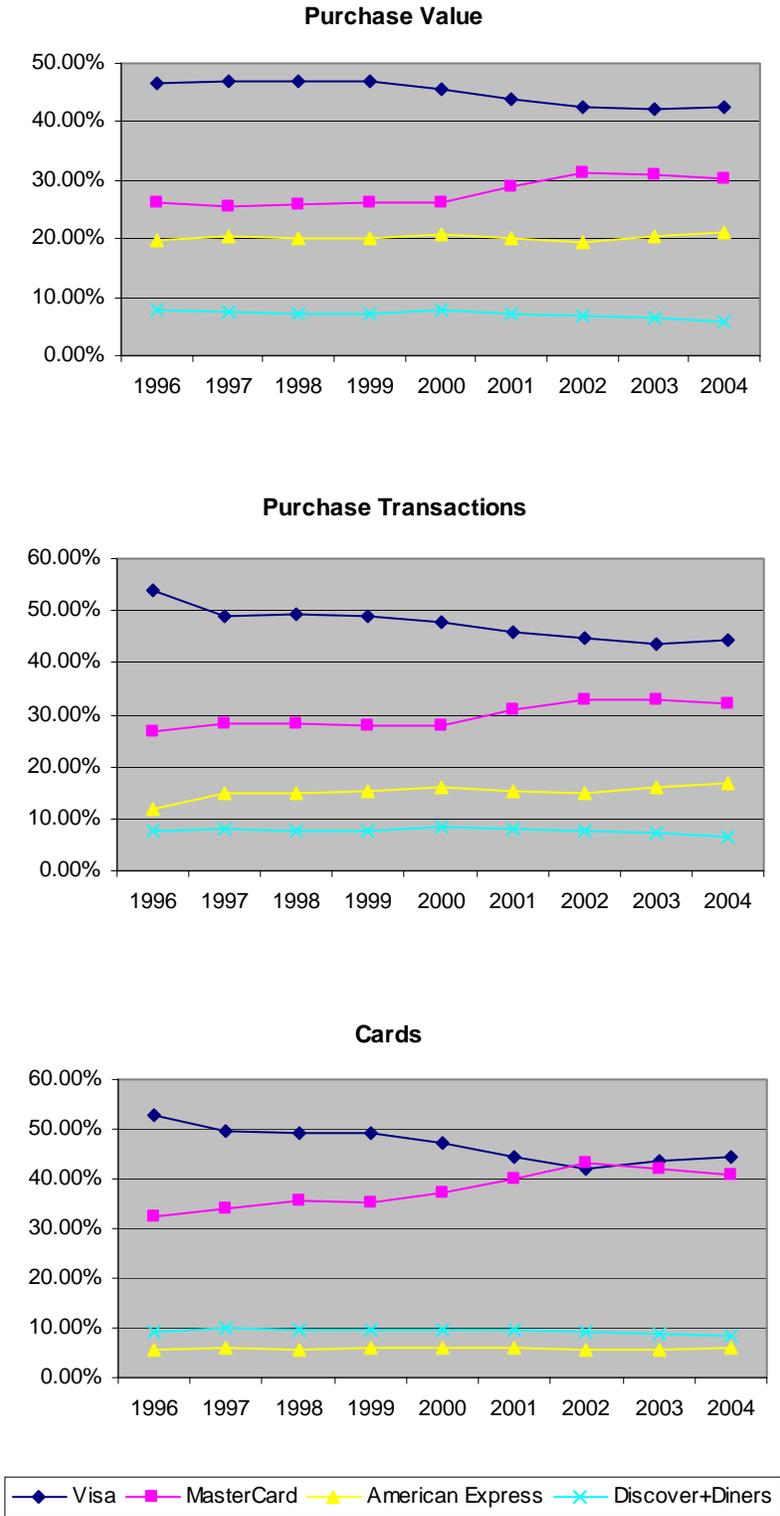
**Table 5: Key Assumptions and Results in Previous Literature (cont.)**

Assumptions		Paper	Assumptions				Results	
Network Competition	Intra-Network Competition		Network	Intra-Network	End-Users			Others
			Competition, Scheme, Objectives, IFs	Competition, Pass-through, Costs, Entities	Consumers	Merchants		
1	2	3	4	5	6	7	8	9
Competition	Both issuers and acquirers are perfectly competitive	Guthrie & Wight (2005)	<ul style="list-style-type: none"> <li>•Identical network competition</li> <li>•4-party scheme (3-party scheme is also considered as an extension)</li> <li>•Maximize weighted sum of end-user surplus</li> <li>•Single IF in a network</li> </ul>	<ul style="list-style-type: none"> <li>•Both issuing and acquiring are perfectly competitive</li> <li>•100% pass-through IF on both sides</li> <li>•Per transaction cost is fixed and no fixed costs</li> <li>•No assumption on issuing and acquiring entities</li> </ul>	<ul style="list-style-type: none"> <li>•Endogenous cardholding (whether to hold two cards, one, or none) and no costs of holding a card</li> <li>•Card benefits are drawn from density function <math>h</math> and do not vary by network</li> <li>•Per transaction fee is charged</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Strategic merchants</li> <li>•Both cases where homogenous and heterogeneous in card benefits with a single IF are considered</li> <li>•Card benefits do not vary by network</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Inter-system competition may raise IFs under competition among heterogeneous merchants (elastic merchant demand for transactions), and it may or may not reduce IFs under competition among homogenous merchants (inelastic demand up to some IFs).</li> </ul>
	Acquirers are perfectly competitive & issuers involve some market power	Rochet & Tirole (2002) (Section 5)	<ul style="list-style-type: none"> <li>•No assumption on whether competing two networks are identical</li> <li>•4-party scheme</li> <li>•Maximize issuers' profits = set highest IF that induces merchant card acceptance</li> <li>•(Multiple IFs are possible)</li> </ul>	<ul style="list-style-type: none"> <li>•Acquiring is perfectly competitive and issuing involves some market power</li> <li>•100% pass through IF on acquiring side</li> <li>•Per transaction cost is fixed and no fixed costs</li> <li>•No assumption on issuing and acquiring entities</li> </ul>	<ul style="list-style-type: none"> <li>•Cardholding and card usage are not distinguished (exogenous cardholding)</li> <li>•Card benefits are drawn from density function <math>h</math> (and do not vary by network)</li> <li>•Per transaction fee is charged</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Strategic merchants</li> <li>•Homogeneous merchants</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•4-party scheme network competition has no impact on IF if consumers hold at most one card. Otherwise, it increases merchant resistance and thus lowers IFs.</li> </ul>
	Both issuers and acquirers retain certain per transaction margins	Maneti & Somma (2002)	<ul style="list-style-type: none"> <li>•Competition between a not-for-profit network jointly run by members and a proprietary network</li> <li>•Networks compete according to the Hotelling model</li> <li>•Maximize total profits</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Per transaction margins to issuers and to acquirers are proportional to net costs</li> <li>•Per transaction cost is fixed and no fixed costs</li> <li>•Issuers and acquirers are different entities</li> </ul>	<ul style="list-style-type: none"> <li>•Cardholding and card usage are not distinguished (make only one transaction)</li> <li>•A fixed card fee is charged (no per transaction fee)</li> <li>•Hold at most one card</li> <li>•Consumer's taste for the network is uniformly distributed over an interval</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•No strategic motives</li> <li>•A fixed fee is charged (not per transaction fee)</li> <li>•Merchants maximize their utility (not profits)</li> <li>•Merchant's taste for the network is uniformly distributed over an interval</li> </ul>	<ul style="list-style-type: none"> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•When intra-network competition is symmetric (ratios of issuer's and acquirer's prices to their net costs are the same), equilibrium networks' profits are independent of the interchange fee.</li> <li>•If acquirer's margin (relative to the net costs) is greater than issuer's, the proprietary network's profit increases with the non-profit network's interchange fee.</li> </ul>

**Table 5: Key Assumptions and Results in Previous Literature (cont.)**

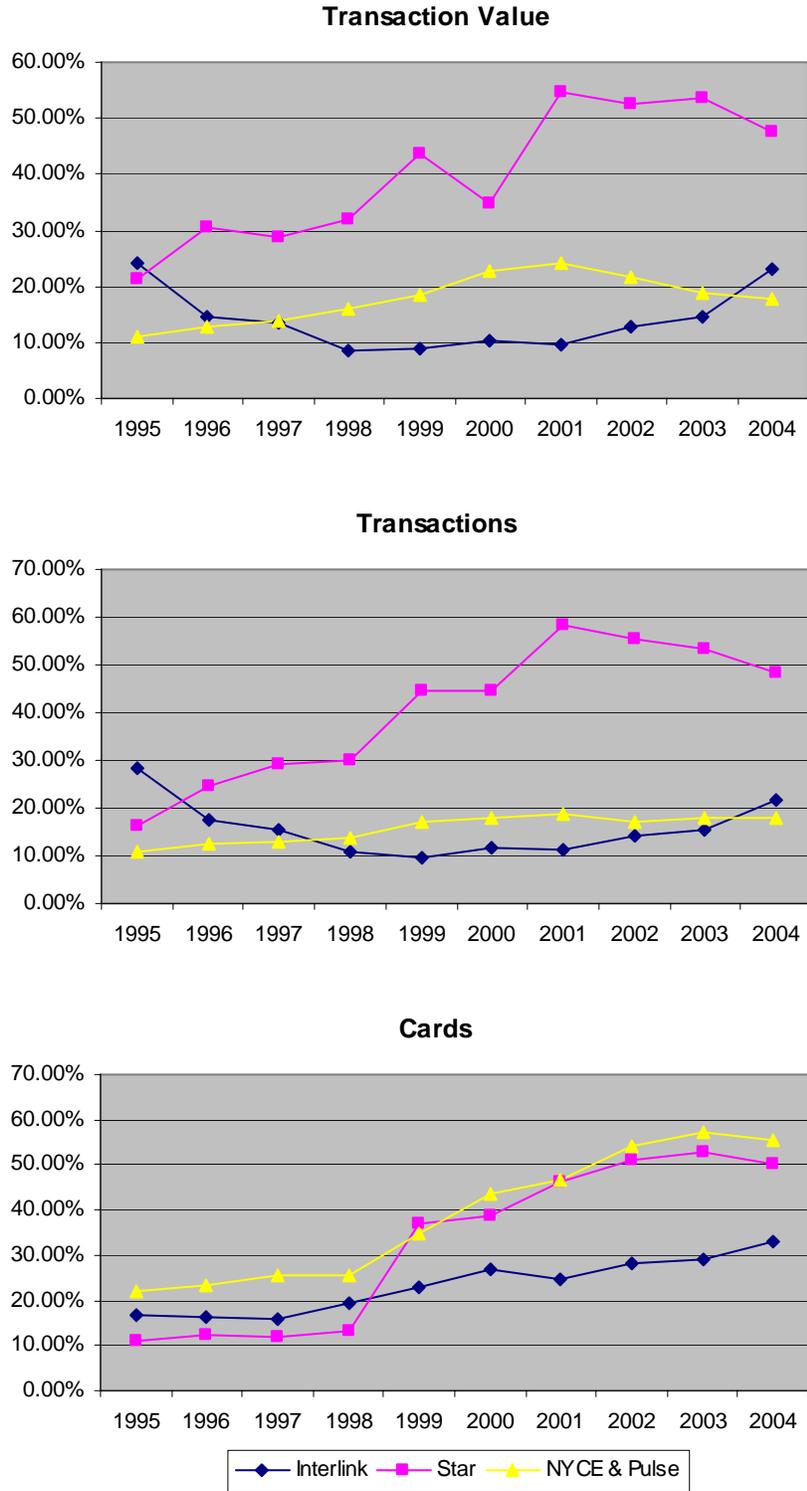
Assumptions		Paper	Assumptions				Results	
Network Competition	Intra-Network Competition		Network	Intra-Network	End-Users			Others
			Competition, Scheme, Objectives, IFs	Competition, Pass-through, Costs, Entities	Consumers	Merchants		
1	2	3	4	5	6	7	8	9
Competition (cont.)	Both issuers and acquirers retain certain per transaction margins (cont.)	Guthrie & Wright (2003)	<ul style="list-style-type: none"> <li>•Identical network competition</li> <li>•4-party scheme</li> <li>•Maximize members' joint profits = maximize the number of transactions</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Multiple symmetric issuers and symmetric acquirers</li> <li>•Per transaction margins to issuers and to acquirers are constant (and tend to be zero).</li> <li>•100% pass through IF</li> <li>•Per transaction cost is fixed and no fixed costs exist</li> <li>•No assumption on issuing and acquiring entities</li> </ul>	<ul style="list-style-type: none"> <li>•Endogenous cardholding decisions (whether to hold two card, one card, or none) and no costs of holding a card</li> <li>•If consumers obtain positive intrinsic benefit from holding cards, multihoming is equilibrium, otherwise consumers hold at most one card.</li> <li>•Card benefits are drawn from density function h and do not vary by network</li> <li>•Pay per transaction fee</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•Both strategic merchants and monopolistic merchants are considered</li> <li>•Both cases where homogenous and heterogeneous in card benefits with a single IF are considered</li> <li>•Card benefits do not vary by network</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Greater inter-system competition may raise IFs if most merchants accept multiple cards and consumers typically carry a single card (heterogeneous merchants).</li> <li>•Greater inter-system competition may lower IFs if most consumers hold multiple cards and merchants will reject the more expensive card.</li> </ul>
		Rochet & Tirole (2003)	<ul style="list-style-type: none"> <li>•Symmetric network competition</li> <li>•Both 4-party scheme and 3-party scheme are considered</li> <li>•4-party schemes maximize the number of transactions and 3-party schemes maximize profit</li> <li>•Single IF</li> </ul>	<ul style="list-style-type: none"> <li>•Per transaction margins to issuers and to acquirers are constant and the same for both networks</li> <li>•Both issuers and acquirers join only one network</li> <li>•100% pass through IF on both sides</li> <li>•Per transaction cost is fixed and with and without fixed costs are considered</li> <li>•No assumption on issuing and acquiring entities</li> </ul>	<ul style="list-style-type: none"> <li>•Cardholding and card usage are not distinguished (exogenous cardholding)</li> <li>•Three types of consumers—marquee, captive, and multihoming—are considered</li> <li>•With and without fixed fee are considered (With a fixed fee, a consumer holds at most one card)</li> <li>•Heterogeneous in card benefits</li> <li>•Card benefits vary by network</li> <li>•Pay per transaction fee</li> <li>•Inelastic demand for goods</li> </ul>	<ul style="list-style-type: none"> <li>•No strategic motives</li> <li>•Heterogeneous in card benefits with a single IF</li> <li>•Card benefits do not vary by network</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> <li>•HAC</li> </ul>	<ul style="list-style-type: none"> <li>•Under identical association network competition, total fees charged across both sides = costs plus issuer and acquirer joint margin.</li> <li>•As more cardholders become multihoming, merchant fee decreases and cardholder fee increases.</li> </ul>
	Intra-system competition is not considered	Chakravorti & Roson (2004)	<ul style="list-style-type: none"> <li>•Both symmetric and asymmetric competition are considered</li> <li>•3-party scheme</li> <li>•Maximize profits</li> </ul>	<ul style="list-style-type: none"> <li>•Intra-system competition does not exist</li> <li>•Fixed costs for card issuing and per transaction cost for acquiring side</li> <li>•Costs may vary by network (asymmetric competition)</li> </ul>	<ul style="list-style-type: none"> <li>•Endogenous cardholding and a fixed card fee is charged</li> <li>•Hold at most one card</li> <li>•Heterogeneous in card benefits</li> <li>•Card benefits vary by network</li> <li>•No per transaction fee</li> </ul>	<ul style="list-style-type: none"> <li>•No strategic motives (each merchant sells an unique good)</li> <li>•Heterogeneous in card benefits</li> <li>•Card benefits vary by network</li> <li>•Pay per transaction fee and no fixed cost</li> </ul>	<ul style="list-style-type: none"> <li>•NSR</li> </ul>	<ul style="list-style-type: none"> <li>•Total fees charged across both sides are always lower in duopoly than in monopoly network (symmetric competition).</li> <li>•Under asymmetric competition, a network with the lower consumer fixed fee always has the higher merchant per transaction fees.</li> </ul>

**Chart 1: US Credit Card Market  
Network Market Share**



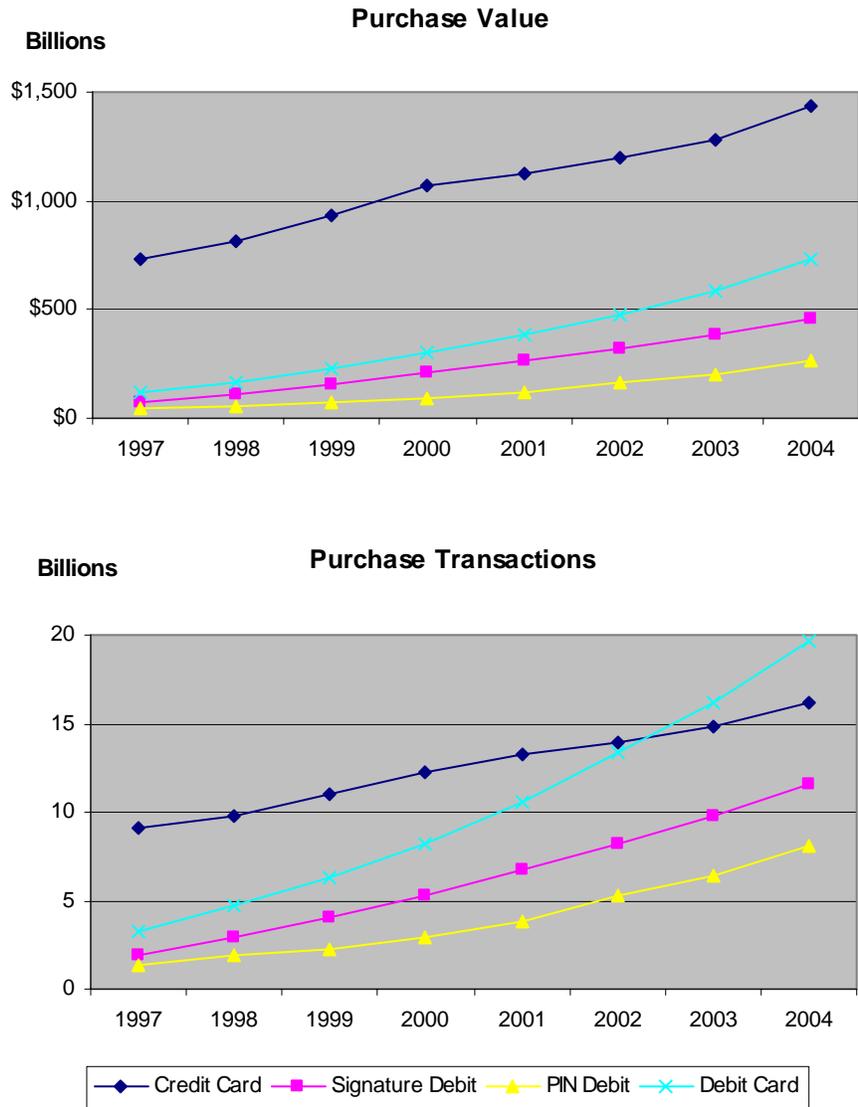
Source: Nilson Reports

**Chart 2: US PIN Debit Card Market  
Network Market Share**



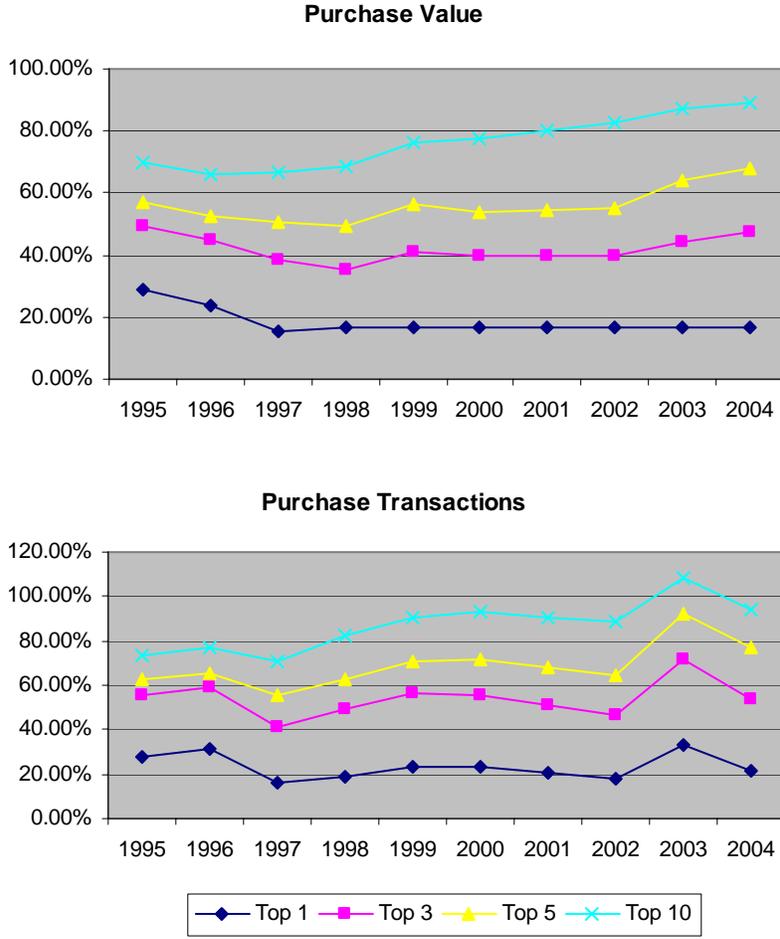
Source: Nilson Reports

**Chart 3: US Payment Card Market**



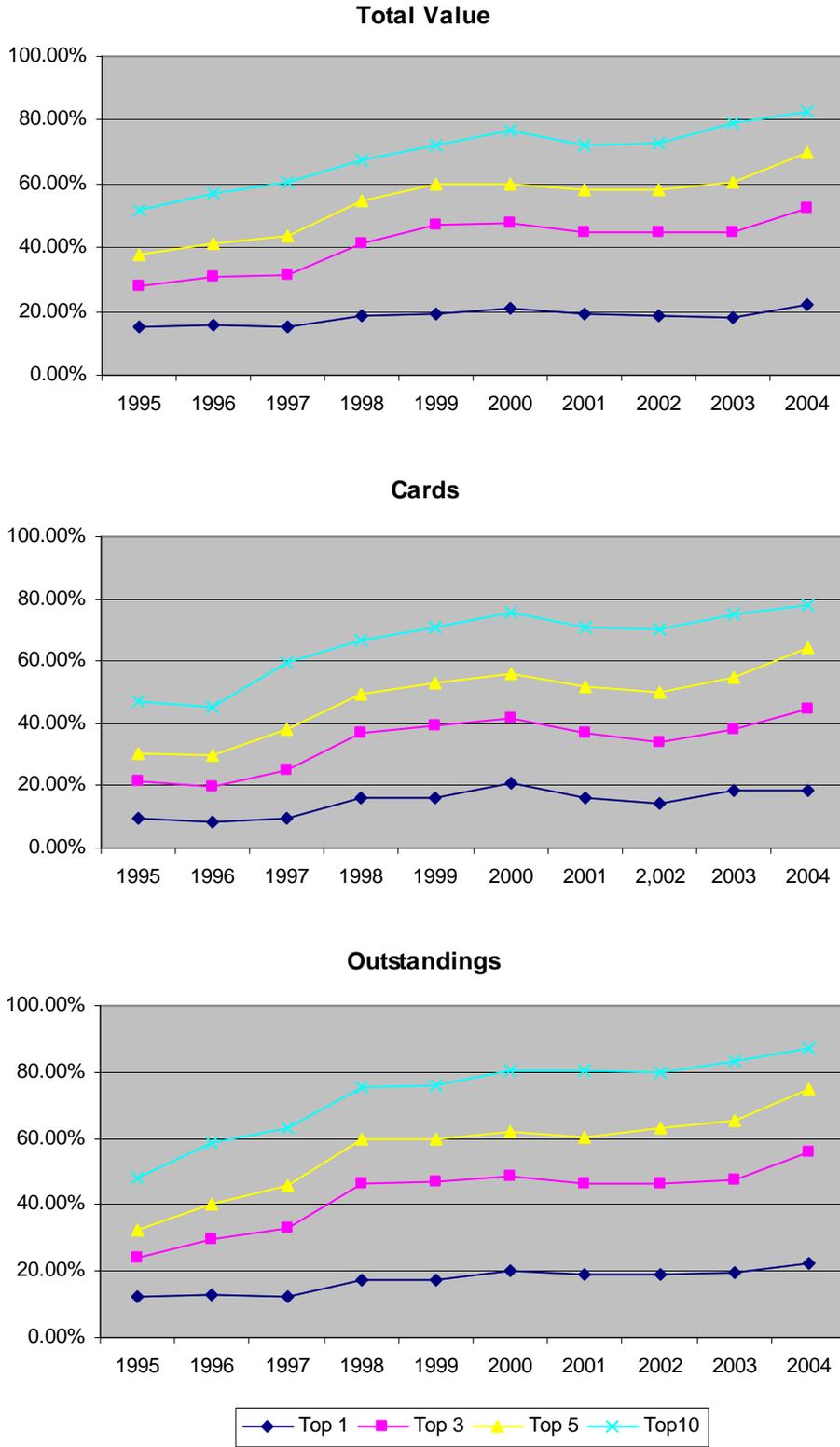
Source: Nilson Reports

**Chart 4: US Signature-Based Card Acquiring Market  
Market Share of Top Acquirers**



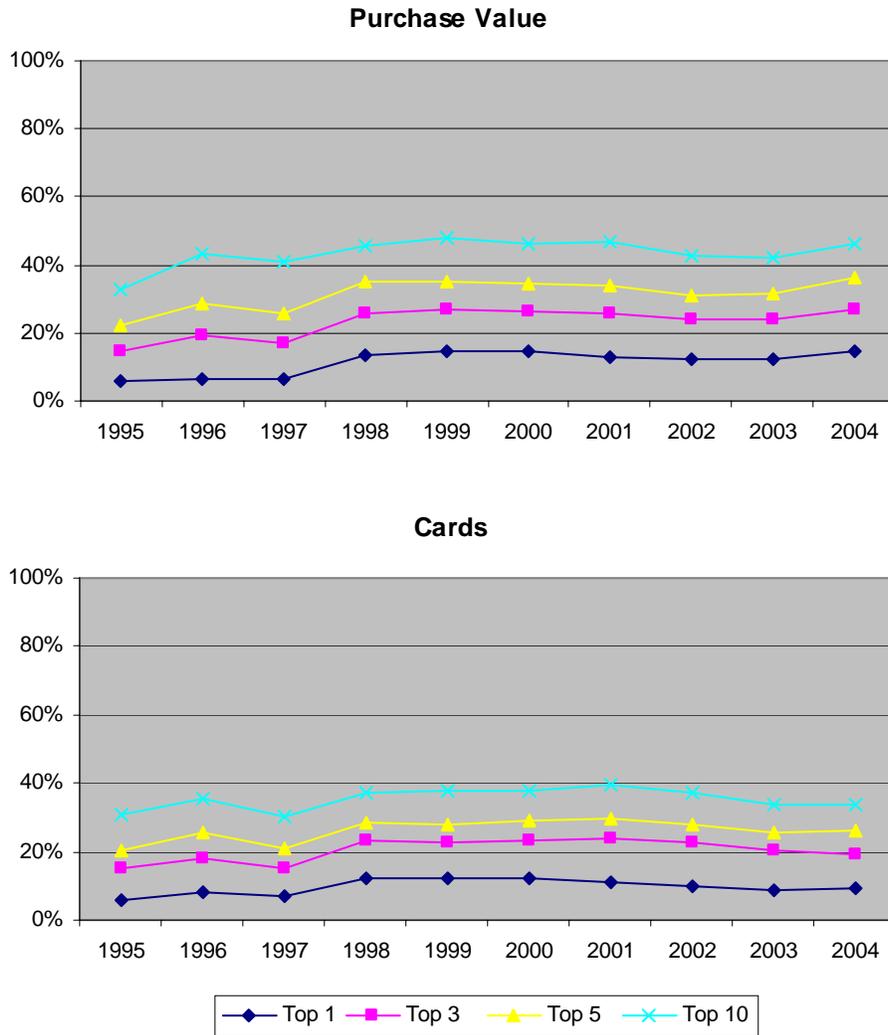
Source: Nilson Reports

**Chart 5: US Credit Card Issuing Market  
Market Share of Top Issuers**



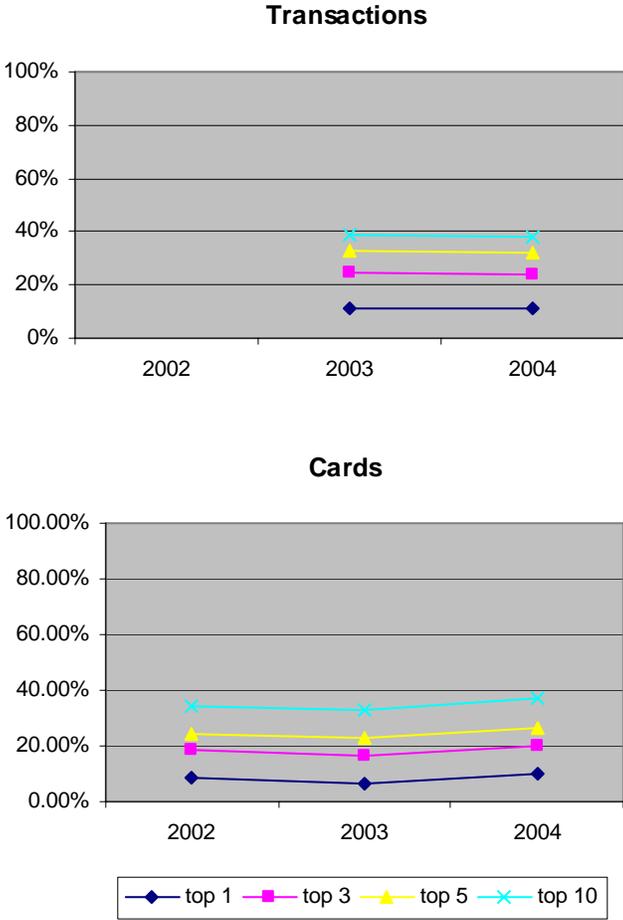
Source: Nilson Reports

**Chart 6: US Signature Debit Card Issuing Market  
Market Share of Top Issuers**



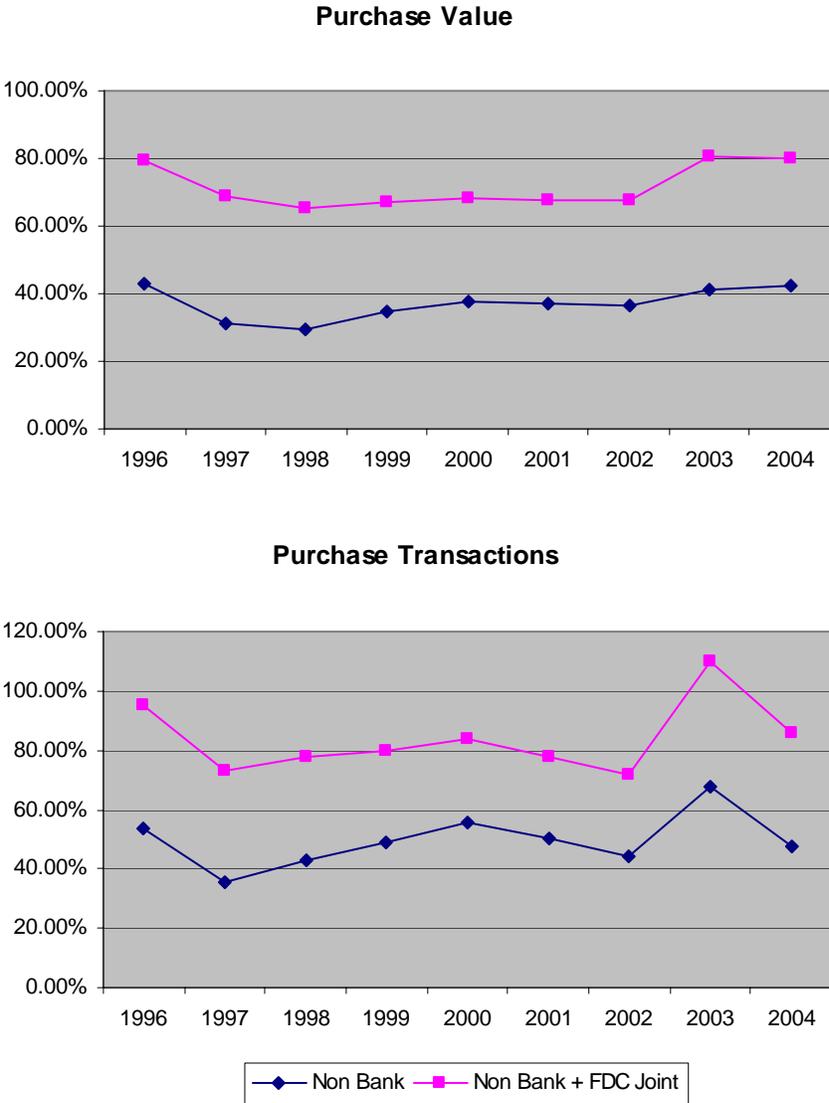
Source: Nilson Reports

**Chart 7: US PIN Debit Card Issuing Market  
Market Share of Top Issuers**



Source: *EFT Data Book 2003-2005 Editions*

**Chart 8: US Signature-Based Card Acquiring Market  
Market Share of Non-Bank Acquirers**



Source: Nilson Reports

**Table 6: Top Acquirers' Ranks as Card Issuers**

Top Acquirers	Rank as Issuer					
	1995		2000		2004	
	Credit	Debit	Credit	Debit	Credit	Debit
1	NB		4	9	1	4
2	26	11	16	12	4	1
3	9		22		NB	
4	8	14	NB		NB	
5		17	NB		6	6
6	NB		5	1	24	10
7	19		NB		NB	
8	NB		27		8	2
9		35	11	2	14	56
10	20	24	NB		NB	
11	NB		7	7	31	11
12	17		18	98	NB	
13	not listed		NB		36	40
14		23	32	37	35	13
15	48	42	10		not listed	
16	NB		NB		NB	
17	not listed		45		NB	
18	43	16	13	11	not listed	
19		38	not listed		NB	
20	NB			13	2	9
21		9	not listed		NB	
22	12	6		15		15
23	not listed			55	NB	
24	32	25		14	NB	
25	35	3	not listed		22	16
26	NB		10	8	NB	
27	not listed		not listed			52
28	23	7		22	NB	
29	12		not listed		NB	
30	31	15	33	31	25	34

NB: Non-Bank

Source: *Nilson Reports*

**Table 7: US Interchange Category by Selected Brand**

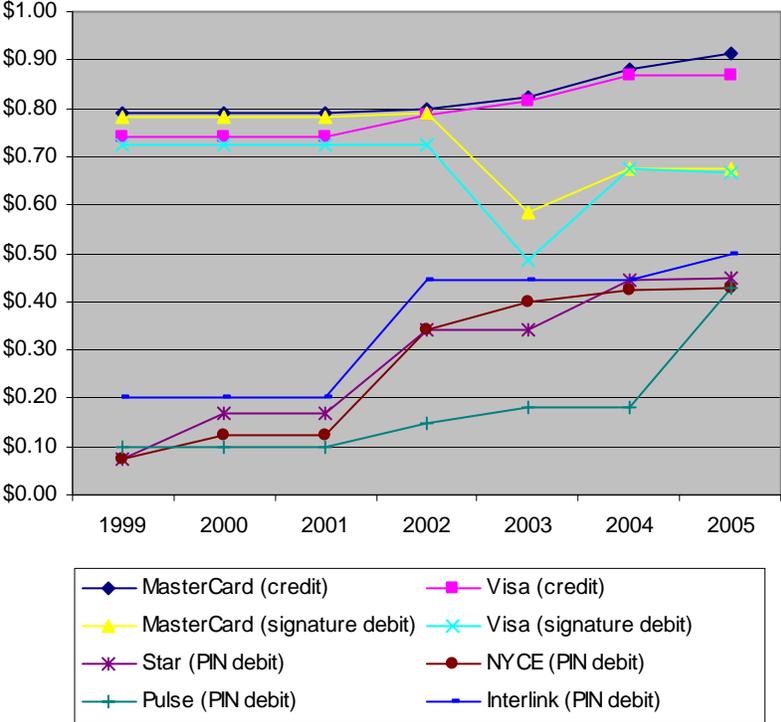
Visa	MasterCard		Star
Credit, Signature-Debit	Credit	Signature-Debit	PIN Debit
Retail #,+ Supermarket #,+ Automated Fuel Dispenser + Service Station + Hotel & Car Rental + Passenger Transport + Restaurant + Small Ticket Retail 2 (Emerging)	Merit III #,+ Supermarket #,+  Convenience + Travel Industries + Passenger Transport  Warehouse Club #,+ Public Sector Service Industries Merit I +	Merit III # Supermarket # Petroleum Convenience Travel Industries Passenger Transport Restaurant Small Ticket Emerging Markeet Warehouse Club # Public Sector Service Industries Merit I	Grocery & Wholesale Club # Petroleum #      Small Ticket      Medical QS Restaurant All Other Retailers #
e-Commerce Basic + e-C Hotel & Car Rental + e-C Passenger Transport + e-C Retail +			
Standard Electronic Card Not Present + Key Entry +	Standard +   Key Entered +	Standard   Key Entered	

#: tiered fee structure

+: varies by consumer credit card type

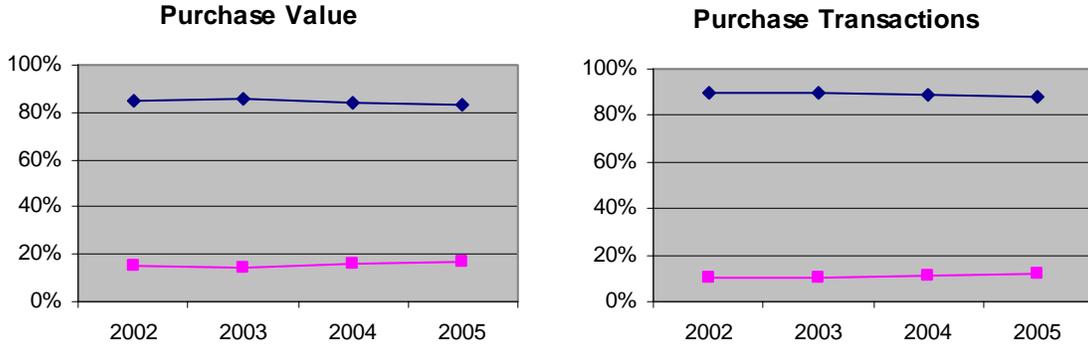
Sources: Greensheets, Star 2005 Fee Schedule

**Chart 9: US Interchange Fees for a \$50 Transaction at Non-Supermarket**

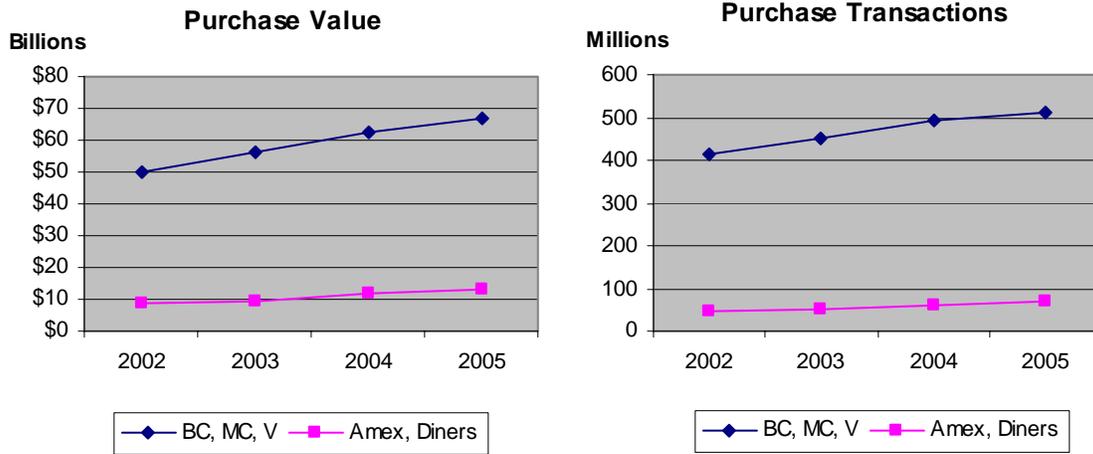


# Chart 10: Australia Credit Card Market

## Network Market Share

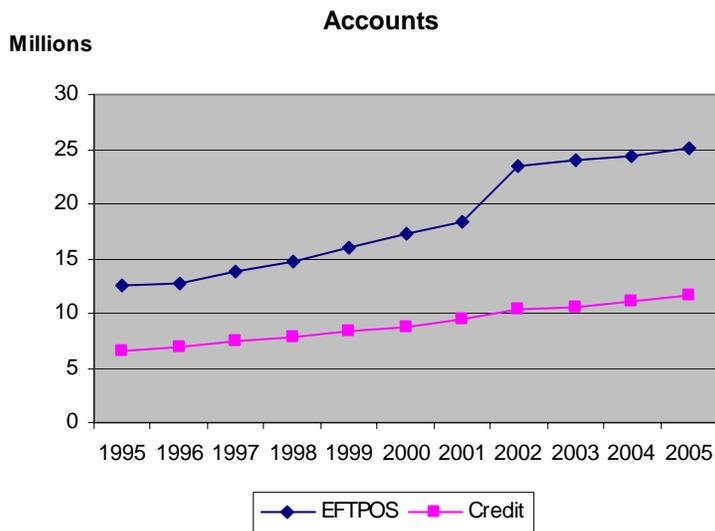
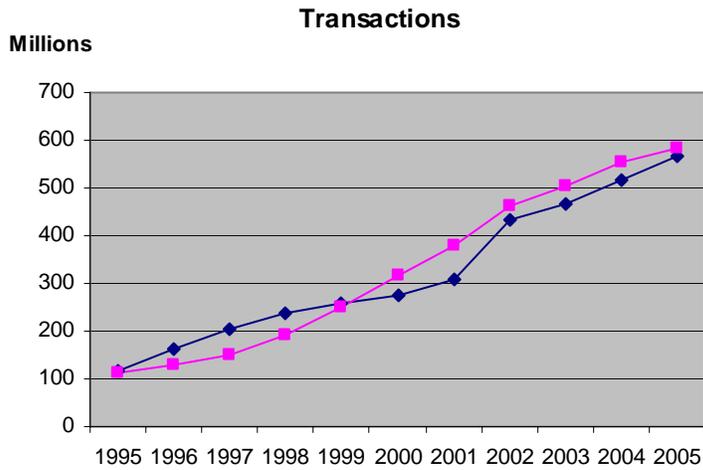
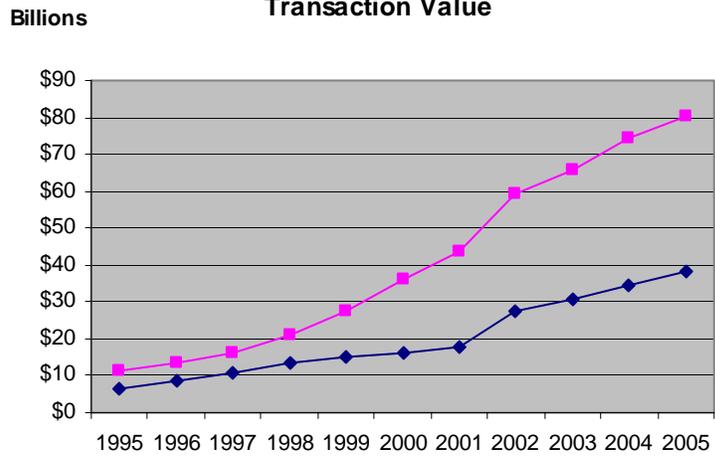


## Network Absolute Term



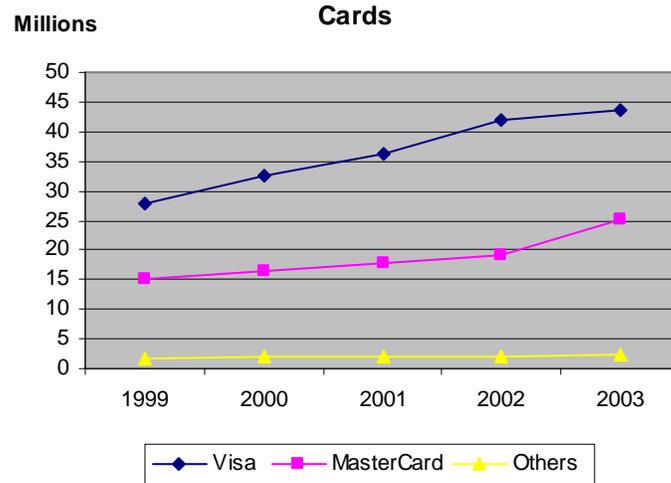
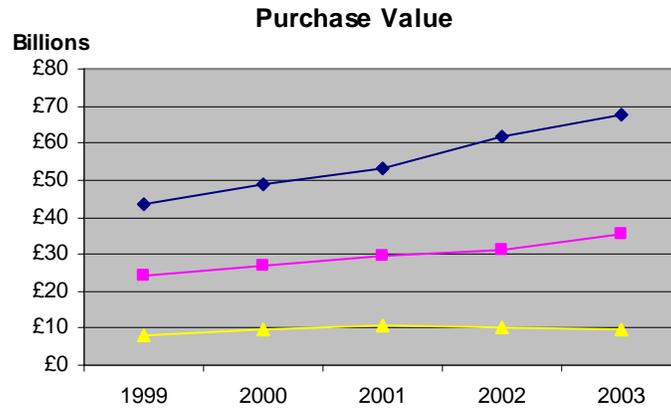
Note: Purchase value and transactions are the first half of the year each year.  
 Source: Reserve Bank of Australia

**Chart 11: Australia Payment Card Market**



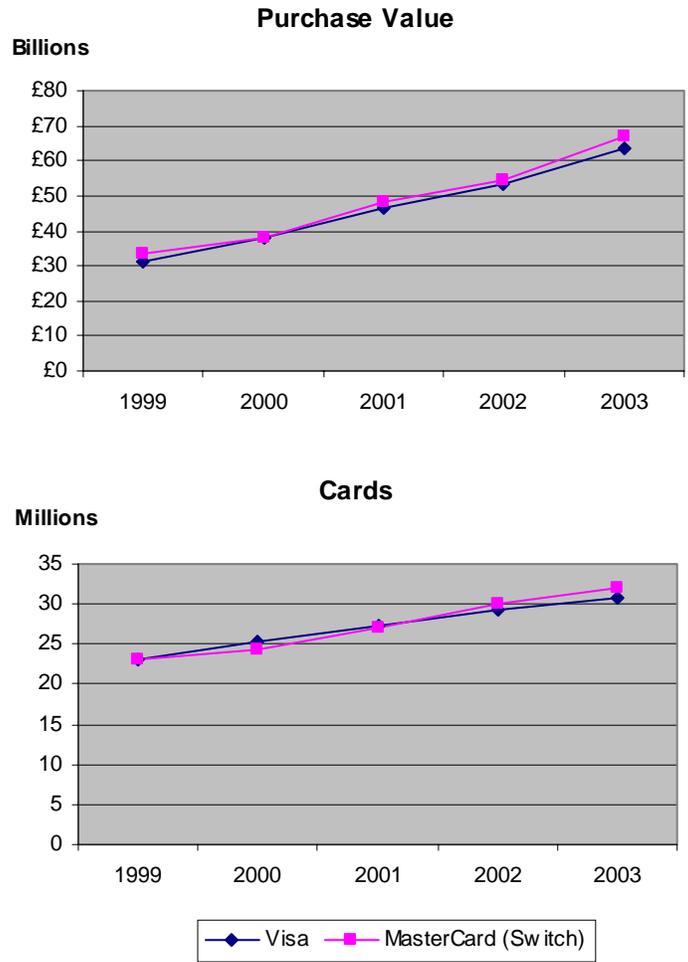
Source: Reserve Bank of Australia

**Chart 12: UK Credit/Charge Card Market Network**



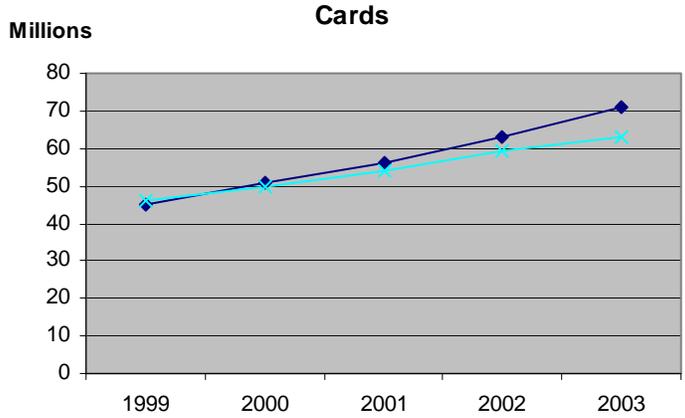
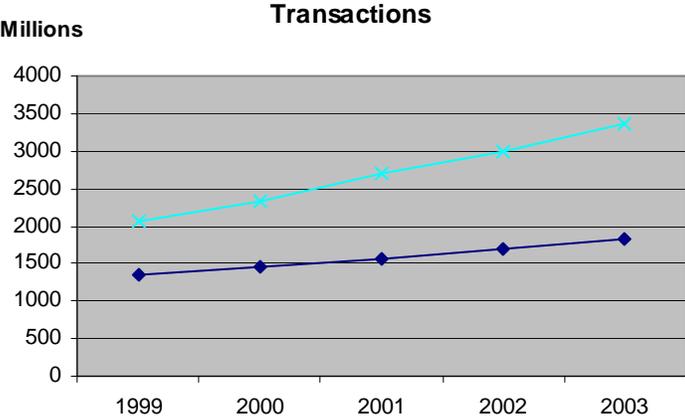
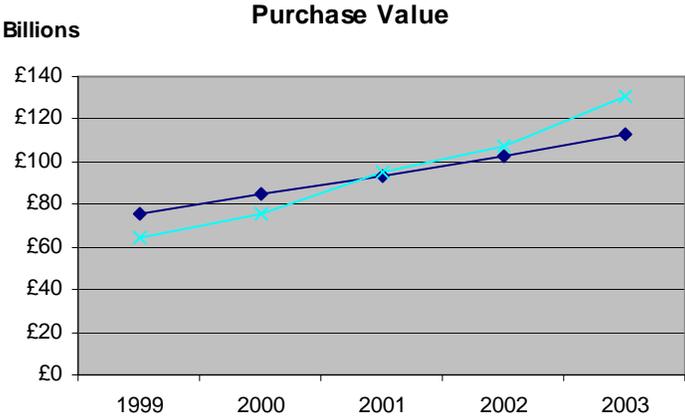
Sources: BIS, *European Payment Cards 2004-5*

**Chart 13: UK Debit Card Market Network**



Source: *European Payment Cards 2004-5*

**Chart 14: UK Payment Card Market**



—◆— Credit Card —×— Debit Card

Sources: BIS, *European Payment Cards 2004-5*

**Table 8: UK Credit Card Market  
Market Share of Top Issuers**

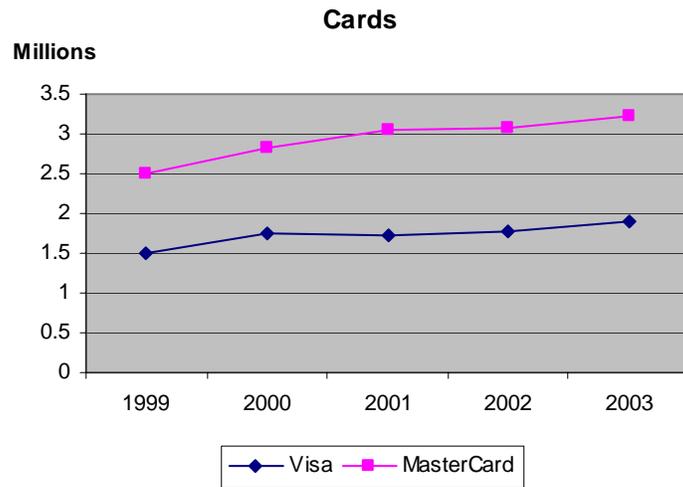
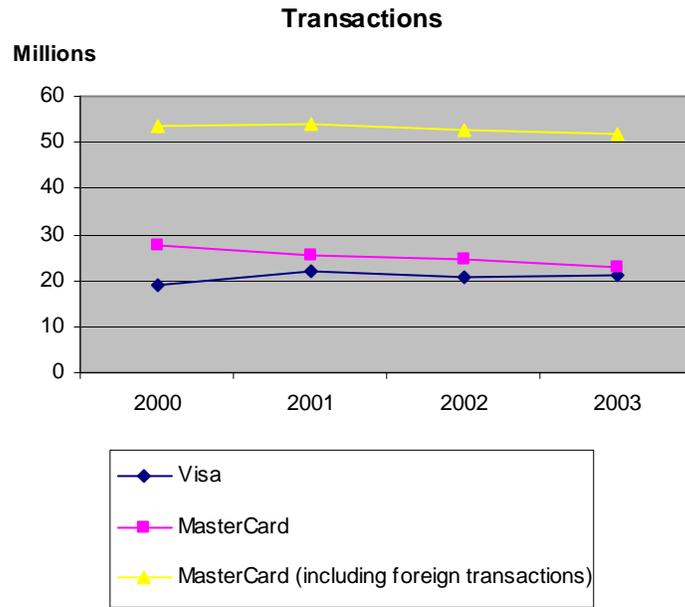
Issuer	Market Share
RBS/NatWest	15.8
Barclaycard	15.7
HSBC <sup>#</sup>	14.8
Lloyds TSB	9.7
MBNA <sup>*</sup>	9.4
HBOS	7.8
Capital One <sup>*</sup>	3.8
Egg	2.8
Co-operative Bank	2.3
Nationwide	1.6
Morgan Stanley <sup>*</sup>	1.6
National Australia Group <sup>*</sup>	1.6

\*: foreign issuers

#: including foreign issuers' portfolios

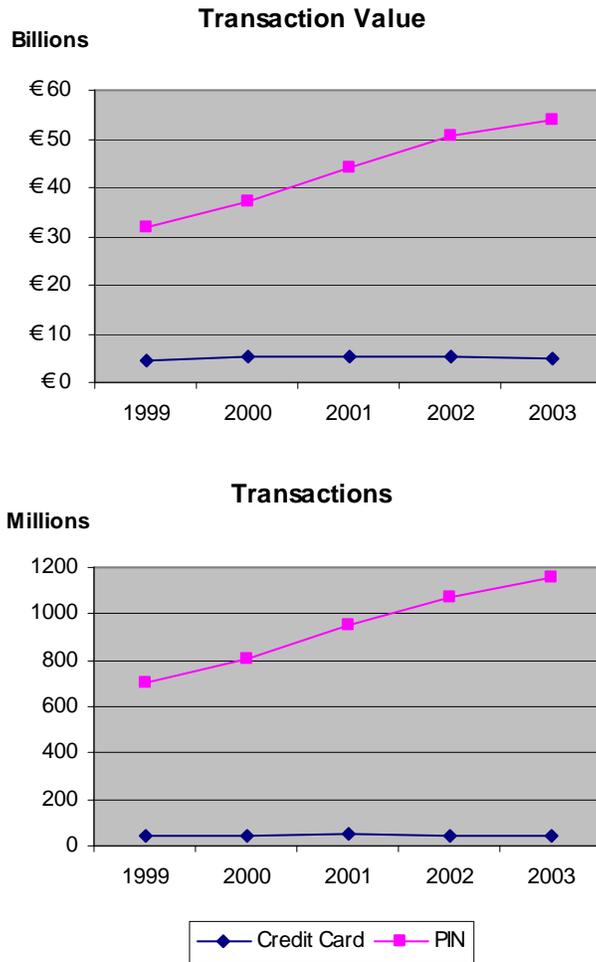
Source: *European Payment Cards 2004-5*

**Chart 15: Netherlands Credit Card Market**



Sources: *BIS, European Payment Cards 2004-5*

**Chart 16: Netherlands Payment Card Market**



Source: *BIS*